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Panagiotis Vlamos *Editor*

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Panagiotis Vlamos
Editor

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Editor
Panagiotis Vlamos
Department of Informatics
Ionian University
Corfu, Greece

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To Ada, who gave me the chance to embrace the joys of maturity, the spirit of teenage adventure, and the wonder of childhood, simultaneously.

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Public's Attitudes Toward Mentally Ill Offenders in Greece

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S. Martinaki, K. Athanasiadis, A. Gkontolia,
E. Karachaliou, A. Karaiskos, E. Sakellariou,
Th. Tsiapla, and F. Chatzinikolaou

Abstract

Mentally ill offenders constitute a vulnerable population group with unique characteristics, and have endured multiple public stigmatizations, which has not been sufficiently studied. The purpose of this study was to capture attitudes of the public toward mentally ill offenders in relation to their perceptions of mental illness in general, as well as their degree of familiarity with it. Our sample of 2059 people can be overall described as a men preponderance, married, with mean value age of 26 years, higher educational level, and medium or higher socio-economic status. Participants completed the ATMIO, CAMI, and Familiarity scales online. The total familiarity index value with mental illness was found to be 4.88, which counts as moderate to low. It was also concluded that women and those with a high educational level sustained more positive attitudes toward mentally ill offenders. However, negative stereotypes (with a mean value of 26.20), stigmatizing attitudes related to risk in the community (mean 16.10), and reduced responsibility for actions (mean 9.45) were recorded, while some (mean 16.50) showed compassion and emphasized on the mentally ill need of rehabilitation. The youngest people were the ones who recorded the most absolute and harsh attitudes. These findings validate the need of raising awareness and informing, especially, the young public about issues of mental health, including the need to oppose prejudices with everyday measures, which can be

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S. Martinaki (✉)
Faculty of Administrative, Economics and Social Sciences, Department of Social Work, University of West Attica, Athens, Greece
e-mail: smartinaki@uniwa.gr

K. Athanasiadis
1st Psychiatric Clinic – Eginitio Hospital, National and Kapodistrian University of Athens, Athens, Greece

A. Gkontolia
Hellenic Police, Security Division of Thessaloniki, Thessaloniki, Greece

E. Karachaliou
Psychiatric Hospital of Attica (Dafni), Athens, Greece

A. Karaiskos
Law Association of Katerini, Katerini, Greece

E. Sakellariou
Psychiatric Clinic, University Hospital of Larissa, Larisa, Greece

T. Tsiapla
Ippokrateio General Hospital of Thessaloniki, Thessaloniki, Greece

F. Chatzinikolaou
Lab of Forensic Medicine and Toxicology, School of Medicine, Aristotle University of Thessaloniki, Thessaloniki, Greece
e-mail: fotischatzin@auth.gr

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accessible to the new generation. Besides, we should extend research to various professional groups that come in contact with mentally ill offenders in order to collect data, which could contribute for intervening policies and formulating different sets of strategies for those people.

Keywords

Mentally ill offenders · Familiarity · Stigma · Attitudes · Stereotypes · Mental illness

1.1 Introduction

Both the stigma of mental illness and negative attitudes toward people with mental disorders are principally barricading and resentfully affecting prevention, early detection, treatment, rehabilitation, rights, and inescapably the quality of life of the mentally ill people [22].

Stigma and negative attitudes toward the mentally ill represent a global phenomenon with various variations in intensity and manifestation of the reactions between the respective countries. The most prevailing stereotypes and prejudices associate the mentally ill with violence, dangerousness, unpredictable behaviors, communication adversities, and inability to contribute to society, causing fear, avoidance, social distance, and segregation [14].

The general population's attitudes toward the mentally ill are predisposed by a variety of factors, intertwined with psychiatric diagnosis, socio-demographic characteristics, and degree of familiarity with mental illness.

Despite research on the general population's stigma and attitudes toward mental illness has been somewhat systematic, research on attitudes toward mentally ill offenders is still limited. Mentally ill offenders represent a particularly vulnerable population with mental illnesses in the criminal justice system. These patients experience repercussions of dynamic interaction of a double objective regarding mental illnesses and their dangerousness as well as the stereotype of being a criminal offender [20].

Research, which has been conducted on stigma and attitudes toward mentally ill offenders, is limited and studies mainly attitudes of professionals and students and less of the public. Notably, regarding the attitudes of the general population, research shows that people are negatively biased against mentally ill offenders in different levels.

In Greece, attitudes toward mentally ill offenders have not been studied and fully explored yet, despite the fact that, as documented, the attitudes of the general population exert a particular influence on the formulation of similar rehabilitative or punitive policies for mentally ill offenders, and the attitudes of justice professionals, the correctional system, as well as the mental health system may influence their sentencing decisions, care, appropriate treatment, and rehabilitation prospects [2].

It is alluded that in Greece the psychiatric forensic system is underdeveloped with a complete lack of psychiatric forensic structures indexed in terms of the level of security and custody (high, medium, low), and the penitentiary system faces serious problems of overcrowding in prisons, lack of staff, and limited access to psychiatric services. According to international epidemiological data, it is estimated that of the total 11,300 inmates of the country's prisons [1], 26% of those people, approximately 3000, are classified as mentally ill offenders. That ever-increasing value is equal to the total number of mentally ill patients treated by the country's psychiatric service system, which confirms the opinion of Weaver [19] that "*prisons have become the new de facto psychiatric hospitals*."

The present study investigates the attitudes of the general population toward mentally ill offenders in Greece in relation to the degree of familiarity with mental illness and socio-demographic data. The conclusions of the study findings may increase our understanding of attitudes toward mentally ill offenders in this country, which hopefully may be enhanced toward a better management of their multiple problems in relation to safety, care, treatment, and rehabilitation.

1.2 Methods

1.2.1 Sample and Procedure

The survey was conducted via an online platform by a non-probability sampling method through voluntary respond sampling. In total, data were collected from 2059 people in Greece by July 2022 for this survey. The age of the participants ranges from 17 to 65 and all participants completed a four-part online questionnaire. The procedure of the survey was pretty straightforward, and questionnaires were uploaded at the date interval described above and the participants completed them at their own time but continuously. All participants, before completing the questionnaires, were informed about the purpose of the study and were provided with explanations of the terminologies mental illness and mentally ill offenders.

1.2.2 Measurement Instruments

The first part of the questionnaire was the Familiarity Level Scale developed by Corrigan et al. [6]. The Greek version was translated and back-translated by two bilingual professionals [3]. The internal consistency (Cronbach's alpha) of the instrument was found to be acceptable at 0.97. This questionnaire includes 11 statements/situations about familiarity with mental illness. The items have an inherent ranking based on the degree of intimacy that they express. Each statement can be answered by yes or no. A score of 11 corresponds to the most intimate contact with a person with mental illness, 7 is regarded as indicating medium intimacy, and 1 indicates little intimacy. If more than one statement is affirmative, the item ranked as expressing the highest level of intimacy is used. Reliability and validity of this instrument have been described by Corrigan et al. [6].

The second part was the Attitudes Toward the Mentally Ill Offenders (ATMIO) scale, with final form of 23 items. The ATMIO scale was developed by Brannen et al. [5]. It produces a final score and four factor scores. These factor scores can be described below: Negative Stereotypes, Rehabilitation/Compassion, Community Risk, and Diminished Responsibility. Each item ranges from totally disagree to (5) totally agree on a 5-point Likert scale. The following 13 items/questions are reverse scored: 3, 4, 5, 6, 7, 9, 12, 13, 16, 17, 18, 20, and 21. The items that conclude each factor are: Negative Stereotypes (6, 7, 9, 12, 13, 16, 17, 18, 20, 21 [10 items]), Rehabilitation/Compassion (2, 3, 8, 14, 23 [5 items]), Community Risk (4, 5, 10, 11, 22 [5 items]), and Diminished Responsibility (1, 15, 19 [3 items]).

In the third part, the CAMI scale was introduced to the participants. That questionnaire quantifies the qualitative Attitudes of the Community Toward the Mentally Ill (CAMI) and is developed by Taylor and Dear [16] and been translated into Greek [7]. It is a 40-item scale; each item requires a rating of the participant's degree of agreement/disagreement on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The CAMI consists of four subscales or dimensions: (1) Authoritarianism, (2) Benevolence, (3) Social Restrictiveness, and (4) Community Mental Health Ideology. In this survey scale, reliabilities range from $\alpha = 0.68–0.99$ with a positive internal validity.

The fourth part was about the demographic data. That questionnaire is informative about quantitative values of the participants, like sex, age, marital status, residence, political positions, socio-economic status, and parental educational level, and can be correlated with the ATMIO and CAMI scale results.

1.2.3 Data Analysis

In this survey R programming language, which is an open code system environment for statistical computing and graphics supported by the R Core Team and the R Foundation, was used. R can provide a wide variety of statistical tools (linear and nonlinear modeling, classical statistical tests, time-series analysis, classification, clustering, etc.) and is highly extensible. In our

Table 1.2 Descriptive statistics of the CAMI subcategories

Variables	Minimum	Maximum	Mean	SD
Authoritarianism	2.00	47.00	30.41	4.83
Social restrictiveness	1.00	49.00	30.10	4.16
Benevolence	1.00	49.00	30.38	3.99
Community mental health ideology	1.00	50.00	31.25	4.48

survey, quantitative variables are expressed as mean values (standard deviation [SD]). Qualitative variables are expressed as absolute and relative frequencies. Student's *t*-tests were computed for the comparison of mean values both in CAMI and ATMIO scale samples between sex, and analysis of variance (ANOVA) was used for the comparison of mean values between marital status, educational level, residence, and educational level of household's leader. Moreover, the Pearson correlation coefficients were used to measure the association between two continuous variables, age and the familiarity index score, of the participants. Multiple stepwise regression models were used in this data analysis. In our sample, the Authoritarianism independent predictor factors were female sex ($\beta = -1.089$; standard error [SE] = 2.083; $p = 0.000515$), familiarity score ($\beta = 0.349$; SE = 0.06116; $p = 0.0000000152$), and age ($\beta = 0.03018$; SE = 0.01081; $p = 0.005362$). The same goes for the Social Restrictiveness independent predictor factors: female sex ($\beta = -0.64275$; SE = 0.3073; $p = 0.0367$), age ($\beta = 0.04035$; SE = 0.1044; $p = 0.000118$), and the familiarity score ($\beta = 0.3644$; SE = 0.05948; $p = 0.00000000128$); and the Benevolence independent predictor factors were female sex ($\beta = -0.77569$; SE = 0.29418; $p = 0.0085$) and the familiarity index ($\beta = 0.36436$; SE = 0.05747; $p = 0.000000000344$), but not the age. For the Community, independent predictor was only the familiarity score ($\beta = 0.310061$; SE = 0.062538; $p = 0.000000834$). Lastly, note that adjusted regression coefficients stand for β with standard errors (SE), which were computed from the results of the linear regression analyses. All reported *p*-values are two-tailed and the statistical significance is set at $p < 0.05$.

1.3 Results

The sample of 2059 people includes 1056 men (52.3%) and 1003 women (48.7%), with mean age 26.0 years (SD = 14.2 years). The sex ratio of the sample is a bit higher for men and different from the total population ratio in Greece of men versus women. The large predominance of people in our sample are married and have completed a university level of education (74%), master degree or higher (PhD). Also, 55% of them either live in Athens or in major cities. Moreover, the sample's socio-economic status is best described as middle class and upper middle class (65%) and their political position stands by one-third into Liberalism (Table 1.1).

For the CAMI scale subscales, the mean value was found at 30.41 for Authoritarianism (SD = 4.83), 30.10 for Social Restrictiveness (SD = 4.16), 30.38 for Benevolence (SD = 3.99), and 31.25 for Community Mental Health Ideology (SD = 4.48) (Table 1.2).

For the ATMIO scale subscales, the mean value was set at 26.60 for Negative Stereotypes (SD = 7.35), 16.50 for Rehabilitation/Compassion (SD = 3.05), 16.10 for Community Risk (SD = 3.03), and 9.45 for Diminished Responsibility (SD = 2.40) (Table 1.3).

The familiarity index of the sample shows how familiar are the participants with the mentally ill population. The most frequent response (70%) was "I know at least one person who has mental illness," followed by "A family friend of mine has mental illness" (69%). More than half of the participants (53%) had the response "A relative of mine has mental illness," and "I have observed, in passing, people with mental illness" stood at 58%, while only 9% of the participants identified themselves as "having a serious mental

Table 1.1 Sample characteristics

Variables	*N*	(%)
Sex		
Men	1056	(52.3)
Women	1003	(48.7)
Age, mean (SD)	26	(14.4)
Educational level		
No answer/not available	26	(1.3)
Primary education	62	(3.0)
High school	448	(21.8)
University/master or PhD	1525	(73.9)
Marital status		
Single	350	(17.0)
Married	1201	(58.3)
Separated/divorced	233	(11.3)
Partnered/civil union	173	(8.4)
Widowed	60	(2.9)
No answer/not available	44	(2.1)
Residence		
Athens	742	(36.0)
Thessaloniki	267	(13.0)
Major urban centers/cities	426	(21.0)
Minor urban centers/cities	325	(16.0)
Villages	289	(14.0)
Educational level of household's leader		
None	9	(0.4)
Primary education	51	(2.5)
Lower secondary education	53	(2.6)
Upper secondary education	379	(18.4)
Short-cycle tertiary education/post-secondary non-tertiary education	460	(22.3)
Bachelor's degree or equivalent	566	(30.6)
Master's degree or equivalent	365	(17.7)
No answer/not available	114	(5.5)
Political position		
Liberalism: Lefts	644	(31.3)
Moderates: Center	404	(19.6)
Conservatism: Right	552	(26.8)
No answer/not available	525	(25.5)
Socio-economic status		
Upper middle class/upper class	659	(32.0)
Middle class	680	(33.0)
Lower middle class/lower class	397	(19.3)
No answer/not available	325	(15.8)

illness." The familiarity index mean score was 4.88, which is categorized as a below average familiarity score with a low standard deviation of 2.5 (Table 1.4).

The associations of the four CAMI subcategories with demographics and familiarity index are shown below. Authoritarianism factor shows that sex is a statistically important factor ($p = 0.05$) with women being less authoritative than men (~1%), but their correlation is quite insignificant. Positive correlation is demonstrated between Authoritarianism and the educational level of the

Table 1.3 Descriptive statistics of the ATMIO subcategories

Variables	Minimum	Maximum	Mean	SD
Negative stereotypes	1.00	50.00	26.60	7.35
Rehabilitation/compassion	3.00	25.00	16.50	3.05
Community risk	2.00	25.00	16.10	3.03
Diminished responsibility	1.00	15.00	9.45	2.40

Table 1.4 Descriptive statistics for the familiarity index

Variables	*N*	(%)
I know at least one person who has mental illness	1446	70
A relative of mine has mental illness	1089	53
A family friend of mine has mental illness	1411	69
I know people with mental illness close to me	810	39
I have observed, in passing, people with mental illness	1195	58
I have watched actors portraying mentally ill people in movies	1254	61
I have watched documentary about mental illness on television or online	817	40
I have observed people with mental illness frequently	872	42
I have worked with a person with mental illness	704	34
My job includes services for people with mental illness	262	13
I have a serious mental illness	190	9
Familiarity index, mean, SD	**4.88**	**2.5**

participants and the householder. Also, lower authoritarianism mean values are in Athens, Thessaloniki, and surprisingly enough in villages. In the Social Restrictiveness category, the educational as well as the householder level are positively correlated meaning that as the social restrictiveness rises so does the educational level. Also, age as a factor highlights some importance but their correlation is thin. In the Benevolence category only the educational level and the householder level can be related. Although, the age mean value (−0.03) indicates a negative correlation between the two dimensions, it is not significantly important. The same refers to the Community mental health ideology dimension, in which age is also negatively correlated, but not so important (Table 1.5).

Conclusively, education and the education of the householder are important through all the CAMI subcategories as well as the Familiarity index, which being statistically important as it is, was surprisingly positively associated with all subcategories of the CAMI scale. The associations of the ATMIO subcategories with demographics and familiarity index resulted that not only sex but also the familiarity index is correlated with all dimensions and showed that men have more negative stereotypes, are less compassionate, fear more the risk of a mentally ill offender being at their community, and believe that mentally ill offenders are responsible for their actions than women. Also, age showcases a positive correlation with the negative stereotypes and the community risks but negative correlation in rehabilitation factor and diminished responsibility, which means that as age progresses people's attitudes tend to be smoother than in a younger age. However, age is statistically significant only in diminished responsibility. On the other hand, greatly significant is shown to be the residence of participants, educational level, and education of the householder throughout the four dimensions in negative stereotypes, rehabilitation, community risk, and diminished responsibility. Lastly, note again in this table that the Familiarity index, as statistically important as it is, was positively associated with all subcategories of the ATMIO scale (Table 1.6).

Table 1.5 Association of the CAMI subcategories with demographics and familiarity index

Variable	**Authoritarianism: mean (SD)**	***p***	**Social restrictiveness: mean (SD)**	***p***
Sex				
Men	30.9 (5.2)	0.005*	30.5 (4.2)	0.09*
Women	29.9 (4.4)		29.7 (4.0)	
Age, mean (SD)	0.08	0.008+	0.08	0.010+
Educational level				
No answer/not available	26.9 (9.4)	<0.001**	27.1 (8.5)	<0.001**
Primary education	33.1 (4.9)		32.2 (4.2)	
Some secondary education	30.7 (5.3)		30.5 (4.5)	
Post-secondary education/higher	30.2 (4.5)		29.9 (3.9)	
Residence				
Athens	30.3 (4.6)	0.73**	29.9 (4.3)	0.79**
Thessaloniki	30 (4.8)		29.9 (4.0)	
Major urban centers/cities	30.4 (5.4)		30.6 (4.7)	
Minor urban centers/cities	30.5 (4.8)		30.0 (4.1)	
Villages	30.7 (4.8)		30.3 (3.5)	
Educational level of household's leader				
None	32 (7.9)	0.001**	29.5 (13.3)	0.038**
Primary education	30.4 (4.2)		31.4 (3.5)	
Lower secondary education	32.4 (4.9)		30.2 (6.4)	
Upper secondary education	30.6 (5.2)		30.4 (4.6)	
Short-cycle tertiary education/post-secondary non-tertiary education	30.6 (4.6)		30.0 (3.6)	
Bachelor's degree or equivalent	30.3 (4.6)		30.2 (3.8)	
Master's degree or equivalent	30.2 (3.9)		29.5 (3.8)	
No answer/not available	28.6 (6.8)		29.8 (4.6)	
Familiarity index	**0.14**	**<0.001+**	**0.12**	**<0.001+**
	Benevolence: mean (SD)	***p***	**Community mental health ideology: mean (SD)**	***p***
Sex				
Men	31.0 (4.3)	0.10*	31.3 (4.97)	0.69*
Women	30.0 (3.6)		31.2 (3.94)	
Age, mean (SD)	−0.03	0.28+	−0.02	0.45+
Educational level				
No answer/not available	25.3 (10.4)	<0.001**	28.6 (7.63)	<0.001**
Primary education	32.3 (4.7)		32.6 (6.5)	
Some secondary education	30.5 (4.5)		31.6 (4.5)	
Post-secondary education/higher	30.3 (3.4)		31.1 (4.3)	
Residence				
Athens	30.3 (3.6)	0.90**	31.048 (4.4)	0.61**
Thessaloniki	30.0 (3.9)		31.0 (4.3)	
Major urban centers/cities	30.6 (4.7)		31.9 (4.2)	
Minor urban centers/cities	30.4 (4.7)		31.2 (4.3)	
Villages	30.5 (3.1)		31.3 (5.1)	

(continued)

Table 1.5 (continued)

Educational level of household's leader				
None	31.3 (15.1)	0.016**	35.4 (7.9)	<0.001**
Primary education	32.0 (3.6)		32.0 (3.9)	
Lower secondary education	30.9 (4.1)		31.5 (6.3)	
Upper secondary education	30.5 (4.5)		31.7 (4.6)	
Short-cycle tertiary education/ post-secondary non-tertiary education	30.4 (3.4)		31.3 (4.5)	
Bachelor's degree or equivalent	30.3 (3.7)		31.2 (3.3)	
Master's degree or equivalent	30.3 (3.1)		31.2 (4.0)	
No answer/not available	29.4 (5.5)		28.8 (7.3)	
Familiarity index	**0.17**	**<0.001+**	**0.12**	**<0.001+**

*Student's *t*-test; **ANOVA; +Pearson's correlation coefficient (*r*)

1.4 Discussion

The present study examines public's attitudes toward mentally ill offenders correlated to perceptions of mental illness generally and accordingly their degree of familiarity.

In Greece, in the last 2 years or so, following periods of confinement due to the COVID-19 pandemic crisis, a particularly high number of femicides have been recorded, as well as various other concerning violent incidents, which have divided public's opinion regarding the mental state of the perpetrators, due to their choice of victims, their violence, and their ferocity. This study was conducted under the shadow of these incidents, which generated social attention and increased public debate. Our results fully confirm findings of previous studies regarding gender and educational level as being important factors as well as that women and those with a high educational level are maintaining more positive attitudes toward mentally ill offenders [23]. On the contrary, men, as in Skorjanc's [15] study, and those with low educational level seem to uphold more authoritarianist positions and greater tendency for social restriction on these patients, while as the educational level of the individuals increases, so does their desire for social restriction upon patients decrease. Regarding age, and contrary to existing studies [11, 21], in our sample younger participants were found to have more negative stereotypes and harsher and absolute attitudes. They considered these patients a danger to society, held them fully responsible for their actions, and did not wish for their rehabilitation. Such finding is justifiable by the moderate to low familiarity rates (4.88) recorded in our sample. Therefore, it is confirmed, as described in other studies [8, 13], that lower levels of knowledge and familiarity with mental illness, as well as lower contact and interpersonal relationship with the mentally ill patients, contribute to the increase in stigma and the manifestation of negative behaviors and attitudes. Only a small percentage, which was above average in age, showed a greater tendency to express kindness and compassion similar to other studies [6, 8, 13].

Regarding the mentally ill offenders, findings of Thielo et al. [17] and Tucker and Yuen [18] are partially confirmed, while the patient's rehabilitation is supported by some small extent, though restrictions like "I want to know if such a patient lives in my area" still exist. This dimension is also mentioned in other research where an inversely proportional relationship between attitudes and behaviors has been demonstrated, with Lehmann et al. [10] finding that while attitudes were positive, behaviors were negative, and Hirschfield and Piquero [9] finding the opposite. However, our participants had some type of contact or interpersonal experience, direct or indirect, with a mentally ill person or a mentally ill offender that did not alter into positively affecting their attitudes about them. Resulting in moderate to low levels, as shown by the familiarity index of 4.88, and in relation to authoritarian atti-

Table 1.6 Association of the ATMIO subcategories with demographics and familiarity index

Variable	**Negative stereotypes: mean (SD)**	***p***	**Rehabilitation/ compassion: mean (SD)**	***p***
Sex				
Men	27.12 (7.29)	0.03*	16.81 (3.02)	0.002*
Women	25.99 (7.39)		16.15 (3.06)	
Age, mean (SD)	0.045	0.15+	−0.03	0.27+
Educational level				
No answer/not available	27.12 (11.1)	<0.001**	13.88 (7.49)	0.001**
Primary education	34.18 (6.5)		17.71 (2.97)	
Some secondary education	26.88 (7.57)		16.42 (2.84)	
Post-secondary education/higher	26.23 (7.14)		16.50 (3.03)	
Residence				
Athens	26.74 (7.38)	0.0008**	16.56 (2.84)	0.006**
Thessaloniki	24.91 (6.78)		15.7 (3.91)	
Major urban centers/cities	27.93 (6.86)		16.55 (2.8)	
Minor urban centers/cities	26.12 (7.24)		16.75 (2.76)	
Villages	26.84 (8.32)		16.63 (3.36)	
Educational level of household's leader				
None	30.67 (9.81)	0.0001**	17 (1)	0.0001**
Primary education	29.73 (6.36)		17.06 (2.86)	
Lower secondary education	28.87 (9.19)		17 (4.06)	
Upper secondary education	27.23 (7.31)		16.29 (2.67)	
Short-cycle tertiary education/ post-secondary non-tertiary education	27.47 (7.01)		16.7 (2.74)	
Bachelor's degree or equivalent	25.97 (7.03)		16.62 (2.94)	
Master's degree or equivalent	25.03 (7.24)		16.4 (3.21)	
No answer/not available	25.87 (9.35)		15.24 (4.76)	
Familiarity index	0.08	0.004+	0.24	<0.001+
Variable	**Community risk: mean (SD)**	***p***	**Diminished responsibility: mean (SD)**	***p***
Sex				
Men	16.49 (3.05)	0.0003*	9.71 (2.24)	0.0005*
Women	15.66 (2.95)		9.17 (2.55)	
Age, mean (SD)	0.03	0.29+	−0.07	0.02+
Educational level				
No answer/not available	15.12 (7.12)	0.02**	8.62 (4)	0.31**
Primary education	17.39 (2.92)		9.54 (2.17)	
Some secondary education	16.04 (2.98)		9.42 (2.6)	
Post-secondary education/higher	16.07 (2.98)		9.47 (2.35)	
Residence				
Athens	16.18 (2.97)	0.05**	9.47 (2.37)	0.46**
Thessaloniki	15.67 (3.53)		9.26 (2.7)	
Major urban centers/cities	16.23 (2.79)		9.37 (2.37)	
Minor urban centers/cities	16.22 (2.59)		9.61 (2.36)	
Villages	15.9 (3.56)		9.5 (2.33)	

(continued)

Table 1.6 (continued)

Educational level of household's leader				
None	18 (1)	0.02**	11.67 (1.15)	0.001**
Primary education	16.61 (2.86)		9.45 (2.14)	
Lower secondary education	16.57 (4.47)		9.23 (2.69)	
Upper secondary education	16.04 (2.92)		9.1 (2.55)	
Short-cycle tertiary education/ post-secondary non-tertiary education	16.43 (2.49)		9.59 (2.29)	
Bachelor's degree or equivalent	16.08 (3.2)		9.56 (2.32)	
Master's degree or equivalent	15.71 (3.22)		9.59 (2.47)	
No answer/not available	15.49 (3.42)		8.9 (2.71)	
Familiarity index	0.24	<0.001+	0.18	<0.001+

*Student's *t*-test; **ANOVA; +Pearson's correlation coefficient (*r*)

tudes, negative stereotyping, attribution of blame, and moderate tendency to rehabilitate mentally ill offenders are troubling. An attainable explanation for that could be the prevailing atmosphere under which the sample was gathered at the given time where the various events, thus presented by the media and social networks, blamed mental illness. Correspondingly, society's trust was affected and disturbed and stirred up negative feelings of fear, anger, and insecurity. Mental illness presence ultimately did not act as a "mitigating factor" in the eyes of the public, something Sutton also points out. Additionally, also to be noted is that in Greece the economic crisis interrupted the development of the mental health sector and the evolution of the psychiatric reform, which resulted negatively in various public awareness actions, which were ultimately suspended. Finally, it should be highlighted that neither an informative nor an awareness campaign has been carried out in our country, which specifically concerns mentally ill offenders.

Strengths of our study include the volume of the sample, which ensured the anonymity of the responses and therefore their validity. Also, there was an equal distribution of gender, age, educational level, income, and place of residence among the sample. However, the study is also characterized by a number of limitations. The first limitation concerns the overall sample, in which people over 65 could not participate. This can be attributed to ignorance, difficulties, or prejudices displayed by this population group in the use of new technologies. The second concerns the choice of "labels" used, the use of general characteristics rather than a specific scenario, and failure to identify specific diagnosis or criminal offenses, which may have led to more negative responses toward mentally ill offenders. Certain diagnoses (e.g., schizophrenia) or types of offending (e.g., domestic violence, sexual offenses) have been found to elicit more negative reactions [4, 12].

1.5 Conclusions

Findings of this study demonstrate negative stereotypes, authoritarian attitudes, desire for social isolation, and low levels of familiarity with mental illness. These results provide valuable evidence, which contribute to understanding of the general population's prejudices and discriminations toward mentally ill offenders and demonstrate the extent to which these perceptions may influence intervention policies and strategies for these patients. Simultaneously, they highlight the need for new antistigma campaigns, perhaps in more ways familiar and accessible using technology to younger audiences. In addition, our study provides important data that could form the basis for future research in other fields (health, mental health, penal system, penitentiary, etc.), during the time professionals employed with them come into contact with this particular population group of mentally ill offenders.

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Pythagorean Self-Awareness Intervention Promoted Healthy Dietary Patterns, Controlled Body Mass Index, and Reduced Self-Reported Stress Levels of Primary School Children: A One-Arm Pilot Study

Marilena Panagiotou, Ioanna Maria Velegraki, Orsalia Gerakini, Flora Bacopoulou, Maria Charalampopoulou, Maya Louvardi, Xanthi Tigani, Aimilia Mantzou, Dimitrios Vlachakis, Christina Kanaka-Gantenbein, George P. Chrousos, and Christina Darviri

Abstract

Stress is common in childhood and an important factor that affects behavior later in adulthood. The aim of this study was to assess the effects of the Pythagorean Self-Awareness Intervention (PSAI), a holistic "cognitive reconstruction" technique to assess primary school children's stress levels, adherence to the Mediterranean diet, and body mass index. Secondary outcome measures included relations with peers, sleep, and hair cortisol concentrations. This one-arm pilot study took place in a primary school, from February to June 2019. Participants were 32 pupils attending the second grade of primary school who received the 8-week PSAI to adopt healthy behaviors and lifestyle. Self-report measures were applied for the evaluation of various variables at the beginning and the end of the eight-week intervention. There were statistically significant reductions in stress levels ($p = 0.00$), nightmares' frequency ($p = 0.00$), body mass index ($p = 0.03$), and bully scale ($p = 0.00$), and improvement in Mediterranean diet quality ($p = 0.00$). Hair cortisol concentrations increased ($p = 0.02$). The social scale significantly increased. Bedtime remained the

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M. Panagiotou · I. M. Velegraki · O. Gerakini · M. Charalampopoulou · M. Louvardi · X. Tigani · C. Darviri
School of Medicine, National and Kapodistrian University of Athens, Athens, Greece

F. Bacopoulou (✉)
Center for Adolescent Medicine and UNESCO Chair in Adolescent Health Care, First Department of Pediatrics, School of Medicine, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece
e-mail: fbacopoulou@med.uoa.gr

A. Mantzou
First Department of Pediatrics, Aghia Sophia Children's Hospital, Athens, Greece
e-mail: amantzou@med.uoa.gr

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same after the intervention. This pilot trial showed that the PSAI promoted healthy dietary patterns, controlled children's body mass index, and reduced their self-reported stress levels. Further research on the implementation of this holistic program on children is suggested, in well-powered randomized controlled trials.

Keywords

Body mass index · BMI · Intervention · Pythagorean self-awareness · Stress · Healthy lifestyle · Bullying · Children · Students · Mediterranean diet

2.1 Introduction

Research on stress demonstrates that it can have both beneficial and harmful effects on health, wellbeing, and performance [1]. In fact, stress experienced by children each day can influence a plethora of complex and interacting physiological reactions. These reactions affect many organ systems within the body. For instance, emotional stress can stimulate the autonomic nervous system, mainly the sympathetic branch, and alter heart rhythm patterns, ultimately altering the activity pattern in the afferent neurological information transmitted from the heart to the brain. Matthews, Gump, Block, and Allen [2] also found that children with significant sources of ongoing stress in their lives exhibited increased physiological activation in response to acute laboratory stressors. Negative affect was also found to be linked to increased resting blood pressure levels in adolescents [3]. Similarly, Matthews et al. found that children who had chronic or ongoing stressors present in their lives exhibited higher diastolic blood pressure responses to acute laboratory stress tasks when compared to children with less background stress in their lives.

Exposure to chronic and acute life stressors can disrupt the neuroendocrine stress regulation system. The increased production of cortisol can result in epigenetic changes in the structure of regions of the brain responsible for emotion regulation and other important functions, and promote obesogenic eating behavior and dietary patterns, as well as lifestyle factors (e.g., disturbance in daily routine, poor sleep, low physical activity) that may increase obesity risk [4–7].

One step further, it has been reported that overweight or obese children are more likely to experience bullying victimization in school settings across different countries [8]. On the other hand, it has been reported that bullied children exhibit a greater risk of becoming overweight or obese [9], while obesity has been found to be associated with psychosocial maladjustment including increased anxiety, depressive feelings, loneliness, lowered self-esteem, and behavior problems.

The above data support the notion that ongoing stress and improper management not only affects a child's health status in the present but also may have cumulative and long-term effects. In examining the present effects of stress, research has also supported the idea that the presence of stress in children can impair cognitive processes involved in learning [10] as well as appropriate social interactions with others.

Parents, on the other hand, may not be able to identify children's stress and its impact on their children, as it is suggested by Breiner et al. [11],

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D. Vlachakis
Laboratory of Genetics, Department of Biotechnology, School of Applied Biology and Biotechnology, Agricultural University of Athens, Athens, Greece
e-mail: dimvl@aua.gr

C. Kanaka-Gantenbein
First Department of Pediatrics, School of Medicine, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece
e-mail: ckanaka@med.uoa.gr

G. P. Chrousos
University Research Institute of Maternal and Child Health & Precision Medicine, and UNESCO Chair in Adolescent Health Care, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece

and it has also been suggested that many parents believe that the child is seeking attention or being difficult, rather than recognize their behaviors as a result of stress.

School settings with the collaboration of parents, teachers, and health professionals can ideally be used for the implementation of health promotion programs to primarily manage stress and prevent its adverse effects on children. Traditionally, school-based programs for overweight and obese children have focused only on the training of healthy eating and increase in physical activity [12]. However, there is a need for school-based intervention programs to reduce stress and its effects. Multicomponent school-based interventions promoting adherence to the Mediterranean diet (MD) have the potential to combat obesity [13].

Based on the aforementioned, we present the effects of the Pythagorean Self-Awareness Intervention (PSAI), a novel holistic stress management program that combines evidence-based lifestyle recommendations (Mediterranean diet, sleep routine, physical activity, limited use of screens, etc.) and cognitive reconstruction based on the teaching of the ancient Greek philosopher, Pythagoras.

The PSAI has demonstrated favorable physical, metabolic, and mental health outcomes in children and adults in Greece. In the school setting, Kalogiratou et al. [14] found that PSAI decreased emotional eating and promoted well-being in third grade primary school children. PSAI has also demonstrated amelioration of stress and aging biomarkers in a sample of type II diabetes mellitus and healthy adults [15]. In addition, the PSAI showed positive results in decrease in weight in a sample of obese adults as well as in a community sample [16, 17]. Furthermore, the implementation of PSAI had positive outcomes in a sample of patients with major depression [18].

The primary aim of the study was to investigate the effects of the PSAI on primary school students' stress levels, adherence to the Mediterranean diet, and body mass index (BMI). Secondary outcome measures included relations with peers, sleep, and hair cortisol concentration (HCC).

2.2 Subjects and Methods

2.2.1 Study Design

A one-arm pilot study took place at the 4th Primary School of Chalandri, Municipality of Attica Province (Greece), from February to June 2019. The program received ethics approval by the Ministry of Education Φ.2.1/ΣΔ/43813/Δ7 for the academic year 2019–2020.

2.2.2 Participants

Pupils attending the second grade of primary school with good comprehension of the Greek language were eligible to participate in the study intervention for eight weeks. Children were excluded from the study if they practiced other stress management techniques. Written consent forms were obtained from children's parents before inclusion in the study.

2.2.3 Measurements

2.2.3.1 Socio-demographic Data

Sex, age, family members, and siblings were recorded for each study participant. Measurements took place in the classroom after completion of school's schedule.

Measurements were performed by a health professional trained in the science of stress. Children completed the questionnaires on their own in the presence of the stress scientists in case they had any queries. The following measures were assessed at baseline and after the intervention.

2.2.3.2 Anthropometric Data

Body weight and height were measured at school with the use of a calibrated digital scale and a stadiometer, in the minimum clothing possible. Body mass index (BMI) was estimated.

2.2.3.3 Hair Cortisol

A sample of hair (3 cm) was obtained from each participant for measurement of hair cortisol concentration (HCC). A lock of hair as thick as a pencil was cut by scissors from the posterior vertex as close as possible to the scalp. As hair has a predictable growth rate of about 1 cm/month, the closest part of 1 cm to the scalp approaches the production of last month's cortisol. Hair samples were stored in paper envelops at room temperature pending analysis. The first three centimeters of hair proximal to the scalp were cut and pulverized with a ball mill. Cortisol was extracted into methanol. Hair cortisol analysis took place at the Choremeio Research Laboratory, Unit of Clinical and Translational Research in Endocrinology of the First Department of Pediatrics, School of Medicine, National and Kapodistrian University of Athens, Greece. Physiological mean concentration of hair cortisol in healthy children aged eight to nine years has been reported to be 6.7 pg/mg [19].

Stress in Children Questionnaire (SIC): The Stress in Children Questionnaire consists of 21 questions that examine the stress that children may encounter in many aspects of their life and has been used with children aged between 8 and 12 years. Higher scores indicate higher levels of stress [20].

KIDMED Index: The Mediterranean Diet Quality Index for Children and Adolescents (KIDMED) is based on the principles of Mediterranean dietary patterns and comprises 16 "yes" or "no" questions that could be self-administered or conducted by interview. Overall score ranges from 0 to 12 and it is derived from the summation of the values, which is classified into three levels: (1) >8, optimal adherence to Mediterranean Diet; (2) 4–7, improvement needed to adjust intake to Mediterranean patterns; and (3) ≤ 3, very low diet quality. The instrument has been used in children and adolescents aged 3–18 years [21].

Peer Relation Questionnaire for Children (PRQ): The Peer Relation Questionnaire (short form) for children measures the bullying phenomenon consisting of 12 items with 3 subscales (tendency to bully others, tendency to be victimized by others, and tend to act in a pro-social or cooperative manner). The instrument has been validated in children and adolescents aged 8–14 years [22].

Sleep: A series of questions were asked to measure the bedtime and the frequency of nightmares. Mean scores were calculated.

2.2.4 Pythagorean Self-Awareness Intervention for Children and Adolescents

Pythagorean Self-Awareness Intervention for Children and Adolescents (PSAI-CA) is a holistic "cognitive reconstruction" technique of stress management and improvement in the quality of life, sleep, and memory. The technique was developed by the Medical School of Athens at National and Kapodistrian University based on the new concept of Evidence-Based Lifestyle Medicine [23] and World Health Organization (WHO) data for adolescents [9]. The technique relied on the philosophy of an ancient Greek philosopher Pythagoras of Samos (c. 570 e c. 495 BCE) [24]. As Pythagoras stated, self-awareness and eudemonia are achieved through constant introspection and self-control. The purpose of the technique is to increase self-awareness using a moral reference for this critical appraisal. The analysis of the neurophysiology of the technique refers to the activation of the Default Mode Network (DMN), a large-scale functional brain network. The DMN is activated when the individual focuses on internal self-relevant mental processes such as memory retrieval of autobiographical events, envisioning future actions, and being aware of the perspectives of others [25, 26].

The technique of PSAI-CA is mainly practiced shortly before night sleep and the individual must follow three cognitive processes. A rule referred to "The Twelve Virtues" has been developed as a moral reference to accomplish the children's self-awareness by following five simple steps, which are presented in Table 2.1. Pythagorean virtues are: (1) fairness, (2) truthfulness, (3) charity and spirituality, (4) decent behavior, (5) discipline and respect for the law, (6) order and accuracy, (7) industriousness, (8) cooperation, (9) contribution to the general good, (10) courage, (11) cleanliness and perfect appearance, and (12) temperance. Events or choices of personal relationships are judged freely by the individual since the primary goal is to enhance self-awareness and not to criticize them [27].

2.2.4.1 PSAI-CA Implementation

Eight sessions were part of the program and numerous pieces of advice were included about healthy nutrition, sleep, physical activity, bullying, and screens (mobile-tablet-PC). Sessions were held once per week (90 min) over eight weeks. The first session included information about the stress system, symptoms, and effects. Students were trained individually in diaphragm breathing using the Biofeedback software. The five tricks were presented to the students. Pedometers were provided as a motivation for exercising. In the second session, participants received instructions on the practice of Pythagorean Self-Awareness and the 12 virtues were taught. In the following sessions guidelines and advice on the Mediterranean diet, physical activity, sleep, use of screens, and bullying were given to the students. During sessions, they were encouraged to discuss practical issues or ideas that might have emerged during the previous days. In each session, a weekly activity logbook (self-report measure of compliance to the PSAI), reading materials, and homework assignments were provided.

Table 2.1 The five steps of PSAI-CA applied daily for 30 minutes by each participant

1st	Before night sleep sitting on a chair, breathe diaphragmatically for 10 min
2nd	Read the 12 virtues then turn your attention inwards and assume the role of the observer
3rd	Recall every event of the day in the exact time sequence it happened
4th	Observe your day like a video timeline
	Choose the events that seem important to you and assess your actions (reward, detest) using 3 questions based on the 12 virtues and the instructions for a healthy lifestyle you were taught:
	What have I done right?
	What have I done wrong?
	What have I omitted that I ought to have done?
5th	The next day make a quick review of the previous day and set your new goals

2.2.5 Statistical Methods

The data were analyzed by non-parametric tests due to the small study sample. Adjusted means were calculated through paired sample *t*-test. The level of significance was set at 0.05. BMI was calculated as the ratio of body weight to the square of height (kg/m^2). BMI *z*-scores were calculated based on World Health Organization (WHO) growth charts. The SPSS statistical software version 22.0 for Windows was used to perform statistical analyses (SPSS Inc., Chicago, IL). The sample size was not calculated prior to the intervention. However, post-hoc power analysis was performed. Power exceeded 90% based on calculations performed in R software using the pwr package [28].

2.3 Results

A total of 32 pupils participated in the study and there was one dropout due to change of school. The flowchart of study participants is depicted in Fig. 2.1.

Full participation in all sessions and full compliance with PSAI were assessed in the weekly diaries. The mean age of the participants was 8 years, with 53.1% of participants being girls, 46.9% boys, and 84.4% had siblings, while most of the participants' families had 4 members. Finally, BMI *z*-scores of the participants were within normal range. Descriptive statistics are presented in Table 2.2.

Table 2.3, presents the study's results. There was a statistically significant reduction in stress levels (SIC, $p = 0.00$), nightmares ($p = 0.00$), BMI *z*-scores ($p = 0.02$), and HCC ($p = 0.02$). Adherence to Mediterranean diet was also found to have statistical improvement; KIDMED ($p = 0.00$) was also improved after

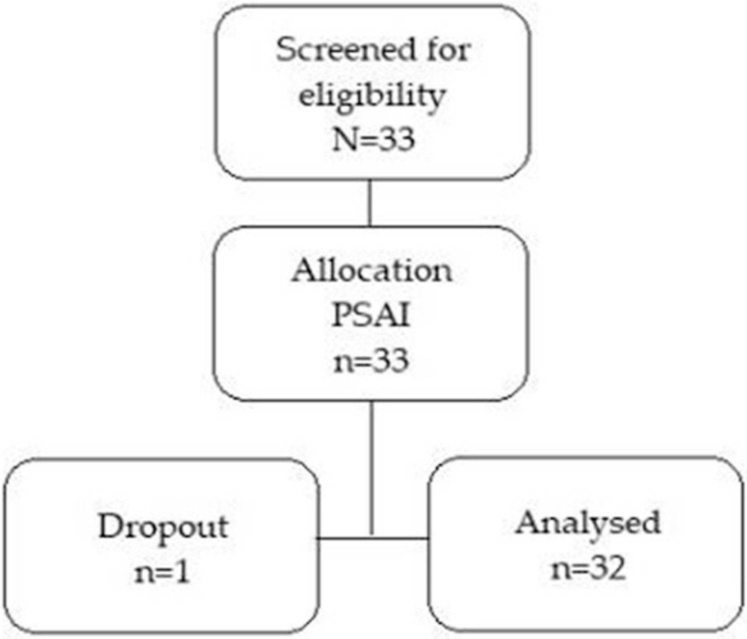

Fig. 2.1 Flowchart of the study participants

Table 2.2 Baseline socio-demographic and anthropometric characteristics of study's participants

Referential measurements	*N* = 32
Sex	
Boys	15 (46.9%)
Girls	17 (53.1%)
Mean age in years (SD)	8.03 (0.18)
Min-max age range in years	8–9
Siblings	
Yes	27 (84.4%)
No	5 (15.6%)
Family members	
3	3 (9.4%)
4	25 (78.1%)
5+	4 (12.5%)
Anthropometric measures	
Median weight in kilograms (iqr)	26.90 (6.05)
Mean height in cm (SD)	1.24 (0.06)
BMI *z*-score	0.94 ± 0.64
Descriptive statistics of the study's participants	

BMI body mass index, *iqr* interquartile range, *SD* standard deviation

the intervention program. Hair cortisol concentrations statistically increased (HCC, $p = 0.02$). Statistical decrease was also noticed in the Bully scale of the bullying questionnaire (PRQ-Bully, $p = 0.00$) while the social scale was statistically increased (PRQ-Presocial, $p = 0.00$). No statistically significant changes were observed in the PRQ-Victim scale ($p = 0.11$) and bedtime ($p = 0.82$).

Table 2.3 Baseline and post-intervention measurements of the study participants

Measurements	Pre-intervention $N = 32$	Post-intervention $N = 32$	p-Value
Primary outcomes			
SIC	2.29 ± 0.70	1.40 ± 0.49	<0.001*
KIDMED	6.41 ± 1.87	10.61 ± 1.39	<0.001*
BMI *z*-scores	0.94 ± 0.64	0.60 ± 0.81	<0.05
Secondary outcomes			
Bedtime	21.03 ± 1.75	21.30 ± 0.54	0.82
Nightmares	1.33 ± 1.16	0.52 ± 0.90	<0.001
PRQ-Bully	8.15 ± 2.55	8 ± 2.62	<0.001
PRQ-Prosocial	12.6 ± 1.96	13.81 ± 2.03	<0.001
PRQ-Victim	8.45 ± 2.31	7.42 ± 1.62	0.11
HCC	4.22 ± 1.98	5.68 ± 3.18	<0.05

SIC Stress in Children Questionnaire, *KIDMED* Mediterranean Diet Quality Index for Children and Adolescents, *PRQ* Peer Relations Questionnaire for Children, *HCC* Hair Cortisol Concentrations, *BMI* Body Mass Index
Measurements are presented in mean ± standard deviation. *Level of significance: $p < 0.05$

2.4 Discussion

The study aimed to assess the effectiveness of a novel holistic cognitive stress management program, PSAI-CA, which included consults of stress, quality of life, sleep, eating behavior, and bullying behavior of children. The hypothesis that PSAI-CA is effective to reduce stress and adopt a healthy lifestyle has been confirmed. After the intervention program, stress levels, nightmares, and BMI were statistically reduced. In the bullying scale, the bully, which represents the physical and psychological maltreatment of one child from another, was diminished. The social scale was increased as well as hair cortisol concentration. Bedtime and PRQ-Victim scale were still the same after the intervention program.

The reduction in stress levels can be explained by the fact that the participants were able to control any stressful factor applying the PSAI technique. The program reduced stress levels and negative emotions and favored a less reward-seeking behavior (e.g., recreational habits) and more healthy choices daily [29–32]. Study participants changed their BMI because of the nutrition guidelines based on the Mediterranean diet, which is considered one of the healthiest dietary models. Kalogiratou et al. found that the implementation of the PSAI had positive effects on a sample of primary school attendants' emotional eating and psychological state [14]. In recent studies, the Mediterranean diet had a beneficial effect on certain body systems [33–35]. Children and adolescents may be the age groups with the most unfavorable Mediterranean diet profile [36]. The PSAI has also been used in overweight/obese adults as an effective method for reduction in BMI, body fat, emotional and external eating behavior, as well as adverse metabolic indices [16].

The main reason behind bullying's reduction is the full compliance of children with PSAI, an item of which was the Pythagorean Virtues. While finding more ways to cooperate, children managed to decrease conflicts. Anger's control was managed through the virtue of temperance. Instead of counting on conflicts, they solved their disputes through dialogue and mutual understanding. Many anti-bullying programs are effective, because intervention programs reduced peer victimization and increased school safety in 14 schools [34, 37, 38]. Therefore, anti-bullying programs appeared to be substantial in encouraging children to change their behavior for the better [39, 40].

As per the study's results, the social scale was increased, which means that peer relations were improved among children. Social skills were also improved by supporting each other. The relationships between them ameliorated and they became more cooperative.

The elementary students who suffered constant nightmares have reported a decrease in them. Even though our sample was not obese, this finding is similar to the study of Mazurak et al. [41] who compared sleep quality of children and adolescents with obesity versus a healthy sample and suggested that sleep hygiene education, as part of weight-loss therapy, may provide both physical and psychological benefits to this population. The effectiveness of the PSAI has been confirmed by the reduction in anxiety and an improvement in sleep, diet, and exercise [42].

Our results are consistent with cognitive behavioural therapy (CBT) studies that also improved sleep and reduced insomnia [43–45].

Cortisol is a measure of stress as an end-product of the hypothalamic-pituitary-adrenal (HPA) axis. Hair cortisol is considered superior to the serum and urine cortisol for the evaluation of chronic stress, as it reflects cortisol aggregation over the previous months. Hair cortisol has been associated with physical and mental illnesses in children and adolescents [46]. In our study hair cortisol concentrations were increased, which could indicate the activation of HPA axis [47]. This could be explained by increasing attention and emotional effort through cognitive reappraisal [29]. The frontal lobe can be activated via gnostic reconstruction. The technique was effective using the moral reference and critical appraisal whereas most intervention programs use a specific technique. Pupils embraced the 12 virtues and learned how to evaluate themselves, discerning what is right and what is wrong. They acquired self-control, self-discipline, and restraint. The role of the observer gives the possibility of self-review and self-evaluation [30]. The children were equipped with skills such as self-discipline and self-control and are now capable of using them for their benefit on their way to development. Those skills will also assist them in spiritual improvement, academic performance, and wellness, which in turn lead to social wellbeing [32].

Besides that, to reduce stress and obesity mindfulness interventions have been implemented. When children received mindfulness training, they reported lower stress [48] and positive results [49]. Furthermore, intervention programs showed that BMI had a significant beneficial alteration [50–53]. A meta-analysis of 19 studies (total participants = 4063) of educational interventions in children and adolescents evaluating social–emotional training, relaxation programs, problem-solving, and stress management showed a positive effect on reducing the symptoms of stress and strengthening coping skills [54]. Environmental, cognitive, and behavioral factors work together to influence children's knowledge of nutrition, self-efficacy, and healthy behavior choices. Both have been shown to contribute to children's eating behavior [36]. However, this study faces some limitations including small and random sample size, lack of control group and short follow-up, small duration of the intervention, and lack of other age groups. Furthermore, compliance to the intervention was assessed by children's self-reports without parental reassurance that all recommendations were followed. Thus, the results of the study cannot be generalized.

2.5 Conclusions

This pilot study showed that the PSAI-CA reduced stress levels and established healthy behaviors and lifestyle in a sample of second grade primary school students. Further research on the implementation of the PSAI on school children is needed to verify these findings, through a well-powered randomized controlled trial.

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3

The Effect of Psychological Resilience and Coping Strategies on Mental Health of Nurses

Evangelos C. Fradelos, Ioanna V. Papathanasiou, Chrysoula Dafogianni, Evdokia Misouridou, Ioannis Koutelekos, Evangelos Dousis, Eugenia Vlachou, Eleni Evangelou, Victoria Alikari, Georgia Gerogianni, Maria Polikandrioti, and Afroditi Zartaloudi

Abstract

Introduction: Nursing professional is considered to be stressful with impact on nurses' mental health.

Aim: The aim of this study was to investigate the effect of coping strategies and psychological resilience on anxiety and depression among nurses.

Methods: In this descriptive and cross-sectional study, 378 nurses from two hospitals (a general and a psychiatric) in Greece completed the Patient Health Questionnaire-2 (PHQ-2), the Generalized Anxiety Disorder-2 (GAD-2), the Connor-Davidson Resilience Scale 25 (CD-RISC 25), and the Ways of Coping Questionnaire for evaluating the depression, anxiety, psychological resilience, and coping strategies, respectively. The study was carried out between October and December of 2019. Statistical analysis was performed with JASP version 0.14.01 and significance for all statistical tests was set at 0.05 or less.

Results: Psychological resilience was significantly correlated with anxiety ($r = -0.127$, $p = 0.014$), Positive approach ($r = -0.466$, $p<0.001$), Seeking social support ($r = -0.228$, $p < 0.001$), Avoidance/Escape ($r = -0.121$, $p = 0.020$). Anxiety was positively correlated with Seeking social support ($r = -0.112$, $p = 0.030$), Prayer/Daydream ($r = -0.132$, $p = 0.030$), Avoidance/Escape ($r = -0.164$, $p < 0.001$), and Assertive problem solving ($r =-0.195$, $p < 0.0010$). Psychological resilience, Avoidance, and Assertive problem-solving were significant predictors of increasing of anxiety ($\beta = -0.128$, $p = 0.013$, $\beta = 0.130$, $p = 0.027$, $\beta = 0.131$, $p = 0.020$, respectively). Avoidance ($\beta = 0.209$, $p < 0.001$) and age ($\beta = 0.208$, $p = 0.029$) were significant predictors of depression.

Conclusions: Psychological resilience and coping strategies have a significant effect on nurses' mental health.

E. C. Fradelos · I. V. Papathanasiou
Department of Nursing, University of Thessaly, Larissa, Greece

C. Dafogianni · E. Misouridou · I. Koutelekos · E. Dousis · E. Vlachou · E. Evangelou · V. Alikari · G. Gerogianni · M. Polikandrioti · A. Zartaloudi (✉)
Department of Nursing, University of West Attica, Athens, Greece
e-mail: azarta@uniwa.gr

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Keywords

Resilience · Coping strategies · Nurses · Depression · Anxiety

3.1 Introduction

The health sector can be an emotionally demanding and stressful working environment. Healthcare professionals are exposed to not only various occupational hazards that consist of life-threatening situations but also the emotional trauma of their patients [1]. Nurses often prioritize the health and wellbeing of their patients and sometimes to the detriment of their own health and wellbeing [2, 3]. To some extent, the aforementioned working environment has an impact on nurse's mental health; a favorable nursing work environment can positively affect both the nurse and the health organization itself, as it helps toward the reduction of stress and burnout. Work stress is described as a stressful and unbearable situation in which a cumulative accumulation of work-related stressful conditions or stress, which stems from a specific work situation, is caused. Usually, this reaction is due to the disharmony or contradiction of the tasks and the environment of the specific job with the temperament and the special mental and physical state of the employee [4].

Health professionals face many mental health problems, such as anxiety and depression. It is indicative that very often nurses report mental health issues, such as anxiety, stress, and depression [5]. Nurses are the most exposed professionals to stressors, resulting in chronic stress [6]. The prevalence of such mental health issues varies depending on the methodology of the study, the country it is conducted, and the setting [7, 8]. In a study among 211 surgical nurses in Brazil, the percentage of anxiety was found to be 31.3% and for depression was 24.2%, while those mental health problems were found to be related to work contract and age [9]. According to a recent study in Greece the prevalence of anxiety and depression among psychiatric nurses in Greece is very high, and 52.7% were classified as depressed while in the 48.2% of the participants symptoms of anxiety were present. Among the related factors were age, marital status, educational level, and working experience [10]. While various occupational, social, and demographic factors have been associated with anxiety and depression, those disorders are often associated with the lack of psychological resilience and ineffective coping strategies [11, 12].

According to Tsaras et al. (2018) [13], nurses who use positive coping strategies are most likely to experience less anxiety and depression. A recent cross-sectional study, in which 282 nurses in China fighting COVID-19 took part, concluded similar results [11]. This study also highlighted the protective effect that psychological resilience has on depression and anxiety among front-line nurses [11]. However, few studies are examining the aforementioned factor and the effect that coping strategies and psychological resilience can have on mental health outcomes among nurses and none of them in Greece. Thus, the purpose of this study was to investigate the effect that coping strategies and psychological resilience can have on anxiety and depression among nurses in Greece.

3.2 Material and Method

A descriptive, cross-sectional design was employed in this quantitative study. Data were collected from two hospitals in Attica, one general and one psychiatric. A convenience sample was the most feasible way to collect data, in terms of participant accessibility and taking into consideration the available financial and time resources. The questionnaires were distributed randomly to 500 nurses in the two hospitals. A total of 378 questionnaires were completed (response rate 75.6%). The study was conducted between October and December of 2019. The sample consisted of 378 nurses working in stable and rotated shifts. Nursing professionals who were diagnosed with mental illness, who were on vacation or sick leave, or refused to participate in the study were excluded.

3.2.1 Ethics

The study was approved by the Scientific Council of both hospitals. The participants who met the criteria gave their written consent and completed the questionnaire after being informed about the aim of the study. All the participants were informed that their anonymity would be maintained, and that the safety of the material given would be ensured, as well as the fact that they could withdraw from the study at will.

3.2.2 Measurement Tools

More specifically, the data collection tools consisted of four instruments.

A sheet containing **demographic, social, and professional characteristics.**

The Patient Health Questionnaire-2 (PHQ-2) and Generalized Anxiety Disorder-2 (GAD-2) questionnaires are two ultra-brief screening instruments for the assessment of depression and anxiety. Each questionnaire consists of two questions answered in a 4-point Likert scale, ranging from "0 = not at all" to "3 = nearly every day," resulting in a range from 0 to 6 for each questionnaire, with a higher score indicative of higher mental health disorder. According to receiver-operating characteristic curve analysis, the optimal cut-off point is ≥3 on both the PHQ-2 and GAD-2 scales. Both questionnaires have been found to have good sensitivity and specificity for detecting the aforementioned disorders [14–17]. In addition, both have been found valid and were used in previous studies in Greece [10, 13, 18].

The Connor-Davidson Resilience Scale 25 (CD-RISC 25), which was used to evaluate nurses' psychological resilience, is a 25-item questionnaire. Items are rated on a 5-point scale (from 0 = "not true at all" to 4 = "true nearly all the time") providing a total sum score ranging from 0 to 100. This is a unidimensional questionnaire providing information regarding the ability that a person has to bounce back from a variety of challenges such as illness, emotional pressure, or painful feelings. Higher scores reflect greater resilience [19]. The scale has been validated for the Greek population and found to have excellent internal consistency (Cronbach's alpha = 0.925) [20].

The Ways of Coping Questionnaire (WCQ), which was used to explore the coping strategies, was developed by Folkman et al. and examines thoughts and actions of people used to dealing with specific stressful events [21]. Its Greek version consists of 38 items answered on a 4-point Likert scale, ranging from "0 = never" to "3 = often." The items are divided into five factors: (i) Positive approach (11 items), including positive re-evaluation and problem solving; (ii) Seeking social support (6 items); (iii) Prayer/Daydream (8 items), including prayer and searching for divine intervention; (iv) Avoidance/Escape (9 items), including resignation and denial; and (v) Assertive problem solving (4 items). A higher score in each factor indicates that the coping strategy is regularly used. The internal consistency of the Greek version of the questionnaire ranged from 0.60 to 0.79 [22].

3.2.3 Statistical Analysis

Descriptive statistics were used to assess sample characteristics and psychological variables. Firstly, variables were tested for their distribution (normality). Pearson correlation coefficient was used to identify the relationship between the examined variables, and multiple linear regression analysis with backwards method was applied to identify the predictors of anxiety and depression. Statistical analysis was performed with JASP version 0.14.01 and significance for all statistical tests was set at 0.05 or less (two-tailed).

3.3 Results

Of the total of 378 nurses, 272 (72.0%) were working in the general hospital; 294 (77.8%) were women with a mean age of 44.01 ± 7.8, and with 17.17 ± 9 years of working experience. Most of them (25066.1%) were married and 122 (58.2%) had completed higher education. A total of 71 participants were either heads of depart-

Table 3.1 Sample characteristics ($N = 378$)

		N	%
Hospital	Psychiatric	106	28.0
	General	272	72.0
Sex	Female	294	77.8
	Male	84	22.2
Age	44.01 ± 7.8		
Marital status	Single	93	34.6
	Married	250	66.1
	Widowed/divorced	35	9.3
Educational status	Secondary education	158	41.8
	University degree	122	58.2
	Total working experience	17.17 ± 9	
Department	Surgical	95	25.1
	Medical	130	34.5
	Other	152	40.2
Rotated shifts	Yes	286	75.7
	No	91	24.1
Working position	Staff nurse/Nurse assistant	306	81
	Head nurse	71	18.8

Table 3.2 Mean ± SD of study parameters

Study parameters	Mean ± SD
Anxiety	2.33 ± 1.65
Depression	2.38 ± 1.50
Psychological resilience	65.75 ± 14.34
Positive approach	2.06 ± 0.51
Seeking social support	1.93 ± 0.57
Prayer/daydream	1.74 ± 0.62
Avoidance /escape	1.75 ± 0.53
Assertive problem solving	1.55 ± 0.60

ments or had managerial positions. The majority of the participants (81%) were working on a rotating shift. The detailed information regarding the nurses' demographic and work-related characteristics is depicted in Table 3.1.

In regard to the mean values of the study variables as for depression, in a sample of $N = 378$, the mean (standard deviation [SD]) score was 2.38 (1.50) with scores ranging from 0 to 6, while similar results were found for anxiety, 2.33 (1.65), with scores ranging from 0 to 6. Regarding psychological resilience, in a sample of $N = 378$, the mean (SD) score was 65.75 (14.34) with scores ranging from 0 to 100. Finally, in regard to coping strategies, the highest value was observed in the positive approach, which was 2.06 (0.51), and the lowest in assertive problem solving, which was 1.55 (0.60). Detailed results on means and SD are presented in Table 3.2.

In order to examine the correlation between psychological resilience, coping strategies, and nurses' mental health, Pearson correlation coefficient was used. Upon examination we observed significant correlation between psychological resilience and anxiety ($N = 378$, $r = -0.127$, $p = 0.014$), psychological resilience and positive approach ($N = 378$, $r = -0.466$, $p < 0.001$), psychological resilience and seeking social support ($N = 378$, $r = -0.228$, $p < 0.001$), and psychological resilience and avoidance/escape ($N = 378$, $r = -0.121$, $p = 0.020$). Anxiety was positively correlated with the following coping strategies: seeking social support ($N = 378$, $r = -0.112$, $p = 0.030$), prayer/daydream ($N = 378$, $r = -0.132$, $p = 0.030$), avoidance/escape ($N = 378$, $r = -0.164$, $p < 0.001$), and assertive problem solving ($N = 378$, $r = -0.195$, $p < 0.0010$). Depression exhibits strong positive correlation with avoidance/escape ($N = 378$, $r = -0.213$, $p < 0.001$). Detailed results of Pearson correlation coefficient are presented in Table 3.3.

Table 3.3 Correlation between resilience, mental health, and coping strategies

	Psychological resilience	Positive approach	Seeking social support	Prayer/ Daydream	Avoidance/ Escape	Assertive problem solving
Psychological resilience	1	0.466***	0.228***	0.093	0.121*	0.047
Anxiety	−0.127*	−0.008	0.112*	0.132**	0.164**	0.195**
Depression	−0.047	0.107*	0.160**	0.179**	0.213***	0.158**

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

To investigate the effect that psychological resilience, coping strategies, and nurses' characteristics have on anxiety, multiple linear regression was performed. Anxiety score was set as a dependent variable and the psychological resilience, coping strategies, and nurses' characteristics were set as independent variables. The model (Table 3.4.) showed that as the psychological resilience increases, the anxiety score decreases ($\beta = -0.128$, $p = 0.013$); as avoidance increases, anxiety also increases ($\beta = 0.130$, $p = 0.027$); as assertive problem solving increases, nurses' anxiety increases ($\beta = 0.131$, $p = 0.020$); and as age increases, anxiety increases too ($\beta = 0.202$, $p = 0.032$); while when working experience increases, anxiety decreases ($\beta = -0.226$, $p = 0.005$).

In order to investigate the effect that psychological resilience, coping strategies, and nurses' characteristics have on depression, multiple linear regression was performed. Depression score was set as a dependent variable and the psychological resilience, coping strategies, and nurses' characteristics were set as independent variables. The model (Table 3.5) showed that as avoidance increases, depression increases as well ($\beta = 0.209$, $p < 0.001$); as age increases, depression increases too ($\beta = 0.208$ p=0.029); while when working experience increases, depression decreases ($\beta = -0.204$, $p = 0.032$).

3.4 Discussion

Our results are indicative of mild depressive and anxiety symptoms among nursing professionals in our sample. Working as a front-line healthcare professional in any facility is physically and emotionally demanding. Nurses are constantly exposed to human suffering. Heavy workload, inter-professional conflicts, staffing inadequacy, and low salaries could lead to the appearance of depressive and anxiety symptoms [23, 24]. In our study, levels of anxiety and depression were low, which could be indicative of the adoption of effective coping strategies suitable to deal with potentially traumatic conditions [25, 26]. Regarding psychological resilience, the mean (SD) score was 65.75 (14.30), which was indicative of above average resiliency, showing they could manage their everyday professional and personal challenges but more work can be done to enhance this characteristic [27]. This finding is in line with other studies [28, 29].

With regard to coping strategies, we found that positive approach, including positive re-evaluation and problem solving, was the most endorsed behavior in our sample. Similar findings have been found in research studies conducted by Jose and Bhat [30] and Zyga et al. [31]. Regarding coping strategies, the lowest value observed was in assertive problem solving, referring to "one's attempts to regulate or control the stressor and actively solve problems by using one's own unique strengths," which are common characteristics of resilient people [32].

According to our results, there was a significant correlation between psychological resilience and anxiety: as the psychological resilience increases, the anxiety score decreases. Resilience could make an individual capable to manage stressful circumstances [33, 34].

Significant correlation has been found between psychological resilience and seeking social support as well as psychological resilience and positive approach. Other studies have concluded that resilience could be promoted in a supportive environment [35, 36]. Higher levels of social support

Table 3.4 Multiple regression (Backwards method) results with anxiety as dependent variable and resilience, coping strategies, and nurses' characteristics as independent variables

				95% CI
	Standardized β (SE)	*p*	Lower	Upper
Psychological resilience	−0.128 (0.006)	0.013	−0.026	−0.003
Avoidance/escape	0.130 (0.177)	0.022	0.059	0.755
Assertive problem solving	0.131 (0.156)	0.020	0.057	0.668
Age	0.202 (0.020)	0.032	0.004	0.083
Working experience	−0.266 (0.017)	0.005	−0.083	−0.015

R^2 adj = 0.552; $F = 23.902$; $p = 0.001$. *CI* confidence interval, *SE* standard error

Table 3.5 Multiple regression (Backwards method) results with depression as a dependent variable and resilience, coping strategies, and nurses' characteristics as independent variables

				95% CI
	Standardized β (SE)	*p*	Lower	Upper
Avoidance/escape	0.209 (0.145)	<0.001	0.305	0.875
Age	0.208 (0.018)	0.029	0.004	0.076
Working experience	−0.204 (0.016)	0.032	−0.065	−0.003

R^2 adj = 0.396; $F = 4.076$; $p = 0.001$. *CI* confidence interval, *SE* standard error

may help individuals assess a situation as less threatening. Social networks may lead their members to positive re-evaluation and problem solving in order to deal with the daily difficulties.

Anxiety and depression were positively correlated with the use of avoidance/escape as a coping strategy. These findings are consistent with others, suggesting that avoidance may decrease anxiety symptoms, as individuals by avoiding the stressful stimulus do not have to deal with their fears and anxieties [37]. Anxiety was also positively correlated with seeking social support and with prayer/daydream. Social support could mean providing practical and psychological help, which could facilitate nurses to overcome obstacles and solve problems [38]. Religion and rituals could reduce the intensity of anxiety and depressive symptoms by offering a sense of social coherence and the benefits of the presence of a socially and spiritually supportive network [39]. Additionally, women, who constitute the majority of our sample, are usually more religious than men [40]. Anxiety was, finally, positively correlated with assertive problem solving. As assertive problem solving increases, nurses' anxiety also increases. The aforementioned finding could be explained considering that assertiveness will enable nurses to use their own unique strengths in challenging situations, unclear ethical dilemmas, or when they have to make paternalistic decisions [41]. Taking into account the meaning of assertiveness and the fact that our participants are characterized by above average resiliency, nurses' increase in anxiety when using assertive problem-solving techniques could be explained.

As age increases, anxiety and depression are also increased. When individuals are young, they are not burdened by their own family. On the contrary they are strongly supported by their parental family. In terms of personal life, as individuals grow up, they may also need to manage other commitments, such as marriage, childbirth, supporting elderly relatives, and upbringing their own children. For shift workers, fatigue related to the above tasks and responsibilities is often accompanied by depression and anxiety. Finally, when working experience increases, anxiety and depression could be decreased. These nurses could develop their coping abilities over years of experience in order to deal with workplace stressors [42].

3.4.1 Limitations

The study has several limitations, including relying on a convenience sample, self-report measures, and a cross-sectional design. Thus, the findings cannot be generalized. Additionally, causal relation between anxiety/depression and the other parameters is not allowed.

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3.5 Conclusions

The findings could provide better understanding of nurses' coping strategies and could enlighten the importance of enhancing social support and resilience in order to increase their psychological wellbeing and improve their quality of life.

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4

Anxiety and Depression in Parents of Children Undergoing Hematopoietic Stem Cell Transplant (HSCT)

Alexandra Papasarantopoulou,
Maria Polikandrioti, Evangelos Dousis,
Eleni Evagelou, Aphrodite Zartaloudi,
Chrisoula Dafogianni, Evdokia Misouridou,
Niki Pavlatou, Kostantinos Mintzaridis,
and Ioannis Koutelekos

Abstract

Hematopoietic stem cell transplantation (HSCT) is a well-established therapy tool for several malignant and non-malignant diseases. Parents of children undergoing HSCT experience physiological distress for various reasons such as intensive caregiving, potential complications, and medically intensive process. The purpose of this study was to explore anxiety/depression in parents of children who underwent HSCT and the associated self-reported characteristics.

Method and material: In the present study were enrolled 100 parents of children who underwent HSCT. Data were collected by the completion of the "Hospital Anxiety and Depression Scale (HADs)," which also included parents' characteristics. The statistical significance level was $p < 0.05$.

Results: Of the 100 participants, 81% and 64% of parents experienced anxiety and depression, respectively, based on HADs scores. A statistically significant association was observed between parental anxiety and gender ($p = 0.017$), frequency of visiting the hospitalized child ($p = 0.023$), whether they desired family members to remain in hospital ($p = 0.033$), as well as with the need for participation in daily care ($p = 0.023$), for help based on personal needs ($p = 0.026$), for scheduled meetings with parents having same problems ($p = 0.006$), for contact with hospital after discharge ($p = 0.035$), and for written information ($p = 0.044$). In terms of depression, a statistically significant association was observed with difficulties during the hospital stay ($p = 0.034$), whether they desired other family members to remain in hospital ($p = 0.009$), as well as with the need for opportunities or time for questions ($p = 0.004$), for scheduled meetings with parents having the same problems ($p = 0.026$), and for contact with hospital after discharge ($p = 0.038$).

Conclusion: Anxiety and depression were associated with possibility of family members to remain in the hospital as well as with the need for scheduled meetings with parents having the same problems and for contact after

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A. Papasarantopoulou · M. Polikandrioti · E. Dousis ·
E. Evagelou · A. Zartaloudi · C. Dafogianni ·
E. Misouridou · N. Pavlatou · K. Mintzaridis ·
I. Koutelekos (✉)
Department of Nursing, University of West Attica,
Athens, Greece

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hospital discharge. Based on the findings presented, it is suggested that understanding parents' needs and perceptions is fundamental to the development of appropriate interventions that address their worries.

Keywords

Anxiety · Depression · HSCT · HADs

4.1 Introduction

Pediatric hematopoietic stem cell transplantation (HSCT) is a demanding treatment for life-threatening pediatric diseases including hematological, oncological, metabolic, and immune deficiency disorders. This complex life-saving procedure involves a regimen of intensive chemotherapy and possibly irradiation followed by an infusion of marrow or peripheral stem cells from a donor (allogeneic transplantation) or from the patient (autologous transplantation) [1–4]

During recent decades, the advances in the field of HSCT have led to better survival rates, and the improvements in donor marrow preparation options increased the donor pool in a variety of diseases [4]. Approximately 50,000 people undergo this procedure each year worldwide [2]. In the United States, HSCT has risen steadily for more than 2 decades, with 340,000 cumulative HSCTs having been performed by 2014 [3]. Approximately 2600 children undergo HSCT in the United States annually. The typical length of stay for pediatric is four to six weeks with a total median cost of US$302,822 [1].

This established treatment is increasing physical and psychological demands and prolongs hospital stay [1, 4, 5]. During the acute phase of HSCT, children report high levels of physical distress, mood disturbance, nausea and pain, and fatigue [6]. After transplantation, children lead a restricted life due to susceptibility to infections and encounter with many challenges such as the risk of recurrence and short- or long-term medical effects with up to 50% of survivors reporting one or more late effect [5].

The significant medical risks and intense caregiving responsibilities along with the difficult experience of this demanding medical procedure may trigger psychological disturbance among parents inducing depression, anxiety, burnout symptoms, and posttraumatic stress disorder [1, 5, 6]. Parents struggle to cope with stress arising from the child's disease, treatment, and survival possibilities. Parents engage in decision-making with multidisciplinary team but also have the responsibility of the child's daily physical and psychosocial needs [7–10].

During recent decades, attention has been focused on parental emotional disturbance, which may strongly influence the mental and physical state of children as well as clinical outcome. An insight into parents' state may enable clinicians to create therapeutic interventions.

To the best of our knowledge, data exploring anxiety/depression among parents of children undergoing HSCT are limited in Greece.

Thus, the aim of this cross-sectional study was to explore anxiety/depression at hospital discharge in parents of children who underwent HSCT and the associated self-reported characteristics.

4.2 Methods and Material

4.2.1 Design, Setting, and Period of the Study

In this study were enrolled 100 parents (70 mothers and 30 fathers) of children who underwent HSCT at a public pediatric in Athens during December 2020–February 2021. This was a cross-sectional descriptive study. Participants were selected by the method of convenience sampling.

4.2.2 Sample: Inclusion and Exclusion Criteria

During the period when the research was conducted, from a total of 120 parents who were initially identified as eligible to participate in the study, only 100 were finally enrolled because 20 refused to participate.

Criteria for inclusion in the study were as follows: (a) primary caregivers (biological parents) of children <19 years of age; (b) parents had to speak, read, and write in Greek language; and (c) ability to read and sign the informed consent form. The exclusion criteria for parents were as follows: (a) history of mental illness, (b) deterioration of the child's general health status or other complications, and (c) living in another city or rural area.

4.2.3 Data Collection and Procedure

The collection of data was performed by the method of interview using a questionnaire, which included self-reported characteristics and the Hospital Anxiety and Depression Scale (HADs). Completion of each questionnaire lasted approximately 15 minutes and took place for each participant in a private room at hospital discharge.

4.2.4 Research Instrument

The instrument used was a questionnaire, which included self-reported characteristics and the Hospital Anxiety and Depression Scale (HADs).

In terms of socio-demographic characteristics were collected: gender and age of parents and children, family status, parents' educational level, job, and number of children.

In addition, were collected the following self-reported characteristics: how often they visited the hospitalized child, difficulties during hospital stay, whether they would like to have a special room for parents, to remain in hospital other family members, and whether they believed that the child's adaptation to the hospital environment is influenced by health professionals. Also were collected parents' needs: information about HSCT, more opportunities or time for questions about child's health, to maintain child's daily life, despite the restrictions, by participating in daily care, a specialist in the department to meet information needs, help based on your personal needs (fatigue, stress), scheduled meetings with parents having the same problems so they discuss experiences with them, contact with the department after hospital discharge, written information about child's health after hospital discharge, and education on issues related to the daily care of the child after hospital discharge.

4.2.5 Assessment of Anxiety/Depression

The "Hospital Anxiety and Depression Scale (HADs)" was used to assess the mental health (depression and anxiety) of parents. The HADs scale consists of 14 questions that assess how respondents felt during the previous week. Respondents answer each question on a 4-point Likert scale (rated from 0 to 3). Seven of the 14 questions assess the level of depression and the remaining seven assess the level of anxiety of the respondents. The scores assigned to the questions are summed separately for the questions evaluating depression and those evaluating anxiety leading to two scores ranging from 0 to 21. Higher scores indicate higher levels of anxiety and depression, respectively [11, 12]. In addition, for both scores the following cut-off value has been proposed and widely used in the literature: score 0–8 does not indicate anxiety or depression and score >8 indicates anxiety/depression [13].

4.2.6 Ethical Considerations

The study was approved by the Ethical Committee of the hospital unit where it was conducted. Patients who met the entry criteria were informed by the researcher about the purposes of this study. All patients participated only after they had given their written consent. Data collection guaranteed anonymity and confidentiality. All subjects had been informed of their rights to refuse or discontinue participation in the study, according to the ethical standards of the Declaration of Helsinki (1989) of the World Medical Association.

4.2.7 Statistical Analysis

Nominal data are presented with absolute and relative (%) frequencies, while scores of the HADs scale with mean, standard deviation, median, and interquartile range. The X^2 Test of Independence was used to evaluate the association between anxiety and depression levels and parents' characteristics, as well as the adjustment of Fisher's Exact test where necessary.

In addition, multiple logistic regression was performed to assess the effect of parental characteristics on their anxiety and depression. Results are presented with odds ratio (OR) and 95% confidence interval (95% CI). The observed significance level of 5% was considered statistically significant. All statistical analyzes were performed with version 25 of the SPSS statistical program (SPSS Inc., Chicago, Il, USA).

4.3 Results

4.3.1 Sample Description

From Table 4.1 it is observed that 70% of the parents were mothers, and about 57% were over 50 years old. Also, 86% of the sample were married and 58% had university education. The majority of the sample (78%) were working and had one child (71%). Also, 55% of the children were boys and 63% were over 10 years old.

Table 4.1 Distribution of the sample according to demographic characteristics (*N* = 100)

	N (%)		*N* (%)
Parent's gender		**Job**	
Father	30 (30.0)	Unemployed	12 (12.0)
Mother	70 (70.0)	Civil servant	27 (27.0)
Age (years)		Employee	32 (32.0)
30–35	15 (15.0)	Freelancer	19 (19.0)
36–40	28 (28.0)	Household	10 (10.0)
41–50	43 (43.0)	**Number of children**	
>50	14 (14.0)	1	71 (71.0)
Family status		2	25 (25.0)
Married	86 (86.0)	>2	4 (4.0)
Single	2 (2.0)	**Child's gender**	
Divorced	11 (11.0)	Boy	55 (55.0)
Living together	1 (1.0)	Girl	45 (45.0)
Education		**Child's age (years)**	
Primary	3 (3.0)	1–3	5 (5.0)
Secondary	39 (39.0)	4–6	14 (14.0)
College/University	34 (34.0)	7–9	18 (18.0)
MSc/PhD	24 (24.0)	10–12	24 (24.0)

Regarding the needs of parents (Tables 4.2 and 4.3) it appears that 69% remained in the hospital during the child's hospitalization, 38% stated they had very much or enough difficulties staying in hospital room, 81% stated they would like to have a special room for parents, 50% stated they would very much like other family members to stay in hospital too, 60% needed information on HSCT, 68% needed more opportunities or time for questions related to the child's health, 46% stated that they were in need of participating in the daily care of the child, 97% believed that the child's adjustment is influenced by the health professionals, 96% stated they needed a specialist for information, 80% very much liked to have help based on personal needs, and 99% needed contact with the department after hospital discharge. Only 20% had the need for scheduled appointments with parents having the same problems. Finally, after hospital discharge 86% and 84% needed to receive written information and to be trained in daily care of the child, respectively.

4.3.2 Anxiety/Depression Levels

Table 4.4, concerning parental anxiety and depression, revealed that 81% and 64% had such a score on the HADs scale leading to anxiety and

Table 4.2 Distribution of the sample according to self-reported characteristics (*N* = 100)

	N (%)
How often do you visit the hospitalized child?	
I remain in the Hospital	69 (69.0%)
Once a day	10 (10.0%)
Twice a day	12 (12.0%)
Three times a day	4 (4.0%)
Day by day	5 (5.0%)
Do you think there are difficulties while staying in hospital room?	
Very much	7 (7.0%)
Very	31 (31.0%)
Moderate	18 (18.0%)
A little	21 (21.0%)
Not at all	23 (23.0%)
Would you like to have a special room for parents?	
Yes	81 (81.0%)
No	19 (19.0%)
Would you like other family members to stay in the hospital?	
Very much	21 (21.0%)
Very	29 (29.0%)
Moderate	19 (19.0%)
A little	19 (19.0%)
Not at all	12 (12.0%)
Do you think that the child's adaptation to the hospital environment is influenced by health professionals?	
Very much	74 (74.0%)
Very	23 (23.0%)
Moderate	3 (3.0%)
A little	0 (0.0%)
Not at all	0 (0.0%)

depression, respectively. The median score for parental anxiety was 11 and for depression 9. Mean values were 11.1 and 8.8 for anxiety and depression, respectively.

4.3.3 Factors Associated with Parents' Anxiety/Depression

Tables 4.4 and 4.5 show the characteristics of parents that were statistically significantly associated with anxiety and depression levels, respectively.

A statistically significant association was observed between parental anxiety and gender ($p = 0.017$), how often they visited the hospitalized child ($p = 0.023$), whether they would like family members to remain in the hospital ($p = 0.033$), the need to participate in daily care ($p = 0.023$), the need for help based on personal needs ($p = 0.026$), the need for scheduled meetings with parents having the same problems ($p = 0.006$), the need for contact with the department after hospital discharge ($p = 0.035$), and the need to obtain written information after hospital discharge ($p = 0.044$; Tables 4.5 and 4.6).

More specifically, mothers had a higher rate of anxiety (87.1%) than fathers (66.7%). Parents who remained in hospital had a higher rate of anxiety (87%) than those who visited the child (67.7%). Similarly, higher rates of anxiety were found in those who wanted very/very much other family members to stay in hospital (90%), those who were very much in need of participating in the daily care of the child (91.3%), those who would like very much to have help based on their personal needs (92.5%), those who were in great need of scheduled meetings with parents having the same problems (100%), those who were in need of contact with the department after hospital discharge (86.6%), and those who were in need of written information at discharge (86.5%).

A statistically significant association was observed between parents' depression and whether they faced difficulties in staying in the hospital room ($p = 0.034$), whether they would like other family members to remain in the hospital ($p = 0.009$), the need for opportunities or time for questions ($p = 0.004$), the need for scheduled

Table 4.3 Distribution of the sample according to their needs (*N* = 100)

	N (%)
Do you need information about HSCT?	
Yes	60 (60.0%)
No	40 (40.0%)
Do you need more opportunities or time for questions about your child's health?	
Yes	68 (68.0%)
No	32 (32.0%)
Do you need to maintain your child's daily life, despite the restrictions, by participating in his daily care?	
Very much	46 (46.0%)
Very	41 (41.0%)
Moderate	8 (8.0%)
A little	2 (2.0%)
Not at all	3 (3.0%)
Do you need a specialist in the department to meet information needs?	
Yes	96 (96.0%)
No	4 (4.0%)
Do you need help based on your personal needs (fatigue, stress)?	
Very much	40 (40.0%)
Very	40 (40.0%)
Moderate	10 (10.0%)
A little	7 (7.0%)
Not at all	3 (3.0%)
Do you need scheduled meetings with parents having the same problems so you can discuss your experiences with them?	
Very much	6 (6.0%)
Very	14 (14.0%)
Moderate	16 (16.0%)
A little	26 (26.0%)
Not at all	38 (38.0%)
Do you need contact with the department after discharge?	
Very much	67 (67.0%)
Very	32 (32.0%)
Moderate	1 (1.0%)
A little	0 (0.0%)
Not at all	0 (0.0%)
Do you need written information about child's health at discharge?	
Very much	34 (34.0%)
Very	52 (52.0%)
Moderate	13 (13.0%)
A little	1 (1.0%)
Not at all	0 (0.0%)
Do you need to be educated on issues related to the daily care of the child after hospital discharge?	
Very much	54 (54.0%)
Very	34 (34.0%)
Moderate	7 (7.0%)
A little	4 (4.0%)
Not at all	1 (1.0%)

meetings with parents having the same problems ($p = 0.026$), and the need for contact with the department after hospital discharge ($p = 0.038$; Tables 4.7 and 4.8). More specifically, higher rates of depression were found in those who reported to face many difficulties while staying in the hospital room (76.3%), those who wanted very much/very other family members staying in

Table 4.4 Parental anxiety/depression levels (*N* = 100)

	N (%)	Mean (SD)	Median (IQR)
Anxiety		11.1 (3.6)	11 (9–14)
No (HADs score 0–8)	19 (19.0)		
Yes (HADs score >8)	81 (81.0)		
Depression		8.8 (3.5)	9 (7–11)
No (HADs score 0–8)	36 (36.0)		
Yes (HADs score >8)	64 (64.0)		

HADs Hospital Anxiety and Depression scale, *IQR* interquartile range, *SD* standard deviation

Table 4.5 Demographic factors associated with parents' anxiety

	Anxiety		
	No	Yes	
	N (%)	*N* (%)	*p*-Value
Parent's gender			**0.017**
Father	10 (33.3)	20 (66.7)	
Mother	9 (12.9)	61 (87.1)	
Age (years)			0.196
<40	6 (14.0)	37 (86.0)	
41–50	8 (18.6)	35 (81.4)	
>50	5 (35.7)	9 (64.3)	
Family status			0.708
Married	16 (18.4)	71 (81.6)	
Single/Divorced	3 (23.1)	10 (76.9)	
Education			0.418
Primary/Secondary	7 (16.7)	35 (83.3)	
College/University	9 (26.5)	25 (73.5)	
MSc/PhD	3 (12.5)	21 (87.5)	
Job			0.614
Unemployed/Household	5 (22.7)	17 (77.3)	
Employee	14 (17.9)	64 (82.1)	
Number of children			0.260
1	16 (22.5)	55 (77.5)	
>1	3 (10.3)	26 (89.7)	
Child's gender			0.778
Boy	11 (20.0)	44 (80.0)	
Girl	8 (17.8)	37 (82.2)	
Child's age (years)			0.688
<10	8 (21.6)	29 (78.4)	
10–12	3 (12.5)	21 (87.5)	
13–18	8 (20.5)	31 (79.5)	

the hospital (78%), those who needed more opportunities or time for questions about child's health (73.5%), those who had no need at all for scheduled meetings with parents having the same problems (78.9%), and those who were in need to contact with the department after hospital discharge (78.1%).

4.3.4 Impact of Parents' Characteristics on Anxiety/Depression

Multiple logistic regression with dependent variables anxiety and depression was performed to investigate the impact of parental characteristics on anxiety/depression, correcting for possible confounding factors.

Table 4.9 shows that parents who felt a moderate need for other family members to stay in the hospital were 81% less likely to experience anxiety than those with a strong need (OR 0.19 [95% CI: 0.03–1.06], $p = 0.058$ with marginal statistical significance). Also, parents who needed a lot of help based on their personal needs were 18 times more likely to experience anxiety (OR = 18.19 [95% CI: 2.34–141.22], $p = 0.006$).

Regarding depression, parents who experienced few difficulties during their hospital stay were 91% less likely to experience depression than those who experienced many (OR = 0.09 [95% CI: 0.01–0.91], $p = 0.042$). Parents who had a moderate need for other family members to stay in the hospital were 86% less likely to experience depression than those who felt a strong

Table 4.6 Self-reported characteristics associated with parents' anxiety

	Anxiety		
	No	Yes	
	N (%)	*N* (%)	*p*-Value
How often do you visit the hospitalized child?			**0.023**
I remain in the Hospital	9 (13.0%)	60 (87.0%)	
I visit	10 (32.3%)	21 (67.7%)	
Did you meet difficulties while staying in hospital room?			0.699
Very much/Very	6 (15.8%)	32 (84.2%)	
Moderate	3 (16.7%)	15 (83.3%)	
A little/Not at all	10 (22.7%)	34 (77.3%)	
Would you like to have a special room for parents?			0.366
Yes	14 (17.3%)	67 (82.7)	
No	5 (26.3%)	14 (73.7)	
Would you like other family members to stay in hospital?			**0.033**
Very much/Very	5 (10.0%)	45 (90.0%)	
Moderate	7 (36.8%)	12 (63.2%)	
A little/Not at all	7 (22.6%)	24 (77.4%)	
Do you need information about HSCT?			0.077
Yes	8 (13.3%)	52 (86.7%)	
No	11 (27.5%)	29 (72.5%)	
Do you need more opportunities or time for questions about child's health?			0.615
Yes	12 (17.6%)	56 (82.4%)	
No	7 (21.9%)	25 (78.1%)	
Do you need to maintain your child's daily life, despite the restrictions, by participating in his daily care?			**0.023**
Very much	4 (8.7%)	42 (91.3%)	
Very	10 (24.4%)	31 (75.6%)	
Moderate/A little/Not at all	5 (38.5%)	8 (61.5%)	
Do you believe child's adaptation to the hospital environment is influenced by health professionals?			0.227
Very much	17 (23.0%)	57 (77.0%)	
Very	2 (8.7%)	21 (91.3%)	
Do you need a specialist in the department to meet your information needs?			0.999
Yes	19 (19.8%)	77 (80.2%)	
No	0 (0.0%)	4 (100.0%)	
Do you need help based on your personal needs (fatigue, stress)?			**0.026**
Very much	9 (22.5%)	31 (77.5%)	
Very	3 (7.5%)	37 (92.5%)	
Moderate/A little/Not at all	7 (35.0%)	13 (65.0%)	
Do you need scheduled meetings with parents having the same problems so you can discuss your experiences with them?			**0.006**
Very	0 (0.0%)	20 (100.0%)	
Moderate	3 (18.8%)	13 (81.3%)	

(continued)

Table 4.6 (continued)

	Anxiety		
	No	Yes	
	N (%)	*N* (%)	*p*-Value
A little	3 (11.5%)	23 (88.5%)	
Not at all	13 (34.2%)	25 (65.8%)	
Do you need contact with the department after discharge?			**0.035**
Very much	9 (13.4%)	58 (86.6%)	
Very	10 (31.3%)	22 (68.8%)	
Do you need written information about child's health at discharge?			**0.044**
Very much	6 (17.6%)	28 (82.4%)	
Very	7 (13.5%)	45 (86.5%)	
Moderate	6 (42.9%)	8 (57.1%)	
Do you need education related on child's care after discharge?			0.400
Very much	9 (16.7%)	45 (83.3%)	
Very	6 (17.6%)	28 (82.4%)	
Moderate	4 (33.3%)	8 (66.7%)	

need (OR = 0.14 [95% CI: 0.03–0.74], $p = 0.021$). Parents who were in moderate need of contact with the department after hospital discharge were 86% less likely to experience depression than those who were most in need (OR = 0.14 [95% CI: 0.03 –0.70], $p = 0.016$) (Table 4.10).

4.4 Discussion

According to the results of the present study, patients experienced mild-to-moderate anxiety and mild depression. The period preceding and following transplantation can be stressful for parents. More in detail, between 20 and 66% of caregivers report elevated depression and/or anxiety before HSCT and about half report elevated depression and/or anxiety at HSCT discharge.4 Relevant studies showed high levels of anxiety and depression in pretransplant period, with a steady decline for the majority of caregivers after HSCT. Depressive and anxiety symptoms decrease from admission to six months after transplantation though some depressive symptoms remain unchanged [14–17].

Persistent distress is associated with premorbid child-behavior problems, elevated distress at the time of HSCT, parent coping, and complications such as infection or organ toxicity [4]. Apart from prolonged hospitalizations and the strict and complex medication regimen, parents face with several challenges including maintaining relationships with partners, managing self-care, intensive caregiving for the child, coping with feelings of uncertainty about child's outcome, and feelings of incompetence about managing child's care. Long hospitalization is associated with employment disruption (income loss or reduction) and financial and psychological burden [18, 19].

Additionally, parents have to take care of the child's healthy sibling(s), because they are at risk of developing posttraumatic stress disorder, anxiety, and low self-esteem, and frequently report loneliness and lack of parental attention [20]. Parental distress associated with HSCT is often double faceted because the child patient and the sibling(s) may be part of the process. Therefore, a considerable portion of parental stress stems not only from patient-child but also from the sibling donor. Interestingly, guilt regarding a child undergoing with HSCT, apprehension for losing the child, and fear of relapse may deteriorate emotional burden of parents [21]. Parents provide ongoing practical and emotional care for the ill child but at the same time try to balance family, household, and/or occupational responsibilities [22].

Four major themes describe parent experiences after HSCT: (1) psychosocial and health care contextual factors, (2) cognitive, affective, and social support reactions to HSCT, (3) problem-based, emotion-based, and cognitive coping strategies, and (4) posttraumatic growth [7]. Psychological

Table 4.7 Demographic factors associated with parents' depression

	Depression		
	No	Yes	
	N (%)	*N* (%)	*p*-Value
Parent's gender			0.413
Father	9 (30.0%)	21 (70.0%)	
Mother	27 (38.6%)	43 (61.4%)	
Age (years)			0.341
<40	12 (27.9%)	31 (72.1%)	
41–50	18 (41.9%)	25 (58.1%)	
>50	6 (42.9%)	8 (57.1%)	
Family Sstatus			0.127
Married	34 (39.1%)	53 (60.9%)	
Single/Divorced	2 (15.4%)	11 (84.6%)	
Education			0.643
Primary/Secondary	13 (31.0%)	29 (69.0%)	
College/University	14 (41.2%)	20 (58.8%)	
MSc/PhD	9 (37.5%)	15 (62.5%)	
Job			0.334
Unemployed/Household	6 (27.3%)	16 (72.7%)	
Employee	30 (38.5%)	48 (61.5%)	
Number of children			0.509
1	27 (38.0%)	44 (62.0%)	
>1	9 (31.0%)	20 (69.0%)	
Child's gender			0.615
Boy	21 (38.2%)	34 (61.8%)	
Girl	15 (33.3%)	30 (66.7%)	
Child's age (years)			0.418
<10	14 (37.8%)	23 (62.2%)	
10–12	6 (25.0%)	18 (75.0%)	
13–18	14 (41.0%)	23 (59.0%)	

care is crucial since parental mental health is a predictor of the child's adjustment to HSCT. Indeed, parents with psychiatric symptomatology become less responsive to their children's needs and put them at risk of additional psychological and social difficulties [21]. Barriers in participation in psychological care among caregivers of children who undergo HSCT include focusing on the child as priority, not wanting to leave the child's bedside, and psychosocial support. Reframing the HSCT in more positive terms by using acceptance, positive reappraisal, and humor is associated with decreases in depressive symptoms over six-month period post-HSCT [4, 5]

In terms of demographic characteristics, mothers had a higher percentage of anxiety (87.1%) than fathers (66.7%), which is already described since 1990 in the study by Dermatis et al. [23]. At the time of HSCT, 22% of mothers met criteria for major depressive, generalized anxiety, and/or panic disorder and an additional 16–21% reported clinically significant anxiety and depression [15]. Factors influencing mothers' stress include family support, personality traits, and coping strategies [10]. Interestingly, mothers are the ones who resign from their employment, and assume the care and support of the child [21].

Participants who needed scheduled meetings with parents having the same problems experienced anxiety. The fear of relapse and the demands of caregiving generate chronic stress for the parents. These stressors include negative experiences from a deteriorating health situation or news and ways that the child of another family had relapsed [24].

Table 4.8 Factors associated with parents' depression

	Depression		
	No	Yes	
	N (%)	*N* (%)	*p*-Value
How often do you visit the hospitalized child?			0.331
I remain in the Hospital	27 (39.1%)	42 (60.9%)	
I visit	9 (29.0%)	22 (71.0%)	
Did you meet difficulties while staying in hospital room?			**0.034**
Very much/Very	9 (23.7%)	29 (76.3%)	
Moderate	5 (27.8%)	13 (72.2%)	
A little/Not at all	22 (50.0%)	22 (50.0%)	
Would you like to have a special room for parents?			0.251
Yes	27 (33.3%)	54 (66.7%)	
No	9 (47.4%)	10 (52.6%)	
Would you like other family members to stay in hospital?			**0.009**
Very much/Very	11 (22.0%)	39 (78.0%)	
Moderate	11 (57.9%)	8 (42.1%)	
A little/Not at all	14 (45.2%)	17 (54.8%)	
Do you need information about HSCT?			0.865
Yes	22 (36.7%)	38 (63.3%)	
No	14 (35.0%)	26 (65.0%)	
Do you need more opportunities or time for questions about child's health?			**0.004**
Yes	18 (26.5%)	50 (73.5%)	
No	18 (56.3%)	14 (43.8%)	

(continued)

Table 4.8 (continued)

	Depression		
	No	Yes	
	N (%)	*N* (%)	*p*-Value
Do you need to maintain your child's daily life, despite the restrictions, by participating in his daily care?			0.267
Very much	19 (41.3%)	27 (58.7%)	
Very	11 (26.8%)	30 (73.2%)	
Moderate/A little/Not at all	6 (46.2%)	7 (53.8%)	
Do you think that the child's adaptation to the hospital environment is influenced by health professionals?			0.398
Very much	25 (33.8%)	49 (66.2%)	
Very	10 (43.5%)	13 (56.5%)	
Do you need a specialist in the department to meet your information needs?			0.294
Yes	36 (37.5%)	60 (62.5%)	
No	0 (0.0%)	4 (100.0%)	
Do you need help based on your personal needs (fatigue, stress)?			0.310
Very much	14 (35.0%)	26 (65.0%)	
Very	12 (30.0%)	28 (70.0%)	
Moderate/A little/Not at all	10 (50.0%)	10 (50.0%)	
Do you need scheduled meetings with parents having the same problems so you can discuss your experiences with them?			**0.026**
Very	9 (45.0%)	11 (55.0%)	

(continued)

Table 4.8 (continued)

	Depression		
	No	Yes	
	N (%)	*N* (%)	*p*-Value
Moderate	10 (62.5%)	6 (37.5%)	
A little	9 (34.6%)	17 (65.4%)	
Not at all	8 (21.1%)	30 (78.9%)	
Do you need contact with the department after discharge?			**0.038**
Very much	29 (43.3%)	38 (56.7%)	
Very	7 (21.9%)	25 (78.1%)	
Do you need written information about child's health at discharge?			0.093
Very much	17 (50.0%)	17 (50.0%)	
Very	14 (26.9%)	38 (73.1%)	
Moderate	5 (35.7%)	9 (64.3%)	
Do you need education related on child's care after discharge?			0.966
Very much	20 (37.0%)	34 (63.0%)	
Very	12 (35.3%)	22 (64.7%)	
Moderate	4 (33.3%)	8 (66.7%)	

Anxiety was experienced by participants who needed written information at discharge. Parents describe difficulty in navigating the health care system, performing daily caregiving, and following medication administration regimens and restrictive hygiene [7]. Anxiety is increasing when information is inadequate or leads to false hope. Providing written material in the form of information booklets or summary letters may reduce confusion, and facilitate the long-term treatment success [25].

Depression was experienced by patients who needed more opportunities or time for questions about the child's health. Open communication

Table 4.9 Impact of parental characteristics on their anxiety

	Anxiety	
	OR (95% CI)	*p*-Value
Parent's gender		
Father	Ref. Cat.	
Mother	2.24 (0.13–39.29)	0.582
How often do you visit the hospitalized child?		
I remain in the Hospital	Ref. Cat.	
I visit	0.46 (0.03–8.01)	0.591
Would you like other family members to stay in hospital?		
Very much/Very	Ref. Cat.	
Moderate	0.19 (0.03–1.06)	**0.058**
A little/Not at all	0.61 (0.11–3.36)	0.569
Do you need to maintain your child's daily life, despite the restrictions, by participating in his daily care?		
Very much	Ref. Cat.	
Very	0.48 (0.10–2.25)	0.352
Moderate/A little/Not at all	0.34 (0.04–2.87)	0.320
Do you need help based on your personal needs (fatigue, stress)?		
Very much	Ref. Cat.	
Very	18.19 (2.34–141.22)	**0.006**
Moderate/A little/Not at all	1.43 (0.26–7.73)	0.680
Do you need contact with department after discharge?		
Very much	Ref. Cat.	
Very	0.19 (0.03–1.18)	0.075
Do you need written information about child's health at discharge?		

(continued)

Table 4.9 (continued)

	Anxiety	
	OR (95% CI)	*p*-Value
Very much	Ref. Cat.	
Very	1.32 (0.23–7.51)	0.755
Moderate	0.38 (0.06–2.55)	0.322

Table 4.10 Impact of parental characteristics on their depression

	Depression	
	OR (95% CI)	*p*-Value
Do you think there are difficulties while staying in the hospital room?		
Very much/Very	Ref. Cat.	
Moderate	0.30 (0.03–2.93)	0.300
A little/Not at all	0.09 (0.01–0.91)	**0.042**
Would you like other family members to stay in hospital?		
Very much/Very	Ref. Cat.	
Moderate	0.14 (0.03–0.74)	**0.021**
A little/Not at all	0.27 (0.05–1.38)	0.115
Do you need more opportunities or time for questions about child's health?		
Yes	Ref. Cat.	
No	1.41 (0.32–6.31)	0.652
Do you need contact with department after discharge?		
Very much	Ref. Cat.	
Very	0.14 (0.03–0.70)	**0.016**

within the family facilitates the child's adjustment to HSCT procedure while open communication between the staff and family facilitates parents' adjustment to the child's treatment [10]. By not being asked, parents believe that health professionals do not care, and clinicians fail to acknowledge important signs of parental depression or anxiety [20]. Accurate information along with assessment of caregivers' beliefs, concerns, and expectations may be an essential measure to diminish stress and misunderstandings [25].

Anxiety was experienced by parents who desired to participate in the daily care of their child and needed help based on their needs. HSCT imposes rules on family and is associated with highly specialized care procedures. It is not rare that parents have difficulty in accessing the care (hospital isolation room). Parents seek for practical issues in care, such as administering medications, care with water and food intake, care with the body, protective isolation, and addressing the child's need for emotional support. This complex care requires elaborate guidance and preparation tailored to the needs of family while clinicians need to facilitate routine support during highly stressful transitions of care [20, 26]. Parents appreciate when nurses offer comfort and reassurance, clarify information discussed at family-centered rounds, and educate parents how to care for their child after HSCT. The bonds parents form with nurses lead to a sense that nurses were an extension of their family [7].

Noteworthy, in the present study 88% of participants declared to need education on issues associated with daily care, after hospital discharge. During hospitalization, care is provided by the health team but after the discharge, family caregiver is responsible for the decisions and care actions [26].

Results also revealed anxiety and depression among participants who needed contacting the department after hospital discharge. Possibly, linkage to support systems may maximize adjustment to HSCT. Frequently, families temporarily relocate to be near the treating specialized hospital, which may negatively affect family by disrupting routines and interrupting employment. Parents are able to encounter with transition to home if the child had complex medical care needs caring prior to HSCT, if parents found caregiving activities rewarding, and if the parent was able to reestablish meaningful connections with family and friends outside the hospital [7].

Anxiety and depression also experienced participants who desired other family members to stay in hospital. Individuals who encounter a potentially threatening event (diagnosis of a critical illness) usually identify resources to cope with the associated stressors [24]. HSCT stressors lead parents to think about their relationships with friends and family differently. Some friends and family remain close during the child's HSCT and recovery while others distance themselves [7].

Interestingly, hospital admission is throwing families into crisis, helplessness, and confusion due to unfamiliarity of the environment, treatment procedures, and uncertainty of patients' clinical outcome. Inevitably, doubts and uncertainty are a source of anxiety at a time when coping resources are limited and the health care team is focused on the sick child [25]. Parents' perception of the child's health status seems a stronger predictor of parental burnout than objective medical measures [27].

Understanding parental psychological distress permits health care professionals to secure appropriate resources, allow parents to receive support in coping with the strain of child's care, and enable the child to better cope with the distressing experience of HSCT [10]. Parents suggest organizational-level solutions to enhance psychosocial support, including respite services, online connections with other caregivers, and bedside mental health services [18].

4.4.1 Limitations of the Study

The present study has some limitations. Firstly, convenience sampling is not representative of all parents living in Greece, thus the results cannot be generalized. Secondly, the study design was cross-sectional, thus not permitting investigation for causal relation between anxiety/depression and parents' characteristics. Finally, there was no other assessment that would allow evaluation of possible changes in anxiety/depression levels through time.

4.5 Conclusions

The results of the present study showed that anxiety was experienced by parents who declared the need to participate in child's daily care, who wanted help based on their needs, and who wanted other family members to stay in the hospital, as well as by those who needed scheduled meetings with parents having same problems, written information at discharge, and contact with the department after hospital discharge.

Depression was experienced by parents who believed they faced many difficulties while staying in hospital room, who wanted other family members to stay in hospital, and who had no need at all for scheduled meetings with parents having same problems, as well as by those who needed more opportunities or time for questions about the child's health, and contact with the department after hospital discharge.

Complexity of HSCT is illustrating the importance to provide such a clinical environment that incorporates assessment of parental distress as an integral part of health care process. In clinical practice, evaluating parents' needs may provide the staff with understanding of the type of knowledge they are seeking.

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5

Investigation of Anxiety and Health Locus of Control in Patients Undergoing Hemodialysis

Sofia Kalini, Afroditi Zartaloudi, Anna Kavga,
Angeliki Stamou, Victoria Alikari,
Evangelos C. Fradelos, and Georgia Gerogianni

Abstract

Introduction: Hemodialysis is the most frequent treatment modality for End-Stage Renal Disease (ESRD). However, a number of limitations and modifications accompany this treatment, affecting people's physical and psychological well-being and increasing anxiety symptoms. The aim of this study was to investigate the level of anxiety and health locus of control among dialysis patients. Methodology: One hundred and five patients on hemodialysis treatment completed a questionnaire with demographic characteristics, the State-Trait Anxiety Inventory and the Multidisciplinary Health Locus of Control Scale. Results: Women had significantly higher levels of state anxiety than men ($p = 0.019$). Similarly, patients with primary school education had significantly higher trait and total anxiety levels than those with technological education ($p = 0.002$ and $p = 0.033$, respectively). Widowed patients exhibited significantly higher state, trait, and total anxiety levels than married ($p = 0.032$, $p = 0.012$, and $p = 0.012$, respectively). Participants who did not do any kind of exercise had significantly higher level of state, trait, and total anxiety than those who did ($p = 0.011$, $p = 0.015$, and $p = 0.006$, respectively). Respondents who did not have any self-care skills had significantly higher level of state, trait, and total anxiety than those who had ($p = 0.011$, $p = 0.015$, and $p = 0.006$, respectively). State, trait, and total anxiety levels were significantly ($p \leq 0.05$) correlated negatively with internal locus of control and positively with "chance" locus of control scale. Conclusions: Hemodialysis patients had increased anxiety symptoms and believed that others had control over their health to a greater extent. Renal professionals need to apply effective interventions to dialysis patients in order to help them gain a better sense of control over their health and reduce anxiety symptoms.

Keywords

Renal disease · Hemodialysis · Anxiety · Health locus of control

5.1 Introduction

Hemodialysis is the most frequent treatment modality for End-Stage Renal Disease (ESRD) [1]. However, a number of limitations and modi-

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S. Kalini · A. Zartaloudi (✉) · A. Kavga · A. Stamou · V. Alikari · G. Gerogianni
Department of Nursing, University of West Attica, Athens, Greece
e-mail: azarta@uniwa.gr

E. C. Fradelos
Department of Nursing, University of Thessaly, Larissa, Greece

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fications accompany this treatment, affecting people's physical and psychological well-being and increasing anxiety symptoms [2]. Most often concerns experienced by these patients are food and fluid limitations; changes in marital roles; financial problems; frequent hospital admissions; restrictions in vacations; restrictions in physical activities; increased dependency on dialysis machine, dialysis staff, and family caregivers; uncertainty about the future; sleep disorders; fatigue; sexual dysfunction; difficulty in maintaining a job; changes in body appearance; pain; muscle cramps; and pruritus [3]. Additionally, these people usually have a poor appetite, infertility, problems with bones, anemia, and cardiovascular and gastrointestinal disorders [2].

Health locus of control beliefs point out whether people believe that their health condition is under their own control or under the control of forces external to themselves, such as other people, destiny, or luck [4]. Patients' beliefs about their health are significant to understand responses to chronic illness. It has been found that hemodialysis patients' beliefs that one's health is under control is related to less depressive symptoms. Moreover, internal health locus can help dialysis patients effectively face their difficulties derived from ESRD and have a better psychological condition, less somatic symptoms, and better quality of life. On the contrary, when patients are focused on important others' control over their condition, they have a depressive mood [5].

It has been found that an increased number of hemodialysis population have an external locus of control, while the longer the duration of hemodialysis the more external their locus of control. This may happen because dialysis patients are frequently dependent on family caregivers, dialysis staff, and dialysis machines, as well as their religious and spiritual beliefs about coping with problems and disease [6].

Moreover, chronic and long-term hemodialysis leads to a loss of meaning in patients' life and increases their anxiety symptoms. Additionally, patients have a sense of lack of control and feelings of hopelessness due to complications and limitations of hemodialysis. Moreover, hemodialysis patients are usually of an increased age, with a variety of physical, cognitive, and emotional problems, which make them unable to live independently [1]. The aim of this study was to investigate the level of anxiety and health locus of control among dialysis patients.

5.2 Materials and Methods

The study sample included 105 patients from one hemodialysis unit in Athens, the capital of Greece, after receiving written informed consent from each respondent. Inclusion criteria were age over 18 years, undergoing hemodialysis, and being able to speak, read, and write in Greek. Exclusion criteria were insufficient language skills, cognitive disorders, and drug or alcohol abuse. All the participants were undergoing regular hemodialysis three to four times per week and they were asked to complete the questionnaires at that time. Participation was voluntary and anonymity was assured. Before collecting data, approval was obtained by the Scientific Council of the hemodialysis unit. The research complied with the General Regulation for the Protection of Personal Data (GDPR) and the ethical standards of the Declaration of Helsinki (1989) of the World Medical Association. Data collection was carried out by interviews using the State–Trait Anxiety Inventory (STAI) for the evaluation of anxiety, the Multidisciplinary Health Locus of Control (MHLC), FORM A, for the evaluation of health beliefs, and a questionnaire that was created by the researchers and included demographic and clinical characteristics.

5.2.1 Instruments

5.2.1.1 State–Trait Anxiety Inventory (STAI)

The state–trait anxiety inventory (STAI) was created by Spielberger [7] and is a reliable and valid scale widely used in research and clinical setting. The State Anxiety questionnaire includes 20 statements that assess how the participant feels "right now, at this moment." The Trait Anxiety questionnaire contains 20 statements evaluating how the participant feels "generally." The assessment is carried out on the basis of a 4-point Likert scale (1–2–3–4) with a range from 1 ("not at all" for State- or "almost never" for Trait-Anxiety) to 4 ("very much so" for State- and "almost always" for Trait-Anxiety). Reverse scoring is used for anxiety-absent items (e.g., "I feel calm" or "I am happy"), and therefore a higher score indicates greater anxiety. Scores for State Anxiety and Trait Anxiety questionnaires can vary from 20 to 80. The state–trait anxiety inventory had high reliability and validity in Greek population [8].

5.2.1.2 Multidisciplinary Health Locus of Control, MHLC (FORM A)

The MHLC is an 18-item form developed by Wallston et al. [9]. It consists of three subscales, each of which includes six questions: The first subscale assesses the extent to which people believe that their health condition is due to their own actions. The second subscale assesses the belief that one's health condition is due to the actions of other persons (health care providers, family members, friends). The third subscale assesses the belief that nobody or nothing controls individuals' health condition, and that their health status is due to fate, luck, or chance. Higher scores for each subscale indicate the prevalence of each type of health belief (score for each subscale ranges from 6 to 36) [4]. The MHLC had high reliability and validity in the Greek population [10].

5.2.2 Data Analysis

Descriptive and inductive statistics were used in the present research study. Through descriptive statistics, the characteristics of the sample and their responses to the main part of the survey were captured. Also, through inductive statistics the research hypotheses and the effect of sample characteristics on anxiety and focus of control were examined. More specifically, Pearson's correlation index, *t*-test, and analysis of variance (ANOVA) test were used. The analysis was performed using the statistical program SPSS 17.0. Statistical significance was set up at 0.05. A *p*-value ≤ 0.05 was considered to be statistically significant. Internal consistency for the questionnaire was evaluated with Cronbach's alpha indexes. Values ≥ 0.7 were indicative of good internal consistency of the items.

5.3 Results

5.3.1 Sample Characteristics

A total of 105 (response rate 65.62%) out of 160 patients participated in the study. The mean age of the respondents was 62.51 years (standard deviation [SD]: 17.55). Additionally, 58.1% of them were male and 41.9% were female. Most of the participants were married (59.6%) and 45.7% had more than 2 children. Almost 40.9% of the participants had secondary education and 60.2% were pensioners. The majority of the participants were Greek (93.3%) and lived in Athens (78.1%). The most dominant co-morbid diseases among the respondents were diabetes (39%), hypertension (31.4%), and heart disease (30.5%). The duration of hemodialysis was 58.15 months (SD: 58.37; Table 5.1).

The mean value of the state anxiety of respondents was 44.6 and anxiety as a characteristic of the personality (trait anxiety) was 46.09. The mean value for the overall anxiety scale in the present study was 90.27. The mean value in the subscale of internal control focus was 24.61, in the subscale of health control focus by others 27.18, and in the subscale of health control focus by chance 21.0 (Table 5.2).

In this study there was a statistically significant negative correlation between state anxiety and internal control focus ($r = -0.310$), trait anxiety and internal control focus ($r = -0.249$), and total anxiety and internal control focus ($r = -0.304$). Furthermore, there is a statistically significant positive correlation between state anxiety and control focus by chance ($r = 0.196$), trait anxiety and control focus by chance ($r = 0.341$), and total anxiety and control focus by chance ($r = 0.261$; Table 5.3).

Table 5.1 Sociodemographic characteristics of the sample ($N = 105$)

		N	%
Gender	Male	61	**58.1**
	Female	44	41.9
Marital status	Single	15	14.5
	Married	62	**59.6**
	Divorced	12	11.5
	Widowed	15	14.4
Children	Yes	82	**78.1**
	No	23	21.9
Occupation	Freelancer	21	25.0
	Civil servant	11	13.1
	Private sector employee	31	**36.9**
	Student	1	1.2
	Another	20	23.8
Education	Illiterate	9	**8.6**
	Primary school	26	**24.8**
	Secondary education	14	13.3
	High school	29	27.6
	Technological education	6	5.7
	University education	18	17.1
	McS	2	1.9
	Other	1	1.0
Do you work at present?	Full time	10	9.7
	Part time	10	9.7
	Unemployed	10	9.7
	Pensioner	62	**60.2**
	Household	10	9.7
	Another	1	1.0
Residence	Athens	82	**78.1**
	Urban areas	22	20.9
	Rural areas	1	1.0
Nationality	Greece	98	**93.3**
	Other country	7	6.7
Age, in years: mean (range)			62.51 (20–93)
Hemodialysis duration, in months: mean (range)			58.15 (1–270)
Do you take an anxiolytic/antidepressant treatment?	Ναι	28	**27.5**
	Όχι	74	72.5
Do you do some kind of exercise?	Ναι	29	28.4
	No	73	**71.6**
Do you have self-care skills?	Yes	27	72.4
	No	71	**27.6**

5.3.2 Association of Anxiety Scale with Patient Characteristics

Women had higher levels of state anxiety than men ($p = 0.019$). Participants who used to take an anxiolytic/antidepressant treatment had higher levels of anxiety (total, state, and trait) than those who did not take ($p = 0.005$, $p = 0.050$, $p = 0.001$, respectively). Participants who did not do any kind of exercise had higher level of anxiety (total, state, and trait) than those who did ($p = 0.006$, $p = 0.011$, $p = 0.015$, respectively). Respondents who did not have self-care skills exhibited higher level of anxiety (total, state, and trait) than those

Table 5.2 Anxiety and health control focus

	Min	Max	Mean	Standard deviation
Anxiety (total)	41.00	133.00	**90.27**	21.82
Anxiety (state)	23.00	70.00	**44.60**	11.82
Anxiety (trait)	22.00	73.00	**46.09**	11.54
Internal control focus	8.00	35.00	**24.61**	5.27
Focus of control in relation to others	9.00	36.00	**27.18**	5.95
Control focus on chance	6.00	36.00	**21.00**	6.03

Table 5.3 Correlation between anxiety and locus of control

	Anxiety (total)	Anxiety (state)	Anxiety (trait)	Internal control focus	Focus of control in relation to others	Control focus on chance
Anxiety (total)	1	0.900^{**}	0.910^{**}	-0.304^{**}	−0.140	0.261^{**}
Anxiety (state)	0.900^{**}	1	0.666^{**}	-0.310^{**}	−0.174	0.196^{*}
Anxiety (trait)	0.910^{**}	0.666^{**}	1	-0.249^{*}	−0.030	0.341^{**}
Internal control focus	-0.304^{**}	-0.310^{**}	-0.249^{*}	1	0.449^{**}	0.223^{*}
Focus of control in relation to others	−0.140	−0.174	−0.030	0.449^{**}	1	0.260^{**}
Control focus on chance	0.261^{**}	0.196^{*}	0.341^{**}	0.223^{*}	0.260^{**}	1

$^{*}p < 0.05$; $^{**}p < 0.01$

who had (SD: 22.06 vs. 16.67; Table 5.4). Similarly, patients with primary school education had higher levels of (total and trait) anxiety than those with technological education (p = 0.033, p = 0.002, respectively; Table 5.5). Widowed had higher levels of anxiety (total, state, and trait) than married (p = 0.012, p = 0.032, p = 0.012, respectively; Table 5.6).

The Cronbach's alpha of the total anxiety questionnaire was found to be 0.947. In particular, the Cronbach's alpha was 0.909 for "state anxiety" subscale and 0.921 for "trait anxiety" subscale, indicating very high reliability for the total scale and for each subscale as well. Additionally, the Cronbach's alpha was 0.693 for internal locus of control, 0.773 for external locus of control, and 0.735 for chance locus of control.

5.4 Discussion

The results of this study showed that women had a higher rate of anxiety than men. This finding is consistent with previous studies [11, 12]. This can be caused due to hormonal factors, low self-confidence, social and cultural restrictions, as well as multiple roles and responsibilities of women [13].

The present study also found that widowed patients had higher levels of anxiety than singles. This finding is consistent with previous studies indicating that people who live alone are more likely to experience higher levels of anxiety [14, 15]. The loss of a close person is experienced as a stressful event leading to anxiety symptoms [14].

The mean values of the scales and subscales of the present study demonstrate that the sample shows slightly higher anxiety than the general population [16]. These results are congruent with those of Ng et al. [17], where 55.3% of participants showed little or no symptoms of anxiety. However, Petrakis et al. [14] found in their research study that 25.2% of men undergoing hemodialysis had high levels of anxiety. Similarly, Gerogianni et al. [11] found that 17.1% of hemodialysis patients had high levels of anxiety. It is important to take into consideration that anxiety of people on hemodialysis is related to health problems they experience and the propor-

Table 5.4 Association of anxiety with demographic characteristics of participants

	Gender						
	Male		**Female**				
	Mean	SD	Mean	SD	*t*	*df*	*p*
Anxiety (total)	**86.92**	20.66	**95.02**	22.77	−1.888	102	0.062
Anxiety (state)	**42.33**	11.73	**47.84**	11.32	−2.393	102	**0.019**
Anxiety (trait)	**44.59**	10.86	**48.29**	12.28	−1.608	101	0.111
	Do you take an anxiolytic/antidepressant treatment?						
	Yes		**No**				
	Mean	SD	Mean	SD	*t*	*df*	*p*
Anxiety (total)	**100.70**	19.67	**87.23**	21.23	2.877	99	**0.005**
Anxiety (state)	**48.56**	11.58	**43.31**	11.88	1.976	99	**0.050**
Anxiety (trait)	**52.15**	10.74	**43.92**	11.26	3.289	99	**0.001**
	Do you do some kind of exercise?						
	Yes		**No**				
	Mean	SD	Mean	SD	*t*	*df*	*p*
Anxiety (total)	**81.52**	19.88	**94.24**	21.08	−2.788	99	**0.006**
Anxiety (state)	**39.86**	11.81	**46.40**	11.37	−2.587	99	**0.011**
Anxiety (trait)	**41.66**	11.02	**47.83**	11.50	−2.472	99	**0.015**
	Do you have self-care skills?						
	Yes		**No**				
	Mean	SD	Mean	SD	*t*	*df*	*p*
Anxiety (total)	**86.97**	22.06	**102.58**	16.67	−3.726	58.731	**0.000**
Anxiety (state)	**43.06**	11.61	**50.58**	10.65	−2.887	95	**0.005**
Anxiety (trait)	**44.53**	11.96	**52.00**	8.28	−3.453	64.632	**0.001**

tion of those experiencing anxiety disorders ranges between 25.2% and 87% [18–23].

The differences in the intensity of the anxiety symptoms experienced by the patients are usually attributed to the stage of their disease that affects their adaptation, as well as the different psychometric tools used by the researcher in order to assess anxiety symptoms [18].

Additionally, it is worth noting that several of the participants in the present study (27.5%) were under medication for the treatment of anxiety or depressive symptoms, a condition that probably affects the result of the assessment of the level of anxiety during the conduct of this survey. According to Timmers et al. [24], the chronic nature of the disease and the treatment of hemodialysis cause severe anxiety to patients. As a result, it is likely that a proportion of these patients are taking medication in order to control their anxiety symptoms [17].

Participants in this study showed a lower score on the internal locus of control subscale (measures the degree to which participants feel they have control of their own health), a higher score on the others' focus of health control subscale (measures the degree to which participants believe that others—doctors—have control over their health), and a higher score on the health control focus on luck subscale (measures the extent to which participants believe that their health is a matter of luck) compared to the general population [10].

The majority of dialysis patients in other studies seem to attribute health control to significant others, such as family and doctors [25, 26]. This may be related to the participants' low self-esteem and a reduced sense of self-efficacy due to their illness [25]. However, in a similar research study, hemodialysis patients reported a higher internal locus of control, possibly due to their attempt to compensate for a sense of dependence on treatment by developing personal control over their illness [27].

Table 5.5 Association of anxiety with educational level of participants

	Education															
	Illiterate		Primary education		Secondary education		High school		Technological education		University education					
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	*Df*	*Df*2	*F*	*p*
Anxiety (total)	**93.00**	18.19	**99.19**	22.82	**89.29**	15.06	**93.28**	22.81	**77.50**	14.92	**79.33**	20.62	5	95	2.541	**0.033**
Anxiety (state)	43.88	11.48	48.58	13.02	44.00	8.74	45.52	11.48	40.00	10.60	40.67	12.57	5	95	1.229	0.302
Anxiety (trait)	**49.13**	8.44	**50.62**	11.58	**45.29**	8.85	**49.43**	11.26	**37.50**	9.69	**38.67**	9.89	5	94	4.231	**0.002**

Table 5.6 Association of anxiety with marital status of participants

	Marital status											
	Single		Married		Divorced		Widowed					
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	*Df*1	*Df*2	*F*	*p*
Anxiety (total)	**91.40**	24.39	**85.31**	19.21	**100.67**	22.12	**103.00**	24.12	3	99	3.852	**0.012**
Anxiety (state)	**47.80**	13.25	**41.90**	10.10	**49.00**	12.34	**49.79**	14.67	3	99	3.042	**0.032**
Anxiety (trait)	**43.60**	12.61	**44.10**	10.35	**51.67**	13.14	**53.21**	11.03	3	98	3.818	**0.012**

The present study also found that when patients had more control over their health, they experienced less anxiety. This finding is congruent with other research studies where there was found that patients with an internal locus of control had a better quality of life and better mental health. According to Theofilou [27], internal locus of control appeared to be negatively related to participants' anxiety, since patients with a high internal locus of control seemed to experience fewer symptoms of anxiety and fewer negative consequences in their daily lives [28].

The findings of the present study indicated that participants with a lower level of academic education had increased anxiety. This can be attributed to the fact that hemodialysis patients with a low level of academic education may be more concerned about maintaining their job due to their decreased functionality since they are usually involved in manual-type occupations. In addition, individuals with a higher level of academic education are likely to have increased abilities to apply more effective coping strategies to manage anxiety. Also, people with higher academic education may be more likely to refer to mental health professionals and seek appropriate intervention to manage difficulties and stressful situations. Seeking help allows them to reduce their anxiety while enhancing their sense of self-efficacy [29].

In this study, participants with self-care skills showed statistically significant lower level of anxiety compared to those who needed help. Similarly, Mahmoud and AbbElaziz [30] found that patients with a higher level of self-efficacy and self-care skills reported lower levels of anxiety. A person's dependence on someone else to meet their basic needs limits their autonomy and sense of freedom, reducing their self-esteem [31].

This study also showed a statistically significant correlation between the degree that participants' health condition affects their ability to respond to daily activities and the anxiety they experience. In a similar research study, it was found that health problems experienced by dialysis patients caused changes in their daily life (professional, social, personal) and increased their anxiety [21]. The social life of patients is frequently affected since they have to adjust their lives to the strict treatment program imposed by hemodialysis treatment [30]. It can be assumed that renal disease affects the patient's daily life and increases their anxiety [32], while the difficulties of the participants to respond to daily activities can be possibly derived from the intense anxiety they experience [33].

The present study also found that 71.6% of participants did not do any kind of exercise and had increased levels of anxiety. It can be assumed that problems caused by hemodialysis affect the physical, mental, and social status of patients and limit their participation in physical exercises, which leads to increased anxiety levels [34]. In a similar research study with the participation of 72 hemodialysis patients, it was found that participants' anxiety and depressive symptoms were associated with reduced physical activity [23]. Patients with lower levels of physical exercise are characterized by a statistically significant higher level of anxiety, while physical exercise has been found to lead to a reduction in anxiety [35, 36].

5.4.1 Limitations of the Study

The sample used in this study is a convenience sample since it comes from one dialysis unit in Athens, Greece. Thus, the findings cannot be generalized. Further investigation of anxiety and health control locus in patients undergoing hemodialysis can be achieved with more qualitative approaches.

5.5 Conclusions

Hemodialysis patients have increased anxiety symptoms than the general population and believe that others have control of their health to a greater extent. This is possibly due to the fact that they are dependent on others, such as physicians, nurses, family, and machines, leading to a limitation of their sense of freedom and autonomy. Furthermore, when patients' anxiety increases, the belief that their health level depends on themselves decreases, and their belief that their health level depends on luck increases. This finding can help renal professionals to apply effective interventions to dialysis patients in order to gain a better sense of control over their health and reduce anxiety symptoms.

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6

The Effect of Pythagorean Self-Awareness Intervention on Stress and Mental Health Characteristics of Civil Servants in Crete, Greece

Christina Darviri, Eleni Zigkiri, Dimitrios S. Simos,
Maria Charalampopoulou, Ioulia Kokka,
Dimitrios Vlachakis, Flora Bacopoulou,
and George P. Chrousos

Abstract

Evidence is limited regarding the effects of holistic programs on work-related stress, anxiety, and depressive symptomatology. This study aimed to evaluate the effects of the Pythagorean Self-Awareness Intervention (PSAI) on stress and mental health characteristics of civil servants in Crete, Greece. This was a single arm interventional study with PSAI outcome evaluation. Validated, self-reported scales were used to assess stress and mental health characteristics (PSS, DASS, UCLA, RSE, and STAXI). Hair samples were obtained to measure cortisol concentrations as a biological stress marker. Paired-samples t-test or Wilcoxon tests were used to evaluate pre- and post-intervention measures. Overall, 48 civil servants (56.3% women, mean age 51 years) participated in the study. Statistically significant reductions were observed in all self-reported stress scales ($p < 0.05$). Although hair cortisol decreased, this difference was not statistically significant ($p = 0.109$). Statistically significant improvements were also observed

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C. Darviri (✉) · E. Zigkiri · D. S. Simos
Postgraduate Course on the Science of Stress and Health Promotion, School of Medicine, National and Kapodistrian University of Athens, Athens, Greece
e-mail: cdarviri@med.uoa.gr

M. Charalampopoulou
Postgraduate Course on the Science of Stress and Health Promotion, First Department of Propaideutic Surgery, School of Medicine, National and Kapodistrian University of Athens, Athens, Greece

I. Kokka
Postgraduate Course on the Science of Stress and Health Promotion, Outpatient Specialty Clinic for Sexual Health, First Department of Psychiatry, School of Medicine, National and Kapodistrian University of Athens, Athens, Greece

D. Vlachakis
Laboratory of Genetics, Department of Biotechnology, School of Applied Biology and Biotechnology, Agricultural University of Athens, Athens, Greece
e-mail: dimvl@aua.gr

F. Bacopoulou
Postgraduate Course on the Science of Stress and Health Promotion, Center for Adolescent Medicine and UNESCO Chair in Adolescent Health Care, First Department of Pediatrics, School of Medicine, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece
e-mail: fbacopoulou@med.uoa.gr

G. P. Chrousos
University Research Institute of Maternal and Child Health & Precision Medicine, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece

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on depressive symptomatology ($p < 0.001$), self-esteem ($p < 0.001$), loneliness ($p < 0.001$), self-efficacy ($p = 0.002$), and anger ($p = 0.017$). The PSAI appeared beneficial with respect to all self-reported outcomes. Larger studies including control groups and further follow-up evaluations are needed to ascertain these findings.

Keywords

Stress · Anxiety · Work stress · Civil servants · Holistic stress management · Pythagorean self-awareness · PSAI · Intervention · Hair cortisol

6.1 Introduction

Work is an activity interwoven with the individual as a social being [1]. Rapid changes in work settings, along with globalization and technological advances have created antagonizing and stress-inducing environments for employees and workers. These changes have led to adjustments regarding procedures and activities of organizations in the public and private sector, which in their turn may provoke emotional distress. This type of stress can be converted in mental health difficulties, such as depressive symptomatology, anxiety, and other burdening psychological expressions, which can affect the personal and professional life of an individual [2] and challenge physical health [3]. According to the World Health Organization depression is classified among the most prevalent problems at a global level. Depression and anxiety are considered among the dominant problems in working environments, as they are responsible for a high percentage of sick leaves [4].

Aiming at reducing employees' stress, several interventions from different starting points have been implemented. A recent systematic review showed that interventions of cognitive behavioral approach were proven as more efficient compared to interventions utilizing relaxation or dialectical techniques [5]. Others, which addressed either structural (e.g., shift schedules) or social-orientated (e.g., social support) aspects [6] and appeared as ineffective [7]. Among those with individual orientation, most attempted to apply lifestyle modifications in the working environments and appeared as moderately effective [8].

The Pythagorean Self-Awareness Intervention (PSAI) is a novel, holistic program that has demonstrated promising results regarding stress reduction in groups facing diverse physical and mental health conditions. The program has been implemented on individuals with obesity [9], major depressive disorder [10], multiple sclerosis [11], mild cognitive impairment [12], breast cancer [13], and chronic insomnia [14]. In all efforts significant reductions were documented regarding stress, depressive symptoms, anxiety [13, 9], sleep quality [14], and hair cortisol concentration [13, 14].

This study aimed to investigate the effects of PSAI on stress and mental health characteristics of Greek civil servants, by using self-reported instruments and hair cortisol measurements as a stress biomarker. The primary objective of the study was to examine the difference in participants' stress levels between pre- and post-intervention assessments. Secondary objectives were to explore PSAI's effect on other mental health characteristics, including depression, anxiety, loneliness, self-efficacy, and self-esteem.

6.2 Subjects and Methods

6.2.1 Study Design, Setting, and Participants

This study was a single arm interventional study with before and after outcome evaluation implemented in Crete, Greece. The study was conducted from January to March 2020 and all civil servants of a regional authority were invited to participate, irrespective of age or gender. Candidates were excluded if they were under any treatment with corticosteroids or if they were under psychotropic medication for less than 3 months. Research has shown that alteration of stress response is possible in both cases [15, 16]. In addition, female participants who used contraceptive medication were also excluded [17]. The study protocol complied with the Declaration of Helsinki and was approved by the Research

Ethics Committee of the University of Crete (protocol number 210/21.11.2019). Employees were enrolled only after being fully informed (both verbally and through an information sheet) about the aims and the procedure of the study and providing their signed informed consent.

6.2.2 Intervention

The PSAI is a mental, cognitive-oriented technique, grounded on the 71 Golden Verses of the ancient philosopher Pythagoras. These verses highlight and dictate a certain lifestyle and moral framework. The corner stone of the technique is to facilitate the practitioner to teach how to observe oneself detached from any emotional charge and achieve self-awareness and restraint. The technique is delivered through 8 weekly sessions. All sessions' duration is planned at 120 min, except from the final one which lasts 1 h.

During the first, individualized session the participant is submitted to baseline measurements and is trained in diaphragmatic breathing. During the following session, all participants as a group are introduced in stress-related information and are educated on stress mechanisms and their impact on physical and mental health. They are instructed on how to follow a healthy lifestyle and receive practical information about how to include exercise in their weekly schedule and maintain a healthy diet and a steady sleep routine. The following four sessions are dedicated at training participants on how to perform PSAI technique. Detailed information on each step of the technique is outlined in Table 6.1. Participants are required to practice the PSAI twice daily (right after morning awakening and right before night bedrest) for 30 min, preferably in a quiet place, after practicing diaphragmatic breathing for 5 min.

6.2.3 Measurements

Measurements were conducted before implementing the intervention (baseline) and after completing the intervention (eight weeks after the baseline assessment). Participants completed validated, self-reported questionnaires assessing study outcomes. Stress levels were evaluated through both self-reported scales and through hair cortisol samples. Study variables and evaluation instruments are described in detail below.

Table 6.1 Detailed presentation of each step of the PSAI technique

Step 1	Sit at a quiet place and comfortable position and breath diaphragmatically for 5′. Read through the golden verses, with emphasis on verses 9–45.
Step 2	Recall all daily events in the exact sequence those occurred.
Step 3	Visualize yourself as an external observer. Assess reactions and behaviors toward each event and whether the day's goals were accomplished.
Step 4	Critically appraise each selected experience using three questions: "In what have I done wrong? What have I done right? What have I omitted that I ought to have done?." remember to stay emotionally detached, examine the performed actions and disapprove or endorse accordingly (verses 9–45).
Step 5	During the morning practice briefly summarize the conclusions of the previous night practice and set goals for the upcoming day.

6.2.3.1 Demographic Characteristics

Participants completed a demographics' form which included gender, age, family status, cohabitation and parity status, educational level, working experience, and medical history (chronic conditions, medications).

6.2.3.2 Perceived Stress Scale 14 (PSS-14)

It consists of 14 items, each answered on a 5-point Likert scale. There are seven positive and seven negative items, and total score can range from 0 to 56. Higher PSS scores indicate higher levels of perceived stress over the past month [18].

6.2.3.3 Depression, Anxiety Stress Scale 21 (DASS-21)

It consists of 21 items that generate 3 subscales (depression, anxiety, and stress). Each item is answered on a 5-point Likert scale. Specific cut-off scores for each symptom describe the degree of severity (normal, mild, moderate, severe, and extremely severe) [19].

6.2.3.4 UCLA Loneliness Scale

It consists of 20 items, involving 10 negative and 10 positive statements. Answers are given on a 4-point Likert scale (1 = “never” and 4 = “often”). The average loneliness score is 20. A score of 25–29 reflects a high level of loneliness. A score of 30 or higher reflects a very high level of loneliness [20].

6.2.3.5 Rosenberg’s Self-Esteem Scale (RSE)

It consists of 10 items which are answered on a 4-point scale from strongly agree to strongly disagree. Five of the items have positively worded statements and five have negatively worded ones. The scale measures self-worth by measuring both positive and negative feelings about respondent’s self. Scores between 15 and 25 are considered average [21].

6.2.3.6 General Self-Efficacy Scale

It is a 10-item scale that assesses optimistic self-beliefs to cope with a variety of daily hassles in life, as well as adaptation after experiencing stressful life events. Participants respond on a 4-point scale [22].

6.2.3.7 State Trait Anger Expression Inventory (STAXI)

It consists of 24 items accessing internalized and externalized anger, and anger control [23].

6.2.3.8 Hair Cortisol Levels

Hair samples were taken from the posterior vertex of the scalp and stored at room temperature until analysis. The first 3 cm of hair most proximately to the scalp were cut and pulverized with a ball mill. Cortisol was extracted into methanol. The exact procedure of hair cortisol analysis has been described elsewhere [13]. The analysis was performed at the Choremeio Research Laboratory of the First Department of Pediatrics of School of Medicine, National and Kapodistrian University of Athens, Greece.

6.2.4 Statistical Analysis

Data are summarized using descriptive statistics. Differences in participants’ outcomes between pre- and post-intervention assessments were explored using paired *t*-tests or the non-parametric equivalent Wilcoxon test. Significance level was set at 0.05. Analysis was performed in SPSS version 24.0 (Statistical Package for Social Sciences, SPSS Inc, Illinois, USA).

6.3 Results

A total of 48 civil servants were included in the present analysis. Figure 6.1 presents the study flow diagram.

Most participants were women (56.3%), married (79.2%) and of tertiary or higher education (75%), with mean (SD) age of 51 (8.5) years. Detailed demographic characteristics are presented in Table 6.2.

Table 6.3 presents the differences in participants’ stress indicators between pre- and post-intervention assessments. Statistically significant reductions were observed in all self-reported stress scales ($p < 0.05$). Though a decrease of hair cortisol was reported, this difference was not statistically significant ($p = 0.109$). Statistically significant improvements were also observed with respect to the secondary outcomes, including depressive symptomatology ($p < 0.001$), self-esteem ($p < 0.001$), loneliness ($p < 0.001$), self-efficacy ($p = 0.002$), and anger ($p = 0.017$).

6.4 Discussion

The present study evaluated the effect of PSAI, a novel cognitive-based holistic intervention, on stress and other mental health characteristics of civil servants in Crete. Findings indicated statistically significant post-intervention improvements in all self-reported outcomes.

Specifically, statistically significant reductions were observed in stress levels as measured by both the PSS and the DASS-21 scales. These results came in line with other studies applying the PSAI. In a randomized controlled trial including 28 individuals with obesity in the intervention group, Simos et al. [9] reported

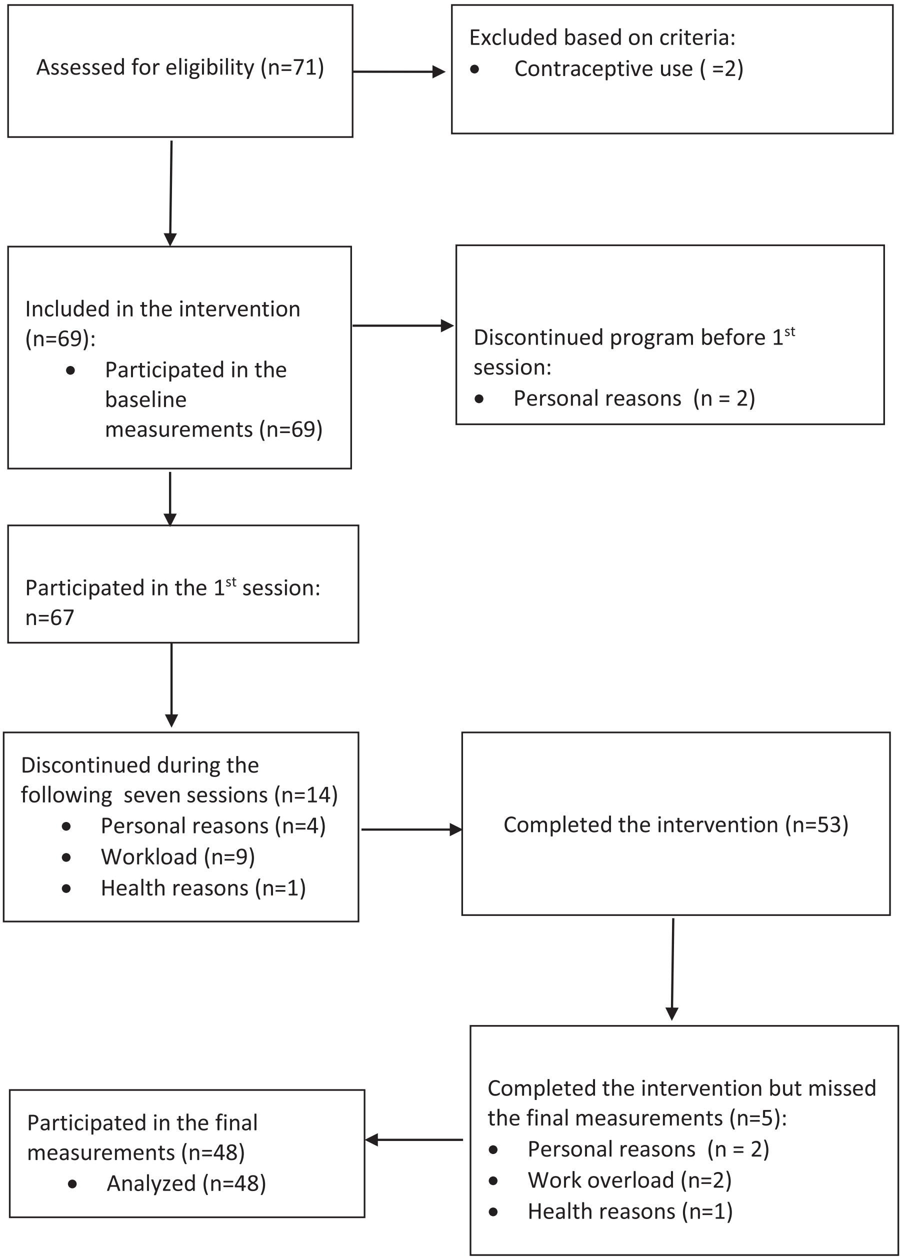

Fig. 6.1 Flow diagram of the participants of the PSAI intervention

similar statistically significant reductions on these self-reported stress indicators. The study of Zigkiri et al. [24] evaluated the effectiveness of the PSAI on a community sample and demonstrated similar results. Reducing stress or regulating stress reactivity is of great importance, since the fact that stress impedes mental and physical health is well-established [25, 26]. The effects of the program on the population under examination is of particular importance. Evidence has shown that reducing stress of employees can lead to elimination of the negative reaction on workload, which could, in turn, lead to a more cooperative and productive cul-

Table 6.2 Demographic characteristics of the civil servants participating in the PSAI in Crete, Greece (*N* = 48)

Variable (*N* = 48)		*N* (%)
Sex	Males	21 (41.8)
	Females	27 (56.3)
Age	Mean (SD)	51.0 (8.5)
	Min–max	25–64
Family status	Single	6 (12.5)
	Married	38 (79.2)
	Divorced	4 (8.3)
Cohabitation status	Yes	39 (88.6)
	No	5 (11.4)
Parity	Yes	41 (85.4)
	No	7 (14.6)
Educational level	Secondary education	10 (20.8)
	Technical education	2 (4.2)
	Tertiary education	24 (50.0)
	MSc/PhD	12 (25.0)
Working experience (in years)	1–10	8 (17.0)
	11–20	18 (38.3)
	>21	20 (44.7)

ture, as well as less sick days [27, 28]. Regarding the effect of PSAI on stress measured through hair cortisol concentrations, results were not statistically significant, although lower levels of hair cortisol post-intervention were documented. A possible explanation for this could be the timepoints and length of hair sample examinations. Namely, 3 cm of hair most proximal to the scalp were utilized for the analysis, while the intervening program lasted for 2 months. Given the fact that each cm of hair depicts the cortisol level of the last month, a significant difference would be difficult to be captured. With respect to the secondary objectives of the study, results indicated a statistically significant reduction in self-reported depressive symptomatology, anxiety, loneliness, and anger, while improvements were documented in self-esteem and self-efficacy indicators. As far as anxiety is concerned, the results are in contrast with those of a cognitive-based, large-scale longitudinal study with structured sessions similar to PSAI [29]. Researchers reported a moderate effect size of anxiety levels; however, that program was held online and the instrument used for anxiety evaluation was different.

The positive results on depressive symptomatology agreed with the results of the study of Psarraki et al. [10]. Researchers implemented the program in a group of 34 individuals with a diagnosis of major depressive disorder. Their findings showed significant improvement on depressive symptoms compared to a control group of usual treatment.

Self-efficacy and self-esteem are strongly associated, with the first one being able to function either as a determinant or a consequence of one's self-esteem [30]. This study revealed statistically significant improvements for both variables. A meta-analysis which examined 274 correlations of traits that could affect job satisfaction and work performance showed that these two traits are those with the highest impact [31].

Statistically significant reductions were also observed in loneliness and anger, both internalized and externalized. Research has shown that individuals who are professionally active are likely to be exposed to others' anger and demonstrate anger as well [32]. Increased anger has been associated with negative outcomes such as aggressive behaviors and higher levels of stress, and more specifically work-related stress [33]. However, contrary findings have shown that anger is related to higher sense of control, responsibility, [34] and optimism.

Table 6.3 Pre- and post- PSAI differences in stress and mental health characteristics of civil servants in Crete, Greece ($N = 48$)

	Pre-intervention	Post-intervention	
	Mean (SD) or median (IQR)	Mean (SD) or median (IQR)	*p* value
PSS$_{\S}$	24.00 (9.50)	19.00 (6.50)	<0.001
DASS21 stress	6.56 (3.12)	3.00 (2.23)	<0. 001
DASS21 depression	3.00 (4.00)	1.00 (3.00)	<0.001
DASS21 anxiety	3.00 (3.00)	1.00 (1.50)	<0.001
UCLA	37.11 (6.66)	31.33 (4.24)	0.001
RSE	17.00 (3.74)	23.78 (4.43)	<0.001
General self-efficacy	28.44 (1.50)	29.89 (1.83)	0.002
STAXI total score	23.00 (4.00)	23.00 (6.00)	0.017
STAXI internalized anger	18.00 (5.50)	16.00 (7.00)	<0.001
STAXI externalized anger	14.00 (2.64)	13.56 (1.87)	0.040
Hair cortisol concentrations	7.81 (2.86–25.20)	7.11 (1.14–24.00)	0.109

DASS21 Depression Anxiety Stress Scale, *UCLA* UCLA Loneliness Scale, *RSE* Rosenberg's Self-Esteem scale, *STAXI* State Trait Anger Expression Inventory, *SD* Standard Deviation, *IQR* Interquartile Range

Hypothesizing the possible pathways through which PSAI functions and manages to reduce stress, as a cognitive restructuring technique, it appears to enable those practicing it to view situations under a different perspective, regain control and reduce the intense emotional reaction to stress-inducing events. Based on the logic of the "third observer," it helps the individual to identify those thoughts that are emotionally burdening and obstructive and replace them with more objective ones. Practicing the technique, a healthier way of relating and responding to experiences can be adopted. Though it appears as PSAI shares common elements with cognitive behavioral therapy, the intervention has several additional features. To begin, once someone is trained, the technique can be practiced individually at home without any assistance required. Furthermore, compared to therapeutic or relaxation techniques, PSAI does not require the constant presence of a therapist or an instructor.

Though the present study demonstrated positive results, it bears certain limitations. Firstly, its descriptive design, particular context, small sample, and absence of formal sample size calculations results' generalizability. In addition, the study did not include a comparison group to test the effect of the intervention compared to a different approach. A follow-up measurement which would facilitate the investigation of the long-term effects of the program was also not performed. Measurements after a reasonable period could have further allowed the more precise evaluation of hair cortisol levels. Lastly, the use of self-report instruments may have introduced certain bias [35].

6.5 Conclusion

This study provides insights regarding the effect of the PSAI on stress levels and specific mental characteristics of the participating Greek civil servants. Findings indicated positive intervention effects with respect to self-reported stress, depressive symptomatology, self-esteem, self-efficacy, and loneliness. Future studies should incorporate larger sample sizes with follow-up measurements and comparison groups.

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7

Coping Strategies in Greek Parents of Children with Cancer

Ioannis Koutelekos, Maria Polikandrioti,
Panagiota Krokou, Evangelos Dousis,
Chrisoula Ntafogianni, Eleni Evagelou,
Eugenia Vlachou, Vasiliki Ntre, Stella Geronikolou,
Dimitris Koukoularis, and Aphrodite Zartaloudi

Abstract

Introduction

Childhood cancer is a life-threatening, chronic condition and treatment may extent for several years. The diagnosis of cancer in children could stress intensely their parents.

Aim

To explore coping strategies utilized by Greek parents who have children with cancer.

Material and Methods

Eighty-five parents of children with cancer, admitted for treatment at the in-patient unit of a Paediatric Hospital in Athens completed a questionnaire with demographic and their children's disease related characteristics and the Family Crisis Oriented Personal Evaluation Scale.

Results

Sixty mothers (70.6%) and 25 fathers (29.4%) completed the questionnaire. A percentage of 29.4% of the parents included in this study considered themselves anxious. Elementary or secondary school graduates scored higher in Seeking Spiritual Support ($p = 0.013$). Stay-at-home or unemployed parents scored lower in the subscale of Passive Appraisal ($p = 0.012$). Parents who were very well informed tended to exhibit more frequently passive appraisal behavior ($p = 0.004$). Parents whose child had Hodgkin's lymphoma scored higher in the subscale of Acquiring Social Support ($p = 0.034$). Statistical significance was found between parent's strategies of Seeking Spiritual Support and the gender (girls) ($p = 0.036$), as well as the treatment problems ($p = 0.008$) of hospitalized children.

I. Koutelekos (✉) · M. Polikandrioti · E. Dousis · C. Ntafogianni · E. Evagelou · E. Vlachou · D. Koukoularis · A. Zartaloudi
Department of Nursing, University of West Attica, Athens, Greece

P. Krokou · V. Ntre
Department of Nursing, "Aghia Sophia" Children's Hospital, Athens, Greece

S. Geronikolou
Clinical, Experimental Surgery, Translational Research Centre Biomedical Research Foundation of the Academy of Athens, Athens, Greece

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Conclusions

This study may help health professionals understand Greek families' coping strategies when they have a child with cancer. Appropriate knowledge could significantly help them in the field of planning and implementation of personalized care in order to achieve optimal therapeutic outcomes.

Keywords

Coping · Parents · Children · Pediatric cancer

7.1 Introduction

Childhood cancer could represent a major crisis for families. Despite scientific achievements in medical treatment, childhood cancer remains a particularly complicated and stressful condition for the parents of children living with cancer. Childhood cancer is a chronic condition, while treatment may extent for several years. The life-threatening nature of the disease, the prolonged and sometimes painful therapeutic interventions, as well as the uncertain outcome may have a tremendous effect on daily functioning of the family. The diagnosis of cancer in children is a source of intense stress for parents [1–3] who may develop post-traumatic stress symptoms, anxiety, and depression [4–6]. A large proportion of parents suppress the aforementioned feelings [2, 7]. At the effort to confront with the disease and related challenges, parents experience a new reality which includes coping strategies and changing roles between family members. Over time, families may go through several cycles of imbalance, crisis, and adjustment [1, 8].

The aim of our study was to explore coping strategies among parents whose child has cancer and the associated self-reported characteristics.

7.2 Material and Method

Design, Setting, and Period of the Study

We invited parents of hospitalized children with cancer at a pediatric public hospital located in Athens, Greece to participate in the study. This was a cross-sectional study. Participants were selected by the method of convenience sampling. The present study was conducted over a three-month period.

Sample: Eligibility and Exclusion Criteria

Eligibility criteria included the following: a parent with sufficient knowledge of the Greek language, a parent with child with cancer aged 1–17 years old, first contact 1–6 weeks after their child cancer diagnosis, and permission for contact by the child's oncologist. The parent with primary responsibility for decision making was invited to participate. If both parents equally shared decision-making roles, they chose which parent participated. The exclusion criteria for parents were as follows: parent with a history of mental illness, parent with debilitating condition, and parent whose child had died.

Data Collection and Procedure

Before collecting data, approval was obtained by the Scientific Council of the hospital. The collection of data was performed using a self-completed questionnaire, which included participants' demographic and clinical characteristics and the Family Crisis Oriented Personal Evaluation Scales (F-COPES) for assessing coping strategies.

Assessment of Family Crisis Oriented Personal Evaluation Scales (F-COPES)

Caregivers completed the Family Crisis Oriented Personal Evaluation Scales (F-COPES) [9], which a 30-item scale is used to measure the coping strategies, translated and validated in the Greek language [10]. The questions are divided into five subscales. Responses yield a total score and 5 subscale scores. Subscale I, Acquiring Social Support, includes questions related to the support acquired from social network.

Subscale II, Reframing, includes questions related to the way stressful events are perceived and redefined by family in order to manage them.

Subscale III, Seeking Spiritual Support, includes questions related to the way religion is perceived by family, whether family members participate in organized religious groups, or seek guidance from clergy. Subscale IV, Mobilizing to Acquire and Accept Help, includes questions related to family's being able to seek and accept help from other people like neighbors, health professionals, or other community resources.

Subscale V, Passive Appraisal, includes questions related to using passive coping strategies by family. Family members tend to deny, avoid, cognitively minimize the problem or accept it with weak reactions, due to family's lack of confidence in their ability to alter outcomes.

Higher scores on the subscales are indicative of using more frequently the specific coping strategies. The F-COPES scale had high reliability and validity in Greek population [11].

Data Analysis

Internal consistency for the questionnaire was evaluated with Cronbach's alpha indexes. Values ≥0.70 was indicative of good internal consistency of the items. Descriptive statistics were used in the present research study, using frequencies, percentages, means, and standard deviations. The post hoc procedure, *t* tests, as well as, ANOVA (analysis of variance) tests were performed. The analysis was performed with the SPSS Statistical software package, version 17.0. Statistical significance was set up at 0.05. A *p*-value ≤0.05 was considered to be statistically significant.

7.3 Results

A total of 85/100 parents, who were invited to participate in the study, self-completed the questionnaire (response rate 85%). In our study, the reliability (Cronbach's alpha) for the total F-COPES scale was 0.83.

Most respondents were <40 years old (56.5%), mothers (70.6%), married (84.7%), and employed (65.9%). The vast majority (90.6%) of participants lived urban/suburban areas. The 55.3% of parents had attended elementary or secondary school. Total 29.4% of the parents included in this study considered themselves anxious. About 22.4% of participants considered themselves calm, while 30.6% and 17.6% reported that they were optimists and overprotective, respectively. Furthermore, 71.8% of the sample had been informed by a health professional. The sociodemographic characteristics of the study population are presented in Table 7.1.

As far as children's characteristics is concerned, the majority (55.3%) were male, <6 years old (50.6%) and diagnosed with acute lymphoblastic leukemia (47.1%). Sociodemographic and clinical characteristics of hospitalized children are presented in Table 7.2.

Mean score and standard deviation of Family crisis oriented personal scales factor-areas with parental employment status, parental level of education, the degree of parental health information, children's type of cancer, the frequency of child's problems during treatment, gender of hospitalized child are shown in Tables 7.3 and 7.4.

Elementary or secondary school graduates scored higher in Seeking Spiritual Support ($p = 0.013$), while state-at-home and unemployed parents scored lower in the subscale of Passive Appraisal ($p = 0.012$). Moreover, among parents who were very well informed, there was a tendency toward a more frequent use of a passive appraisal pattern ($p = 0.004$).

The findings showed that parents whose child had Hodgkin's lymphoma scored higher in the subscale of Acquiring Social Support than parents whose child had acute lymphoblastic leukemia, non-Hodgkin's lymphoma or solid tumors ($p = 0.034$). Statistical significance was found between parent's strategies of seeking spiritual support and the gender (girls) ($p = 0.036$), as well as the high frequency of treatment problems ($p = 0.008$) of hospitalized children.

7.4 Discussion

The majority of the participants in this study were female. Mothers were more represented than fathers because, as the main caregivers, they were more likely to remain beside their sick child. Though a great number of women with children are working and adopt other roles beside the maternal one, the gender-specific clichés that mothers and not fathers should stay at home with their sick child and abandon their career remain prevailing in modern society. Grandparents who

Table 7.1 Sociodemographic characteristics of the study participants ($n = 85$)

Variables		n	%
Gender	Male	25	29.4
	Female	60	70.6
Age group (years)	<40	48	56.5
	>41	37	43.5
	Married/living with partner	72	84.7
Marital status/family type	Single/separated/divorced/one-parent family	13	15.3
Parental level of education	Elementary/secondary	47	55.3
	University graduates /master degree (MSc)	38	44.7
Spouse’s level of education	Elementary/secondary	51	60.0
	University graduates/master degree (MSc)	34	40.0
	Stay-at-home/unemployed	24	28.2
Parental employment status	Public servants	14	16.5
	Employees in private sector	16	18.8
	Medium/small business owners	31	36.5
	Stay-at-home/unemployed	29	34.1
Spouse’s employment status	Public servants	13	15.3
	Employees in private sector	17	20.0
	Medium/small business owners	26	30.6
	City	33	38.8
Residence	Suburbs	44	51.8
	Rural area	8	9.4
	>2	21	24.7
Number of children in the family	2	49	57.7
	1	15	17.6
	Anxious	25	29.4
Parental character self-descripted during their child’s treatment	Calm	19	22.4
	Optimistic	26	30.6
	Overprotective	15	17.6
Parental health information	Enough/good	41	48.2
	Poor/none	44	51.8
Source of health information	Health professional	61	71.8
	Media, publications, internet	24	28.2

Table 7.2 Sociodemographic and clinical characteristics of hospitalized children ($n = 85$)

		n	%
Age group (years)	1–6	43	50.6
	7–12	18	21.2
	13–17	24	28.2
Gender	Male	47	55.3
	Female	38	44.7
Duration of hospitalization	3 months	35	41.2
	>3	50	58.8
	Acute lymphoblastic leukemia	40	47.1
	Hodgkin's lymphoma	25	29.4
	Non-Hodgkin's lymphoma	4	4.7
Type of cancer	Solid tumors	16	18.8
	Rhabdomyosarcoma	*1*	*1.2*
	Neuroblastoma	*2*	*2.3*
	Other solid tumors	*13*	*15.3*
	Parent	35	41.2
Carer of sick child with cancer	During of parental absence	50	58.8
	Grandmother/grandfather	*34*	*40.0*
	Other relatives/housekeeper/nursery	*16*	*18.8*
	None–rarely	24	28.2
Frequency of absence from school	Sometimes	14	16.5
	Often–always	47	55.3
	None–rarely	32	37.7
Treatment problems	Sometimes	38	44.7
	Often–always	15	17.6

helped with child care were the main source of support in our study, thus allowing Greek parents to be more flexible to work and contribute to family's financial needs. As far as children's characteristics is concerned, the majority of them were boys and diagnosed with acute lymphoblastic leukemia. Our findings are supported by previous studies [12–14].

Almost 30% of parents included in this study considered themselves anxious. In relevant studies parents reported they felt distressed, uncertain, anxious, depressed, having decreased self-esteem and hope for future [15, 16]. In terms of children living with cancer, parents may use a great number of coping strategies to respond with increased family needs. Another 30% of respondents were optimists. "Maintaining optimism" suggested that parents tended to look on future and deal with difficulties through positive way of thinking. When parents are optimistic, supportive, cooperative with health professionals and adherent to treatment, they are more likely to apply the most effective coping method during illness crisis [17]. More than 15% of parents reported that they were overprotective and perceived their child as vulnerable and they often paid less attention for their other healthy children [16].

More than half of our respondents reported that they had poor or none information about their children's health. Lacking of appropriate knowledge could make a difficult situation even more stressful. Seeking for information is a coping strategy which allow people to "gain control over a chronic medical condition" [18]. Provision of elaborate and accurate information could protect and empower parents [2, 19]. Moreover, most parents had been informed by a health professional. It is noteworthy that adequate training of health professionals in providing information related to disease nature, prognosis, and treatment, along with family's coping strategies are of outmost importance. Moreover, parents who

Table 7.3 Mean score ± standard deviation (SD) of family crisis oriented personal scales factor-areas with parental employment status, level of education, and health information

Family crisis oriented personal scales factor-areas	Parental employment status				
	Stay-at-home/ unemployed	**Public servants**	**Employees in private sector**	**Medium/small business owners**	***p***
	Mean score ± SD	**Mean score ± SD**	**Mean score ± SD**	**Mean score ± SD**	
Acquiring social support	25.2 ± 10.4	30 ± 7.6	27.8 ± 6.5	27.9 ± 5.6	0.334
Reframing	32.9 ± 4.9	32.2 ± 4.7	32.6 ± 4.7	32.4 ± 4.7	0.981
Seeking spiritual Support	14.8 ± 4.5	15.6 ± 2.2	13.7 ± 2.8	13.8 ± 4.4	0.447
Mobilizing family to acquire and accept help	14.6 ± 3.9	16.7 ± 2.1	13.9 ± 2.2	14.5 ± 2.9	0.677
Passive appraisal	10.4 ± 3.7	13.6 ± 3	13.3 ± 3.1	12.4 ± 2.9	**0.012**
	Parental level of education				
	Elementary/secondary		**University graduates/Master degree (MSc)**		***p***
	Mean score ± SD		**Mean score ± SD**		
Acquiring social support	26.3 ± 8.8		28.3 ± 6.3		0.245
Reframing	32.3 ± 4.9		32.9 ± 4.5		0.594
Seeking spiritual support	15.4 ± 3.3		13.2 ± 4.2		**0.013**
Mobilizing family to acquire and accept help	14.6 ± 3.2		14.8 ± 2.9		0.763
Passive appraisal	11.6 ± 3.5		12.9 ± 3		0.085
	Parental health information				
	Enough/good		**Poor/none**		***p***
	Mean score ± SD		**Mean score ± SD**		
Acquiring social support	26.7 ± 8.5		27.6 ± 6.8		0.601
Reframing	32.9 ± 5		32.4 ± 4.1		0.603
Seeking spiritual support	14 ± 4.3		14.8 ± 3.4		0.355
Mobilizing family to acquire and accept help	14.5 ± 3.3		15.2 ± 2.8		0.304
Passive appraisal	13.3 ± 3.6		11.1 ± 2.8		**0.004**

were very well informed, tended to exhibit statistically significant more frequent passive appraisal behaviors. Parents who were “very well” informed by health professionals seemed to trust them completely and give them total control of their child’s health treatment interventions. This kind of parents may consider themselves as having no control over the situation. As a result, they may adopt the “passive appraisal” strategy in order to make their children’s disease more manageable [19].

Stay-at-home and unemployed participants had a statistically significant lower score in Passive Appraisal subscale than those who were currently employed. Stay-at-home and unemployed parents usually have more available time to deal with increased responsibilities and roles in domestic sphere. Consequently, they may use more frequently active problem focusing and less passive behaviors in order to manage the demands of their child’s life-threatening disease, which in turn may become their absolute priority.

The findings showed that parents whose child had Hodgkin’s lymphoma reported statistically significant higher scores in acquiring social support than parents whose child had acute lymphoblastic leukemia and non-Hodgkin’s lymphoma or solid tumors. The differences between the above diseases as far as the nature of their symptoms, the therapeutic interventions or their complications could possibly explain the aforementioned finding [18–20]. Parents of children with malignant diseases need support and connectedness in order to cope with illness related demands [18, 19]. They could seek social

Table 7.4 Mean score ± standard deviation (SD) of family crisis oriented personal scales factor-areas with children's type of cancer, frequency of problems during treatment, and gender

Family crisis oriented personal scales factor-areas	**Children's type of cancer**			
	Acute lymphoblastic leukemia	**Hodgkin's lymphoma**	**Non-Hodgkin's lymphoma/solid tumors**	***p***
	Mean score ± SD	**Mean score ± SD**	**Mean score ± SD**	
Acquiring social support	26.2 ± 8.7	30.5 ± 4.2	25 ± 7.7	**0.034**
Reframing	31.5 ± 5.3	33.9 ± 3.8	33 ± 3.6	0.151
Seeking spiritual support	14.8 ± 3.1	14.3 ± 3.3	13.8 ± 5.5	0.630
Mobilizing family to acquire and accept help Passive appraisal	14.6 ± 2.8 12.1 ± 3.5	15.5 ± 2.5 12.8 ± 3.2	14.2 ± 4.1 11.6 ± 3.2	0.374 0.486
	Child's problems during treatment			
	None–rarely	**Sometimes**	**Often–always**	***p***
	Mean score ± SD	**Mean score ± SD**	**Mean score ± SD**	
Acquiring social support	25.5 ± 7.4	28.3 ± 7.8	28.2 ± 8.7	0.316
Reframing	32.6 ± 4.5	33.6 ± 4.4	29.8 ± 4.9	0.055
Seeking spiritual support	13.3 ± 4	14.5 ± 3.4	17.2 ± 2.8	**0.008**
Mobilizing family to acquire and accept help	14.3 ± 3.2	15.2 ± 3.1	14.6 ± 2.4	0.496
Passive appraisal	12.4 ± 3.8	12.8 ± 3	11 ± 3.5	0.477
	Gender of hospitalized child			
	Male		**Female**	***p***
	Mean score ± SD		**Mean score ± SD**	
Acquiring social support	27.2 ± 6.8		26.9 ± 8.7	0.855
Reframing	32.5 ± 4.2		32.6 ± 5.2	0.948
Seeking spiritual support	13.5 ± 4.2		15.3 ± 3.1	**0.036**
Mobilizing family to acquire and accept help	15 ± 2.6		14.4 ± 3.5	0.368
Passive appraisal	12.5 ± 3.1		11.9 ± 3.7	0.447

support from health professionals but also from informal networks like parents of other children with cancer as they share the same experiences and difficulties and they could understand each other [20].

Elementary or secondary school graduates have sought statistically significant greater spiritual support than those who had higher educational status. This finding is not supported by the study of Hexen et al. [21]. Spiritual support may help parents psychologically adjust to their children's cancer [2, 22]. One possible explanation for this result may be that parents with higher educational level comprehend knowledge related to the illness more easily which enable them to exert a positive control over the situation. On the other hand, higher educational status may be associated with increased annual income. The availability of more resources reinforces parents with higher income to convert stressful conditions to more manageable ones. Parents with lower educational status may face an uncontrollable, devastating event, when coping with pediatric cancer. Consequently, they place hope and trust in religion and spirituality. Parents may seek guidance from clerics and spiritual leaders in order to reframe attitudes and options in a new way and attribute a substantial meaning to their life that empower them to manage the situations more effectively [23].

Additionally, parents whose child with cancer was female, as well as parents whose children coped often or always with problems during their treatment sought statistically significant greater spiritual support. It has been shown that disease may be perceived by parents as more severe and the death risk as higher in girls [24]. As a result, parents may become more distressed in case of their daughter being ill and suffer and they may have the need to use more coping strategies. When a situation is perceived as more serious, threatening and stressful individuals appear to get involved with religion more often to manage stress [25]. This could also explain why parents whose children coped often or always with complications during their treatment sought spiritual support. Those parents experienced also higher levels of distress. It is common for individuals to seek spiritual and religious guidance while attempting to explain their suffering and attribute perspective to their struggles [26].

7.4.1 Limitations of the Study

The findings cannot be generalized due to the small number of participants and the use of a convenience sample. The majority of respondents were married. Single parents may use other strategies. Also, measures were self-administered subjective inventories. Further investigation can be achieved with more qualitative approaches.

7.5 Conclusion

Understanding parents' coping strategies could significantly help them in the field of planning and implementation of personalized care. During children's hospitalization, a comprehensive family assessment of stress levels and coping strategies could provide valuable information for care planning. Health professionals should be appropriately trained. Helping parents could substantially contribute to providing adequate care to children with cancer in order to achieve optimal therapeutic outcomes.

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Validation of the Greek Version of the State Shame and Guilt Scale (SSGS)

8

Ioanna Tzelepi, Lida Sotiropoulou,
Flora Bacopoulou, Maria Charalampopoulou,
Eleni Zigkiri, Dimitrios S. Simos,
Dimitrios Vlachakis, George P. Chrousos,
and Christina Darviri

Abstract

Both shame and guilt are self-conscious negative emotions claiming self-representations and self-awareness. Growing evidence indicates that these pessimistic emotions are associated to stress and stress-related disorders. The aim of this study was to translate and investigate the validity and reliability of the State Shame and Guilt Scale (SSGS) in a Greek adult population sample. A total of 181 adults (63% women) participated in the study. To validate the SSGS, correlations with the Depression Anxiety Stress Scales (DASS) and the Perceived Stress Scale (PSS) were also examined. Exploratory factor analysis was used to examine the factors of the Greek version of the SSGS. In addition, for greater validity, comparisons were made according to sex, marital status and level of education. The reliability assessment revealed that the index of internal consistency (Cronbach's alpha) was above the acceptable margin (0.7) for the three subscales (shame; 0.717, guilt; 0.770, pride; 0.874). The Greek version of the 15-item State Shame and Guilt Scale (SSGS) demonstrated good psychometric properties and could be proven useful for the assessment of shame, guilt, and pride.

Authors Ioanna Tzelepi, Lida Sotiropoulou, George P. Chrousos and Christina Darviri have equally contribued to this chapter.

I. Tzelepi · L. Sotiropoulou · E. Zigkiri · D. S. Simos · C. Darviri
School of Medicine, National and Kapodistrian University of Athens,
Athens, Greece
e-mail: cdarviri@med.uoa.gr

F. Bacopoulou (✉)
Center for Adolescent Medicine and UNESCO Chair in Adolescent Health Care, First Department of Pediatrics, School of Medicine, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece
e-mail: fbacopoulou@med.uoa.gr

M. Charalampopoulou
First Department of Propaedeutic Surgery, School of Medicine, National and Kapodistrian University of Athens, Athens, Greece

D. Vlachakis
Laboratory of Genetics, Department of Biotechnology, School of Applied Biology and Biotechnology, Agricultural University of Athens, Athens, Greece
e-mail: dimvl@aua.gr

G. P. Chrousos
University Research Institute of Maternal and Child Health & Precision Medicine, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece

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Keywords

Shame · Guilt · Stress · Greek · Negative emotions · Pessimistic emotions · State shame and guilt scale · SSGS

8.1 Introduction

Shame and guilt are two powerful negative emotions that may influence and shape human behavior or actions with undesirable outcomes. Although these emotions have been the focus of several scientific fields, they have been more extensively studied under the view of psychology. During the past decades, several scientific studies concerning shame and guilt have been published and have provided more insights into their devastating role on human life and, more specifically, how destructive guilt and shame were to Vietnam veterans [1, 2] or to former prisoners of war veterans exposed to trauma [3], to victims suffered from rape trauma syndrome with a subsequent silent reaction [4], to military stuff after combat exposure [5], and to humans with post-traumatic syndromes [6]. The emotion of guilt serves as a tool of self-punishment and the excessive feeling of guilt was considered as an important factor in psychiatric disorders, e.g., neuroticism [7–10].

Shame was described by Lewis in 1971, as a very painful and unpleasant emotion, which makes the person feel powerless and wishing to "vanish." In addition, Lewis tried to differentiate shame conceptually and empirically from guilt and he supported that a substantial difference between guilt and shame lies in the focus of negative evaluation. The emotion of guilt has its focus on the act—done or undone, whereas shame focuses on the evaluation of the self [11]. Years later, Tracy and Robins stated that shame is multiplex, socially principal emotion, that requires the negative evaluation of the self [12]. Shame is connected to avoidance behaviors, e.g., collapsing of the body, hiding someone's face, gaze aversion or slumping [13–16]. In 2004, a survey showed that shame can predict the activation of the hypothalamic—pituitary—adrenal axis (HPA) [17]. Contributing to the strength of cortisol stress responses is shame associated with body esteem, making it a potential negative factor in stress-related health [18]. According to a various collection of clinical and theoretical surveys, it was revealed that shame has been associated with posttraumatic stress disorder (PTSD), as it plays an important role in the etiology and path of PTSD [19–22]. For some people who suffer from PTSD, sadness, shame, or anger are related to the disorder's clinical distress as well as functional disability rather than fear in a pathological level [23].

Guilt, in 1994, was defined as an unpleasant emotion, such as remorse and regret linked to the conception that one should have thought, felt, or acted differently, as he/she was being driven by a set of internalized standards or orders [24]. Plus guilt is linked with certain behaviors, which make an individual to regret its actions and feel bad about them and his/herself [25]. In other words, guilt is considered as a sentimental construction, resulting from perceived moral transgression, which may be linked to social norms and to certain behaviors. Trauma-related guilt may be linked to a failure to recognize the multiple sources causing negative events [26].

Often, shame and guilt are understood as interchangeable concepts, probably because both are self-conscious emotions. However, they can be discriminated by the fact that shame involves painful emotions regarding the self, while guilt is a negative emotion that focuses on someone's own behaviors and acts [27–29]. According to Tangney and Dearing, guilt and shame do not differ in terms of content and structure of the situation that leads to them, but the difference lies in the way people themselves interpret the bad events related to them [30]. At the same time, it has been shown that postnatal psychological health and possibly the relationship that a parent will develop with their child, is negatively affected by feelings of shame and guilt [31].

Guilt and anxiety are strongly related to each other, to the extent that they are not always distinguishable [32] negative self-appraising emotions, such as distress and anxiety, are often considered to be the result of guilt [33], as the latter is associated with violations of orders organized by the conscience, which behaves as a self-regulating factor [34]. Moreover, in Spain and Portugal a cross-cultural study was conducted about the role of guilt in the professional burnout of 1266 teachers, so that this condition can be differentiated from other psychosomatic disorders, such as depression [35]. Guilt is linked to stress-related disorders, as uncontrolled guilt in major depressive disorder has been tethered to depressive symptomatology [36, 37]. Additionally, depression is considered as a usual comorbid symptom of PTSD [38], as many surveys propose that trauma is linked to guilt, which—the latter—is highly prevalent in individuals with trauma [39, 40].

The need for creating a more solid scientific context in this domain highlights the importance of having valid tools appropriate for measuring the emotions of guilt and shame. At this moment, there are many self-report instruments of shame and guilt available. Firstly, there are adjective-based measures, for participants to assess the frequency of feeling shame and guilt. In particular, dispositional shame is considered as the frequency with which someone feels the emotion of shame that is not associated with any particular event. These measures have been reprimanded due to the sentimental detachment of shame and guilt from the particular settings in which they happen and with no association with the certain features of these sentiments, that are behavioral motivational and phenomenological traits [41]. Adjective-based measures are the Internalized Shame Scale (ISS) [42] and the Personal Feelings Questionnaire-2 (PFQ-2) [43].

A second type of self-report instruments of shame and guilt is scenario-based measures, which enquire participants to read theoretical scenarios and choose how they would probably behave, consider something and feel, from a given set of various responses. Examples of scenario-based measures include (a) the Guilt and Shame Proneness scale (GASP)—any validation effort, such as the Spanish version [44]—and this tool has been divided to 2 shame subscales that estimate negative self-assessments and withdrawal action tendencies, along with publicly exposed transgressions, and 2 guilt subscales, that measure negative behavior-estimations and restoring action tendencies, acting in accordance with private transgressions [45], and (b) the Tests of Self-Conscious Affect-3 (TOSCA-3) [46]. In particular, Tests of Self-Conscious Affect (TOSCA) are a group of theoretically guided self-report tools, specifically organized and designed to evaluate differences through six dimensions; proneness to guilt, proneness to shame, detachment unconcern, externalization of blame, pride in self (alpha-pride) as well as pride in behavior (beta-pride). Each scale displays a distinct way of admitting a moral predicament, presented in 15 scenarios. Researchers have created different age suitable versions for children 8–12 years [47], adolescents 12–20 years [48] as well as adults [49]. In theory, all versions of the TOSCA are based on Tangney's [48, 50], which is an extension of the guilt and shame model proposed by Lewis [11].

Scenario-based scales are apparently time-consuming, as they need the participants' attention to properly read a hypothetical scenario. Therefore, the use of these scenario-based scales in larger population or empirical, epidemiological research is apparently limited. Cohen and Wolf [45] have underlined that the TOSCA-3 has certain obstacles or limitations, for instance, that emotional and behavioral replies to transgressions are confounded in the items' focuses.

Furthermore, the third type of self-report instruments of shame and guilt is statement-based measures, which expect participants to rate how much they have an accord to a certain statement, describing the experience of feeling guilty as well as shameful. State measures of shame evaluate someone's current experience of the emotion. For instance, the Adolescent Shame-Proneness Scale (ASPS) [51], the Brief Shame and Guilt Questionnaire for Children (BSGQ-C) [52], the State Shame and Guilt Scale (SSGS) [53]—a 15-item self-report scale of "in-the-moment (state) feelings" of shame, guilt, and pride, which is also available in a shorter 8-item Italian version [41]—are examples of statement-based measures. On the other hand, these tools have some drawbacks, such as a specific focus on the child population (BSGQ-C) or on shame (ASPS).

Measuring shame and guilt is not a very easy task since they are complex psychometric parameters. However, several scales and tools have been constructed to best measure and describe guilt and shame different from the State Shame and Guilt Scale [54–57]. The State Shame and Guilt Scale (SSGS) is one of the most widely used psychometric tools to measure both shame and guilt in one instrument [53]. There are other questionnaires, which tried to assess shame or guilt, such as the Spanish version of Guilt and Shame Proneness Scale [44]. The SSGS is currently available in English [53] and there are an Italian validation effort [41] as well as a validation in Tamil [58]. In addition, this measurement has been proved very useful for scientific purposes, since studies have provided evidence that shame and guilt correlate with several other important dimensions of human's psychology and may also predict future behavior [29, 59, 60]. Despite the importance of valid and reliable tools to measure shame and guilt, the SSGS remains untested in the Greek population. Therefore, the aim of this study was to validate and examine the psychometric properties of the Greek version of the SSGS in an adult sample.

8.2 Subjects and Methods

8.2.1 Translation Procedure

The research team received permission by Dr. June Tangney, to validate the Greek version of the SSGS. Two bilingual researchers, with fluency in both Greek and English language, translated separately the SSGS into Greek. A forward translation was conducted by these two researchers, completely aware of the terminology of the psychological area covered by the scale. Both translators aimed at a conceptual equivalent of the SSGS scale rather than a word-to-word translation. After the translation the two translated versions of the SSGS were discussed, compared and the differences among the translated questionnaires were discussed under the authority of an expert research team. The panel consisted of a psychiatrist and a bilingual, linguistics teacher. The panel of experts' goal was to identify and resolve the inaccuracies of the forward translation. The differences between the two translations were minor and the final questionnaire was back translated into the English language. When this process was completed and all three researchers agreed to the suitability of the Greek version of the SSGS they tested it in a small sample to confirm that all the items were clear and appropriately understood by adults. Lastly, a translation back to English was conducted by a native English speaker, who had no previous knowledge of the scale. Again, emphasis was given on conceptual and not linguistic equivalence.

8.2.2 Participants and Procedures

In total, 181 community dwelling male and female adults from the general population took part in the present study. The SSGS questionnaire was distributed online, using Google Forms through email invitations, various social media posts and from mouth-to-mouth. Non-responses to individual questions disqualified the response from statistical analysis. Inclusion criteria to the study were: (a) Greek native speakers and (b) age equal or older than 18 years. On the other hand, participants were excluded from the study if (a) they were not able to read Greek and (b) they had any mental disease that would not allow them to understand the questionnaires. Prior to data collection, all study participants were asked to give their consent to proceed with the answers.

8.2.3 Ethical Considerations

The study was performed in agreement with the ethical standards, as stated in the 1964 Declaration of Helsinki and its subsequent modifications or comparable ethical standards. The study protocol was approved by the School of Medicine, National and Kapodistrian University of Athens, Greece. All participants were informed of the study's goal with a brief presentation of the research protocol before proceeding to its total completion. Submission of participants' response was equivalent to an automatic consent. The SSGS scale administered was anonymous and no payment was provided. Safety and privacy of the collected data were maintained.

8.2.4 Measures

Sociodemographic Questionnaire: Participants completed a brief sociodemographic form for researchers to collect general information such as educational level, age, sex, chronic decease, and relationship or marital status.

The State Shame and Guilt Scale: The SSGS is a 15-item psychometric tool that assess the in-the-moment (state) feelings of shame, guilt, and pride. The questions are short and easily understood, i.e., "I cannot stop thinking about something bad I have done," while the answers are given on a 5-point Likert-type scale ranging from 1 = "Not feeling this way at all" to 5 = Feeling this way very strongly." Five items [1, 4, 7, 10, 13] correspond to the Pride subscale, five items [2, 5, 8, 11, 14] correspond to the shame subscale, while the rest 5 items [3, 6, 9, 12, 15] correspond to the guilt subscale [30, 53].

The Depression Anxiety Stress Scales (DASS): The DASS is a self-report measure that consists of 42 items. The DASS contains three subscales: Depression, Anxiety and Stress, and it is scored on a 4-point Likert-type scale, ranging from 0 = "Strongly Disagree" to 3 "Totally Agree." Each subscale of the DASS consists of 14 items that evaluate the emotional states of depression, anxiety, and stress [61]. This scale has been translated and validated into the Greek language and has been shown to have good psychometric properties [62].

The Perceived Stress Scale (PSS): Perceived stress was measured, using the Greek version of the PSS questionnaire, which is a 14-item self-report questionnaire. Each item rates thoughts as well as emotions, which are perceived as stressful, on a 5-point Likert scale (0 = never to 4 = very often). There are seven negative and seven positive items and the total score ranges from 0 to 56. Higher PSS scores demonstrate a higher level of someone's perceived stress over the past month [63, 64]. Reliability and internal consistency of PSS were very good in baseline and final measurements (Cronbach's alpha: 0.91 and 0.96, respectively).

8.3 Statistical Analysis

For descriptive purposes quantitative variables are presented as median (IQR) and mean (SD), while qualitative variables are presented as frequencies and percentages (%). Exploratory factor analysis was used to examine the factors (dimensions) of the Greek version of the SSGS in the Greek population. The reliability of the scale was examined using the Cronbach's α index for internal consistency. To confirm the validity of the scale, its associations with the DASS and the PSS scales were also examined, while comparisons were also made according to sex, family status and education for discriminant validity. SPSS v.24 for Windows was used to perform statistical analyses and the level of significance for all analyses was 0.05.

8.4 Results

The detailed descriptive statistics of the sample's sociodemographic characteristics, as well as the scales' scores are presented in Table 8.1.

The results from the EFA revealed that 3 factors contributed significantly to the explanation of the model. All three factors had eigenvalues >1 and their cumulative explanation of the variance was 49.390%. The load of each item on factors are presented on Table 8.2.

The reliability assessment revealed that the index of internal consistency (Cronbach's alpha)

Table 8.1 Participants' sociodemographic characteristics and scales' scores

Sociodemographic characteristics		Scales and subscales scores		
Sex N (%)		*SSGS score*		
Females	114 (63%)			
Males	67 (37%)			
Age				
Median (IQR)	53.81 (8.85)	Shame	Mean (SD)	9.05 (3.51)
Mean (SD)	54 (11)		Median (IQR)	9.00 (7.00)
		Guilt	Mean (SD)	10.92 (4.23)
			Median (IQR)	11.00 (7.00)
		Pride	Mean (SD)	19.81 (4.39)
			Median (IQR)	21.00 (6.00)
Marital status N (%)		*PSS score*	Mean (SD)	21.78 (7.55)
Married	31 (17.2%)		Median (IQR)	22.00 (10.00)
Unmarried	131 (72.8%)			
Married	15 (8.3%)	*DASS score*		
Separated	3 (1.7%)	Stress	Median (IQR)	5.89 (4.3)
Widower/widow			Mean (SD)	5.00 (5.00)
		Anxiety	Median (IQR)	3.52 (4.01)
			Mean (SD)	2.00 (6.00)
		Depression	Median (IQR)	2.86 (3.55)
			Mean (SD)	1.00 (4.00)
Education level N (%)				
High school	27 (15.2%)			
College	15 (8.4%)			
Higher education Institution/technological Educational institute	80 (44.9%)			
MSc	48 (27%)			
PhD	8 (4.5%)			

of the pride subscale was 0.874, of the shame subscale was 0.717 and of the guilt subscale was 0.770. The descriptive statistics, as well as the change of Cronbach's alpha values if item deleted are presented in Table 8.3.

Spearman's correlation analysis was conducted due to a non-parametric allocation of the sample and this analysis showed that age was not significantly associated with any subscale of the SSGS (Table 8.4). However, it was found that PSS had a significant, moderate and positive correlation with shame (0.403) and a significant, small and positive with guilt (0.310). It was also revealed that PSS had a significant and negative association with the sub-scale of pride (−0.498). Plus, the DASS stress subscale had a significant small and positive correlation (0.264) with shame, a small and positive correlation (0.420) with guilt and a small negative correlation (−0.316) with pride. The DASS anxiety subscale had a small, significant, positive correlation with both shame (0.243) and guilt (0.258), and a small, significant negative correlation with pride (−0.343). The DASS depression subscale had a small, signifi-

Table 8.2 Rotated factor loadings of the EFA for 15 items (*N* = 181)

	SSGS		
Item	SSGS pride	SSGS shame	SSGS guilt
1. I feel good about myself	0.720		
4. I feel worthwhile, valuable	0.854		
7. I feel capable, useful	0.903		
10. I feel proud	0.694		
13. I feel pleased about something I have done	0.785		
2. I want to sink into the floor and disappear		0.415	
5. I feel small		0.698	
8. I feel like I am a bad person		0.452	
11. I feel humiliated, disgraced		0.653	
14. I feel worthless, powerless		0.652	
3. I feel remorse, regret			0.559
6. I feel tension about something I have done			0.539
9. I cannot stop thinking about something bad I have done			0.779
12. I feel like apologizing, confessing			0.425
15. I feel bad about something I have done			0.727
Eigenvalues	5.337	2.428	1.041
% of variance	32.481	13.240	3.670

cant, positive correlation with shame (0.270) and a small, significant positive correlation with guilt (0.359), and a moderate, significant negative correlation with pride (−0.480) (Table 8.4).

The comparison analysis among different groups according to demographic variables revealed that there was no significant difference between males and females for any of the SSGS subscales (Pride; $p = 0.971$, Shame; $p = 0.694$, Guilt; $p = 0.607$). On the other hand, there was a significant difference between education groups for the Shame subscale, but not for Guilt or Pride. Finally, no statistically significant differences were found between different groups of marital status for Shame, Guilt, or Pride (Table 8.5).

8.5 Discussion

The aim of the present study was to translate the SSGS psychometric tool into the Greek language and examine its validity and reliability in a Greek adult community sample. The validity of the Greek version of the SSGS is acceptable and 3 subscales were detected as with the original version. The main findings suggest that the factor structure of SSGS-15, strongly resembles the original model of psychometric measurement.

The index of internal consistency (Cronbach's alpha), which indicates the reliability of the scale, is inside the acceptable margin. In particular, for the pride subscale is 0.874, for the shame subscale is 0.717 and for the guilt subscale is 0.770.

A limitation of the study is that all variables of SSGS, DASS, PSS were self-reported and this introduces potential methodological bias. The Italian version of SSGS has not revealed the index Cronbach's alpha and this short version SSGS-8 substantially bears resemblance to the original tool [53]. To our knowledge, even though the scale may be available in different languages, the only published validations are in Italian and Tamil, which did not allow any comparisons with others. Furthermore, no test–retest reliability evaluation was conducted neither in our validation effort nor in the Italian version [41]. In addition, in our validation effort, we used two psychometric tools (PSS, DASS) to compare them to SSGS. In the Italian version of SSGS, a correlation between the SSGS and State–Trait Anxiety Inventory (STA-I) were statistically significant, as the correlation of STA-I with SSGS guilt was $r = .38$, $p < 0.001$ and the correlation between STA-I and SSGS shame was $r = 0.49$, $p < 0.001$. In our validation, the statistical results from Spearman's correlations were encouraging and they were similar to the Italian version.

In southern India the State Shame and Guilt Scale has been used for investigating the association between guilt, shame, symptoms of PTSD and depression in HIV-positive women ($n = 20$) looking for supportive health services [58]. Compared to our validation, SSGS in Tamil has

Table 8.3 Range, mean, standard deviation (SD), item-total correlation and Cronbach's alpha coefficient of the SSGS scale

Subscale	Range	Mean (SD)	Min–Max	Item-total correlations	Alpha of scale
SSGS pride	5–25	10.84 (3.01)	5–16		0.874
1. I feel good about myself				0.654	
4. I feel worthwhile, valuable				0.742	
7. I feel capable, useful				0.822	
10. I feel proud				0.646	
13. I feel pleased about something I have done				0.681	
SSGS shame	5–25	11.76 (4.31)	5–25		0.717
2. I want to sink into the floor and disappear				0.367	
5. I feel small				0.523	
8. I feel like I am a bad person				0.422	
11. I feel humiliated, disgraced				0.514	
14. I feel worthless, powerless				0.559	
SSGS guilt	5–25	18.78 (4.68)	5–25		0.770
3. I feel remorse, regret				0.529	
6. I feel tension about something I have done				0.532	
9. I cannot stop thinking about something bad I have done				0.619	
12. I feel like apologizing, confessing				0.445	
15. I feel bad about something I have done				0.578	

Table 8.4 Correlations (Spearman's rho) between SSGS, DASS, and PSS scales

	Age	DASS stress	DASS depression	DASS anxiety	PSS	SSGS Shame	SSGS Guilt	SSGS Pride
Age	1.000							
DASS stress	0.045	1.000						
DASS depression	−0.044	0.698**	1.000					
DASS anxiety	0.037	0.680**	0.685**	1.000				
PSS	−0.092	0.540**	0.662**	0.533**	1.000			
SSGS Shame	−0.058	0.264**	0.270**	0.243**	0.403**	1.000		
SSGS Guilt	−0.023	0.420**	0.359**	0.258**	0.310**	0.467**	1.000	
SSGS Pride	0.062	−0.316**	−0.480**	−0.343**	−0.498**	−0.330**	−0.268**	1.000

**Correlation is significant at the 0.01 level (2-tailed)

Table 8.5 Associations between SSGS subscales and other study measurements

Study measurements	Categories	SSGS Pride	SSGS Shame	SSGS Guilt
		Mean (SD)	Mean (SD)	Mean (SD)
		Median (IQR)	Median (IQR)	Median (IQR)
Sex	Males	19.66 (4.76)	8.86 (3.41)	10.52 (3.70)
Median (IQR)		21 (7)	9.00 (7)	11 (5)
Mean (SD)	Females	19.89 (4.16)	9.15 (3.56)	11.15 (4.51)
		21 (6)	9.00 (7)	10.5 (7)
	p-value	0.971	0.694	0.607
Education level	Senior High School	18.75 (4.73)	10.88 (3.93)	12.29 (5.25)
Median (IQR)		19.00 (7.25)	12.00 (6)	13.00 (9.75)
Mean (SD)	College	21.80 (2.88)	7.47 (2.33)	10.50 (4.8)
		23.00 (3)	7.00 (4)	8.50 (6.25)
	Higher education Institution/technological Educational institute	19.97 (4.43)	8.83 (3.30)	10.40 (4.19)
		21.00 (6)	9.00 (7)	9.00 (6)
	MSc	19.54 (4.36)	9.38 (3.73)	11.64 (3.56)
		19.50 (7.75)	9.00 (7.75)	11.00 (5)
	PhD	20.13 (3.64)	6.38 (1.77)	8.38 (2.83)
		21.50 (6.5)	6.00 (2)	8.00 (4.75)
	p-value	0.266	0.011	0.073
Marital status	Unmarried	19.39 (4.57)	8.41 (3.57)	9.96 (3.94)
Median (IQR)		21.00 (8)	7.00 (6)	9.00 (6)
Mean (SD)	Married	20.17 (4.15)	9.07 (3.5)	10.98 (4.11)
		21.00 (5)	9.00 (7)	11.00 (6)
	Separated/divorced	18.43 (5.4)	9.87 (3.7)	11.60 (5.6)
		19.00 (8.25)	11.00 (6)	12.00 (7)
	Widow/widower	14.33 (5.03)	9.67 (.58)	15.00 (1.42)
		15.00 (6)	10.00 (1)	15.00 (1)
	p-value	0.128	0.582	0.263

construct validity in an Indian cultural setting, completely different from the Greek one. In comparison with the community sample of the Greek validation, the women of the validation in Tamil were not mentally healthy, as they experienced stigma in the form of negative social reactions, endured interpersonal violence and were exposed to other adverse life events [58]. On one hand, in the Indian validation, shame had a no significant correlation with PTSD or depression whereas in the Greek validation all three subscales of DASS were significantly correlated to shame. In the

Indian version of SSGS, guilt had a significant correlation with depression and PTSD and these results were in accordance with the Greek correlation results between guilt and three subscales of DASS. The sample size of the Indian validation was small, as researchers distributed the SSGS only to 20 women, compared to our validation in a community sample of 181 adults. Following the Indian validation effort, a validation of SSGS in clinical populations with mental difficulties or mild disorders should be taken into consideration in future studies.

In conclusion, the results of this study indicate good psychometric properties of the Greek version of the 15-item State Shame and Guilt Scale. This questionnaire meets requirements for internal consistency and criterion validity, as the results were sufficient. This measurement tool could be proven useful for the assessment of shame, guilt, and pride in Greek adults. Further research is warranted in larger clinical samples, to further investigate the psychological mechanism of self-conscious emotions, shame, and guilt.

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9

Factors Contributing to Stress and Well-Being Among Trainee Psychiatrists in Victoria, Australia

Rhoda Lai, Kevin Teoh and Christos Plakiotis

Abstract

Doctors in training experience stress, as they balance the demands of working and studying at the same time. As evidenced by reports of suicides among trainee doctors, it is clear that the level of stress they experience is dangerously high. Long working hours, which can lead to exhaustion, burnout, and time taken away from meaningful activities and relationships outside of work, are a large contributor to trainee stress and increase the likelihood of mental illness and suicidal ideation. For psychiatry trainees, this workload burden is also compounded by a high emotional burden associated with the nature of their work, including patient suicides, aggression, and threats. This study sought to investigate the factors that contribute to the stress and well-being of psychiatry trainees, through in-depth interviews analyzed via qualitative, template analysis. The main sources of stress identified were workload, aspects related to the psychiatry training program, and workplace-based aggression. Supervision, external supports such as family and health professionals, and distraction or "switching off" were the main sources of well-being support. Overall, this study highlighted the importance of structural factors in the workplace and training program in psychiatry trainee stress and well-being levels. Workload and training commitments limited the amount of time trainees could devote to well-being-related activities, despite their awareness of these. This study contributes useful insights into how we can better look after the mental health and well-being of psychiatry trainees, as future leaders of our mental health system.

Keywords

Psychiatry trainees · Well-being · Workplace culture · Workplace stress

9.1 Introduction

It is not surprising that doctors in training experience stress, as they balance the demands of working and studying at the same time. However, as evidenced in reports of suicides among trainee

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R. Lai
Monash Ageing Research Centre (MONARC), Monash University, Melbourne, VIC, Australia

K. Teoh
Department of Organizational Psychology, University of London, Birkbeck, UK

C. Plakiotis (✉)
Monash Ageing Research Centre (MONARC), Monash University, Melbourne, VIC, Australia

Aged Persons Mental Health Service, Monash Health, Melbourne, VIC, Australia

Department of Psychiatry, School of Clinical Sciences at Monash Health, Monash University, Melbourne, VIC, Australia
e-mail: Chris.Plakiotis@monash.edu

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doctors, it is clear that the level of stress they experience is dangerously high [3, 12].

A number of studies have highlighted that long hours, which can lead to exhaustion, burnout, and time taken away from meaningful activities and relationships outside of work, are a large contributor to trainee stress [6, 8, 13, 15]. A recent Australian study has linked trainee doctors' long working hours to an increased likelihood of experiencing mental illness and suicidal ideation [25]. Trainee doctors in Australia work an average of 47.3 h per week, far beyond the 38 h that the Australian Medical Association considers full-time [6, 31].

In addition to long working hours, workload intensity is often cited by trainees as a factor that leads to fatigue, with trainees often taking work home or doing overtime in order to fulfil work responsibilities and satisfy training requirements, as well as meet perceived expectations that they take up additional career and educational opportunities [5, 23, 28]. For psychiatry trainees, this workload burden is also compounded by a high emotional burden associated with the nature of their work, including patient suicides, aggression, and threats [28].

Work demands have a negative impact on well-being and work performance [1], but this may be mitigated by a sense of control and social support at work [11]. In the setting of specialist doctor training, this can come in the form of support from colleagues, supervisors, and the healthcare organization. Our recent literature review [21] explored current knowledge of the factors that contribute to psychiatry trainees' work-related stress and well-being. This study aimed to further explore the impact of these and other factors qualitatively with psychiatry trainees.

9.2 Methods

9.2.1 Participants and Procedures

Psychiatry trainees at all stages of completion of the Royal Australian and New Zealand College of Psychiatrists (RANZCP) Fellowship program at a large health service in Victoria, Australia, were invited to participate through group email advertisements and talks by the research team at group meetings. Trainees expressed interest in participating by contacting a research assistant who did not have a direct relationship to their training or clinical work.

Participants took part in semi-structured interviews with the research assistant centered around factors contributing to their stress and well-being, including work demands and hours, job control, social support, work-family conflict, and antisocial behaviors (see Appendix for the interview schedule). These categories were based on workplace-based stressors identified by O'Driscoll and Brough [24], and questions on possible mitigating factors of stress were informed by Bakker and Derks' [4] book chapter on positive occupational health psychology.

Interviews went for approximately 1 h, and were conducted individually in private rooms and audio-recorded then transcribed by the research assistant, with any identifying information removed before analysis was undertaken. This project received ethical approval from the health service's Human Research Ethics Committee.

9.2.2 Data Analysis

Template analysis [18–20] was used for qualitative data analysis as the interviews were undertaken in a semi-structured format using an interview schedule informed by the literature and the senior author's practical experience. NVivo 11 software (QSR International) was used to code the data. As this study was undertaken as the senior author's Master degree project, data analysis was undertaken by author CP under supervision.

An initial template was formed from key themes that emerged in the coding of the first six transcripts. The objective of the initial template was to characterize the data, avoiding hierarchical clustering of themes. Once the initial template was developed, the remaining transcripts were coded to the initial template, and the template was then revised to reflect additional themes that emerged and grouped into overarching themes.

The final template consisted of two overarching themes: “sources of stress” and “sources of support and well-being.” Sources were grouped within these themes depending on the predominant view of the participants, though it must be acknowledged that most sources had both positive and negative aspects to them, which are discussed below.

9.3 Results

9.3.1 Participants

Seventeen psychiatry trainees (8 male, 9 female) participated in this study. They were aged between 25 and 57 (average 36), and had graduated with their medical degrees between 3 and 32 years prior to their interviews (average 9.5). Thirteen participants had a partner, and seven had children.

Five participants were in their first year of psychiatry training, four had been training for 6 or more years, and the remainder were spread between years 2 and 5. Two had completed all of the RANZCP Fellowship program’s training hurdles (including multiple choice question exam, essay style exam, objective structured clinical exam, psychotherapy written case, and scholarly project), seven had not completed any yet, and eight had completed some. Seven had prior non-medical qualifications or employment outside medicine, and two had completed prior training in another medical specialty.

The training program that was in place at the time that this study was completed was the 2012 competency-based fellowship program of the RANZCP [16], although some of the more senior trainees had commenced training prior to implementation of this program.

9.3.2 Theme 1: Sources of Stress

9.3.2.1 Workload

Excessive workloads were the most cited source of stress among the psychiatry trainees—“if it was a more manageable workload, people would be more happy” [Participant 4]. Though the interview schedule directly asked about workload, participants also spontaneously referred to their workload when responding to other questions about stress.

Inadequate staffing was noted as the main factor that contributed to excessive workloads. Trainees felt that junior medical staff, registrars, and consultants were all “stretched very thinly” [Participant 6], and felt that, being a large metropolitan mental health service, “the demands grow much faster than we can deal with” [Participant 6]. This also led to inadequate leave cover, where “someone’s role just gets absorbed by everyone else who’s still at work, which can be extremely difficult” [Participant 4]. Notably, Participant 4 mentioned that “In every other specialty…that I’ve worked in before, when someone goes on leave, it’s usually planned leave/annual leave, they have a locum or a backfilling HMO [hospital medical officer] role.” Another structural contributor to workload stress was the on-call roster—the trainees’ rostered after hours work was interspersed among their normal daily shifts, and while they were given a half day off if called in overnight, there was no cover for this time. Participant 13 said they “don’t think the way it’s structured is safe or conducive to registrar well-being…if you go home then after, say, a 15-16 hour workday, you’re then expected to be safe and in your right mind to drive yourself back to work, make assessments about people’s risk and their mental state and their safety…at 3 o’clock in the morning in a sleep-deprived and overworked state…” The lack of adequate orientation to new rotations was also mentioned, with a “few weeks” [Participant 9] of stressful adjustment periods needed at the start of each new role.

Trainees also noted that their workloads impacted on their training—“it makes it really difficult to then go home and study for College exams” [Participant 1]. Again, a lack of cover for protected training time featured here—“Time away having training means less time doing clinical work, means often clinical work gets clumped together, gets piled up…” [Participant 15]. Workload was also perceived to be impactful on family life. As Participant 2 stated,

> There are times when I seem to be working/doing on-call a lot, and if I'm on call…it takes a chunk out of the week where I'm not being as supportive looking after my kid and I'm not with it because I'm exhausted…I don't mind doing on call, I really don't, but it does affect my ability to be a dad, it really does, and support my wife.

9.3.2.2 College Training Program

Trainees saw the need to devote time to studying outside of work "hard because you often have to study at the expense of your more balanced lifestyle kind of activities, like friends or family, exercising… Your interests are restricted to study, and so it can take a really big toll on you because you don't have your usual outlets for stress relief after a big day at work" [Participant 7].

While they understood the need for a rigorous level of training ("…it seems like it's going to be really exact and really difficult, but you want it to be—you want your psychiatrist to be properly trained" [Participant 2]), aspects of the training program that induced stress included the "notoriously low pass rates" [Participant 13] for examinations combined with having "not really all that much guidance from the College about what they want in an exam answer" meaning "it's a bit difficult knowing you can go anywhere" [Participant 1]. Participant 14's description illustrates well the feeling for trainees who had failed examinations, especially more than once: "…I just felt so demoralised by not being able to pass the exam, it's like the College is saying you're not good enough for this."

Structural elements of RANZCP Fellowship training that were heavily criticized by the trainees included the requirement that they complete a formal Master degree ("I haven't found it very helpful…There have been some useful topics and presentations but by and large it's a big chunk of your time" [Participant 4]), and the programmatic assessments. Trainees found having this number of low-stakes assessments to be "a lot of paperwork…the constant sort of filling out forms reduces the whole thing to an administrative task…" [Participant 8].

9.3.2.3 Workplace-Based Aggression

Most of the trainees reported experiencing verbal and/or physical aggression from patients. While there were variable responses to the events, it was clear that they had the ability to impact both physical and mental well-being: "…after that violent incident I was a bit shaken and it affected my sleep a few days after…it impacted the care of how much I'm in tune with patients, empathy, for example…if you're having a stressful time, you might avoid socialising…So it is pervasive" [Participant 12]. While many trainees sought support after these incidents from supervisors, some perceived management to be unhelpful. Some trainees also sought support from family members, but found this could have the effect of adding stress to them. For example, Participant 2's wife "would say that every day when I went to work, she would have a feeling in the pit of her stomach that I would be either seriously injured or killed."

Either the experience or observation of "terrible" [Participant 8] team dynamics was noted as a stressor for a number of trainees, with reported incidents including being shouted at. Some colleagues were perceived to "judge registrars for being absent for a tutorial and university or for an exam" [Participant 4], despite these being necessary parts of their training. A small number reported behavior such as being "belittled" [Participant 14] by supervisors that could be construed as bullying. Participant 12 reflected that "in hindsight, I think some of the over-critical supervisors were bullying…I'm not sure if it was to do with my race or something they didn't like about me." Participant 7 had an experience with a supervisor "who was a little, probably, inappropriate in supervision, in that it was more like psychoanalysis than supervision, and it wasn't consented for…".

Some trainees also perceived that doctors from other disciplines viewed psychiatry in a stigmatized manner. Participant 10 relayed that "it would take us calling a MET [medical emergency team] Call to actually get a gen med registrar to come to the ward to review our patient that we were genuinely and understandably concerned about, but the response time was lethargic, to say the best." Some trainees suggested that regular refreshers on psychiatric topics for nonpsychiatric doctors would assist in reducing stigmatization, while some also believed that they would benefit in refresher sessions that could help them to manage medical comorbidities, noting that "some skills are deteriorating, like you know, if I had to take blood, I would be a little bit nervous because I haven't done that for I don't know how many years now" [Participant 14].

9.3.3 Theme 2: Sources of Support and Well-Being

9.3.3.1 Supervision

Trainees viewed supervisors and the supervision process in an overwhelmingly positive light: "They allow some autonomy, or a good amount of autonomy, but also allow opportunity for you to touch base with them and make sure you're feeling supported in managing your patients" [Participant 7]. Trainees turned to supervisors for discussing challenging cases ("as a way to debrief about difficult patients"), exam preparation assistance, and moral support when dealing with difficult situations such as "resolving team issues" [Participant 15].

Fortunately, issues with supervisors (mentioned above) were not reported by many trainees, but experiences of having difficulty accessing supervision due to the workloads of their supervisors were more common. Participant 6 said "I was doing supervision on the run forever…There was a set time, but we could never do it in a set time—never." Trainees also noted that the RANZCP's use of programmatic assessment could impede on this precious supervision time: "That's frustrating because sometimes if you want to talk about dynamic issues or interactions with patients or their families, there's no time for that in supervision, because it's all about your WBAs [workplace-based assessments]…" [Participant 7]. It was clear from the interviews that supervision was deemed to be a major source of support but more measures were needed in order to protect this time.

9.3.3.2 External Supports

Trainees most often reported seeking support from peers, family, and friends in the first instance: "It's kind of also good to have that objective side of things as well to put things into perspective a bit from perhaps people who are seeing things from the outside" [Participant 13]. However, some felt that drawing on family for support would cause them unnecessary stress on top of the work-family conflict that some felt arose from long and stressful work and training hours. Trainees also identified health professionals as helpful sources that some had sought in the past—Participant 1 noted that their GP had "been really helpful in the past and I guess being a doctor they have some understanding of the challenges," and Participant 12 noted that they would "definitely recommend" seeing a psychologist as they had found it helpful following a "stressful time."

Despite the availability of support services offered by the health service to employees, as Participant 3 stated: "I would be reluctant to use the services within the organization. I'm just being honest." They expressed fear of professional consequences due to mandatory reporting requirements to be the main driver: "I know what consequences there can be for me, professionally, financially, insurances…" [Participant 3]. However, they did acknowledge the importance of leadership and advocacy on trainees' behalf from within the organization—in particular, having the Director of Training's advocacy and advice was "a nice, secure feeling to have" [Participant 10].

9.3.3.3 Distraction or "Switching Off"

A common thread that trainees took when asked about their sources of support related to distraction or "switching off" once they stepped outside the workplace: "Just spending time away from a work environment and not talking about work. Physical activity—I go to the gym, it's a good distraction technique" [Participant 4]. Some even expressed not wanting to talk about work: "My wife gets annoyed at me because I don't ever talk about work. She goes, she has no idea what I'm doing, and it's like I always forget to talk to her. I shut off when I get home" [Participant 2]. Looking at aspects that the trainees felt that long work and training hours took away from their lives, it was also apparent that having adequate time for family life, socializing, exercising, and hobbies were important distractors from the stress of their jobs.

It must be noted that while positive self-beliefs were expected to arise as a means of coping with stress, they did not feature prominently in these interviews. While the majority of the trainees reported feeling engaged ("I love psychiatry, I'm passionate about it" [Participant 14]), and some felt that they were resilient, when asked about positive self-beliefs, many felt they did not use these consciously: "I don't think I actively think of those things, but certainly I would think that those qualities would help you get through" [Participant 7].

9.4 Discussion

While it is not new knowledge that psychiatry trainees experience high levels of stress, this study sought to investigate the factors that contribute to their stress, as well as those that contribute to their well-being. This study had several strengths, including the length and in-depth nature of the interviews conducted and the spread of participants in age, gender, and experience levels. The main sources of stress identified were workload, aspects related to the College training program, and workplace-based aggression; supervision, external supports such as family and health professionals, and distraction or "switching off" were their main sources of well-being support.

Workload has been frequently cited in the literature as a major source of stress for trainees, so while this finding was not surprising, its effect on trainees' ability to meet College training requirements—and vice versa—was a key finding of this study. While we did not include a quantitative measure, the effects of excessive workload reported by the trainees reflected symptoms of burnout such as feeling "emotionally drained" or "used up" [22], which are not conductive to studying effectively for exams [26]. More worrying was the trainees' perception that time taken from the workday to complete training requirements would, at best, only result in a build-up of work for them to complete later, and at worst, result in judgement from their colleagues for being absent. They attributed these effects to the lack of cover for their role during the 4 h of protected time during the work week that they were required to be given to attend classes or undertake learning activities [32].

The notion that training time is protected must be supported by the provision of adequate staffing to ensure that the workplace does not suffer from the absence of the trainee and ensuring that colleagues are reminded by management of the importance of trainees receiving this time. These solutions, in addition to other job design improvements such as safer on-call rostering (consistent periods of after-hours work rather than having these interspersed with day shifts) [29], were suggested by the trainees themselves. After all, a variety of factors related to workload beyond just long hours, including undertaking education outside of work hours, workload intensity, and jarring mixtures of shifts, can lead to stress and fatigue [23]. Disappointingly, inadequate leave cover was identified as being particularly problematic in the psychiatry specialty.

Of course, workload difficulties have only been compounded by the COVID-19 pandemic, with many staff being furloughed and the intensity of work being heightened [30]. To add to this, difficulties in shifting to online exam delivery have resulted in delays in trainees being able to sit their exams, leading to delays in some receiving their Fellowship and a heightened sense of stress and frustration for those who had been studying for their scheduled exams [33]. While this study was conducted prior to the pandemic, stress over the College training requirements was already high amongst the trainees due to low pass rates and time-consuming assessments. In a survey study, only 58% and 56% of trainees who had completed Fellowship requirements reflected that the examinations were fair and transparent, respectively [10], and this was reflected in the responses from our participants. In addition to needing to better protect study time and reduce work stress, our findings suggest that College training stress can also impact adversely on work, and that this could be improved by keeping the requirements highly relevant to clinical work and reducing the frequency of programmatic assessment tasks [27] so that they are not viewed as extra paperwork.

The trainees displayed a good sense of awareness about factors that improved their well-being. Spending time socializing with family and friends, exercising, and engaging in hobbies were frequently listed as activities that contributed to this, as evidenced in the theme of the need to "switch off" from work. Benson et al. [5] similarly found that activities that medicine and psychiatry residents related to relaxation occurred outside the workplace. While unfortunately the general sentiment was that trainees did not have enough time for these activities, it is encouraging that, should improvements be made to their rostering and workload, they would likely spontaneously engage in well-being-boosting activities. Exploring ways to incorporate self-care activities into the workplace, such as availability of exercise machines and nutritious food, could also be a useful adjunct [7].

Trainees were also positive about seeking external supports from health professionals, though reluctant about utilizing internal supports apart from their supervisors. While it may be difficult to prompt greater use of internal support services for general mental health due to their concerns about mandatory reporting, other internal supports would be useful to improve. For example, providing managers with training on how to support staff following an incident of patient aggression could reduce the reliance on trainees having to seek help themselves, thereby mitigating this common source of workplace stress. Secondly, facilitating more cross-specialty training could reduce trainees' feelings of being stigmatized by other medical disciplines, while also keeping their knowledge of non-psychiatric issues current and creating better team dynamics.

A lack of supervision has been found to be associated with burnout [14, 15], so it was not surprising that supervision was a major source of support for trainees in this study. It offered support in a wide range of areas, both learning-related and in other work-related issues such as managing difficult team dynamics. Previous studies have found that the supervision relationship is the most important factor in effective supervision [17], and despite a lack of consistent structure, supervision has positive effects on educational and patient outcomes [9]. While the introduction of WBAs has given more structure to psychiatry trainees' supervision sessions, some trainees in this study believed this took time away from issues they would prefer to discuss. A lack of regularly scheduled time for supervision was also identified as a problem for several trainees. Protecting supervision time in a similar way to training time seems a given; ensuring there is adequate cover and structure to keep consultants' workloads manageable would be key. Additionally, increasing other supervision-like opportunities, including consultant-led and peer discussion groups, could provide trainees with more protected support time to discuss non-assessment-related issues [2]. While issues with supervisors were not common in this study, increasing this kind of support could also provide trainees with additional outlets to obtain support from within the workplace if their supervisors are less than supportive.

Overall, this study highlighted the importance of structural factors in the workplace and training program in the stress and well-being levels of psychiatry trainees. Trainees were very aware of the activities that improved their well-being and willing to seek external support, but work and training loads affected the amount of time they could dedicate to these activities. Our study was limited to a single health service and discipline, which limits the generalizability of our findings. However, we were able to explore a broad number of topics in great detail in our interviews. As future leaders in our mental health system, psychiatry trainees' own mental health must be looked after; this study contributes useful insights into how we can better do so.

Appendix: Interview Schedule

Basic demographic information	
Age	________
Gender	________
Year (e.g., 1–5) of psychiatry training	________
Year (chronological) of graduation in medicine	________
Do you have a partner (yes/no)?	________
Do you have children (yes/no) and, if so, how many?	________

What key RANZCP exams or other assessments (e.g., psychotherapy case) have you successfully completed to date?

____

____

____

____

What key RANZCP exams or other assessments (e.g., psychotherapy case) remain to be completed?

____

____

____

____

Prior non-medical qualifications or employment outside medicine.

____

____

____

____

Prior completion of training in another medical specialty.

____

____

Note to interviewer: Please ensure that trainees elaborate on the reasons for their responses and do not answer simply in a "yes-no" manner. If a trainee does not spontaneously do so, please follow up each question with "please elaborate" or "please explain."

Work Demands

Work-related stress, engagement, and psychological capital

The term "engagement" may be used to describe employees who are energetic, dedicated, and absorbed in their work.

Would you consider yourself to be well engaged in your work and training at present?

How well do you believe you are performing your job at present?

Have you ever experienced work-related stress? What is the source of this stress?

Has work-related stress ever impacted adversely on your performance or have the potential to do so?

Self-beliefs such as self-efficacy, hope, optimism and resilience may be helpful in countering the effects of work-related stress.

Do you make use of any such beliefs to manage the demands of work and training or cope with any work-related stress you experience? [Clarify which belief(s) in particular].

How else do you manage work-related stress?

Have you ever contemplated leaving the psychiatry training program because of the demands associated with it?

General clinical challenges

What aspects of your clinical work in psychiatry do you find most challenging?

Do you find these aspects of your clinical work challenging in a positive sense or are they a source of work-related stress? If they are stressful, why is this so? If not, what factors help to mitigate the stress?

Are you well supported in managing aspects of your clinical work by clinical supervisors and the service more broadly?

Working Hours

Clinical workload

Is your clinical workload in your current and/or prior rotations reasonable and manageable?

Have inadequate staffing levels in your current or prior workplaces contributed to an excessive clinical workload?

Could your current or prior placements have been better designed to make your workload more manageable?

Have you been given adequate opportunities to redesign your job yourself (e.g., through task selection or job content renegotiation) to make your workload more manageable? If not, do you think such opportunities would be helpful?

Mental Health Tribunal

Were you working in psychiatry prior to the change in the Mental Health Act (MHA) in 2014?

Has the change to a new MHA in 2014 impacted on your workload as a registrar?

Do you find the volume of work needed to prepare for Mental Health Tribunal hearings excessive or the process of presenting at MHT hearings stressful? Is this more so than under the previous MHA (if applicable)?

Do you think there is a role for aspects of your job being redesigned (by your employer or yourself) so that you can better meet the demands of preparing patients for MHT hearings?

Job Control

Factors intrinsic to the College Training Program

What are the positive aspects of the College Training Program and the associated examination process?

What aspects of the College training or examinations are most stressful?

Has failure to pass examinations or otherwise meet College training requirements ever given rise to a sense of (or actual) job insecurity?

How can the College training program be improved?

Work-training interface and human resources issues

Do training and working requirements ever conflict? If so, do you see this conflict originating within the training program (e.g., unreasonable training demands or difficult exams) or within the health service (e.g., inadequate facilitation of training)?

What changes could be made by your employer or yourself to increase your sense of control in relation to training activities within the workplace?

Has the on call roster ever been a source of work-related stress?

Have leave arrangements ever been a source of work-related stress?

Have any requests in relation to job flexibility, such as working part time or accessing specific rotations, been easily met?

Social Support at Work

Team dynamics

Would you identify team dynamics in your immediate workplace as generally good, poor or somewhere in between?

Have poor team dynamics ever been a source of work-related stress? If so:

What was the nature of these poor team dynamics?

How did they impact adversely on you?

How did they impact adversely on other team members?

What did you do to address the problem?

Clinical supervision

Do you believe that current formal supervision requirements as mandated by the RANZCP are adequate in meeting trainee needs or should they be changed in any way?

Have you found RANZCP supervision requirements to be implemented well in practice within the clinical service?

What type of support do you seek from clinical supervisors and have they generally been supportive in practice?

Can you provide an example of a positive supervision experience you have had and explain what made it positive?

Is there any particularly negative supervision experience that comes to mind? Why was it so negative and what could have been done to improve it?

Relationship with other medical disciplines

As a psychiatry trainee how well do you get along with doctors from other disciplines within the organization at a personal level?

Is psychiatry (or is practitioners) ever marginalized or stigmatized by other medical disciplines within the organization? Have you ever been personally affected by this?

Is there anything that the clinical service can do to improve the image of psychiatry and reduce stigmatization within the organization?

Is there anything more that the RANZCP should be doing to improve the image of psychiatry and psychiatry training more broadly?

Support within the workplace

Please indicate whether you find each of the following groups supportive or otherwise and describe the sort of support you might turn to each for:

Health service managers (including senior medical administrators).

Peers (trainees and other junior medical staff).

Other multidisciplinary team members.

Do you look for support outside the workplace (e.g., from family and friends) to complement support received within the workplace or to compensate for a lack of such support?

Are you aware of resources you can access for assistance if you become emotionally distressed as a result of your work and training in psychiatry?

If so, please identify these resources.

How comfortable would you feel to access these resources at a time of need and why?

Can you identify any factors that would increase your confidence in accessing such services if required?

Work-Family Conflict

Support from family and friends

What sort of non-professional supports outside the workplace do you have available to help you with your training and clinical work?

Do you believe that your clinical work or training requirements (or both) impact adversely on other people close to you, such as family or friends?

Do difficulties at home ever impact on your role as a psychiatry trainee?

Conversely, do you find a source of support in your family and friends in relation to your clinical work and/or training?

Overall, do you feel that you are able to achieve a reasonable work-life balance as a psychiatry trainee?

Role Changes

Orientation and handover

Would you characterize the quality of the orientation provided at the outset of each rotation as good, average or poor?

Which areas have been covered well and which poorly during orientation?

Would you characterize the quality of the handover received at the outset of each rotation as good, average or poor?

Has the quality of orientation and/or handover at the outset of a rotation ever impacted on your subsequent sense of control over your work during that rotation?

Do you have any recommendations regarding how orientation and/or handover can be improved for future cohorts of registrars?

Proficiency in dealing with physical health problems

How much experience do you have of working in other areas of medicine prior to entering psychiatry training?

Have you been able to maintain your expertise in dealing with patients' physical health problems or do you feel that your skills in this regard are deteriorating over time?

Are medically compromised patients ever a source of work-related stress?

What could be done to improve you skills and confidence in managing your patients' medical problems?

Antisocial Behaviors

Workplace-based violence, harassment, or bullying

Have you ever witnessed or been subjected to workplace-based violence, harassment or bullying? If so, please describe the circumstances involved.

How did this experience impact on you both within and outside the workplace?

If you were the one subjected to these behaviors, did your experience impact adversely on others within the workplace (e.g., other trainees) or outside the workplace (e.g., your family)?

Did you draw on any positive self-beliefs such as self-efficacy, hope, optimism or resilience to help you cope with this experience? [Clarify which belief(s) in particular].

Did your employer (and/or the RANZCP) do enough to support you after this experience? What was most helpful about the support provided? How could it be improved?

Did you draw upon any non-work-related resources to cope with this experience, such as family and friends or a professional counsellor?

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10

Family Recovery from Addiction and Trauma: An Interpretative Phenomenological Analysis of Mothers' Lived Experience

E. Missouridou, E. Segredou, E. Stefanou, V. Sakellaridi, M. Gremou, E. Kritsiotakis, P. Kokori, E. Roditi, V. Karahaliou, I. Rizavas, A. Vasiliou, S. Patseas, and S. Parissopoulos

Abstract

Introduction and Aims Addiction has a devastating impact in the lives of millions of people worldwide. Mothers constitute a hidden population. Previous research did not focus on mothers' experience of recovery.

Methods An Interpretative Phenomenological Analysis was used to analyze the experiences of 10 mothers whose young adult son/or daughter was in recovery from addiction.

Findings Four themes delineated mothers' lived experience of the long journey from traumatic loss and isolation to traumatic growth and connection: (a) Trauma and despair. Loss of relationships and healthy family life, (b) coping strategies, (c) finding meaning and constructing a new identity, and (d) connection and gratitude. Overall, halting the descent into despair involved a perceptual shift that restored meaning, relationships, and hope and alleviated mothers' feelings of chronic grief and distress over their adult child's addiction problems.

Conclusions Addiction can have a damaging traumatic impact on mothers which is enhanced by social and self-stigmatizing processes. Ambiguous loss can occur when one's child uses substances, as the child may be physically present yet be psychologically absent in terms of the mother (and the family). Understanding the experience of mothers may help health and social care professionals to develop compassion, patience, and empathy towards mothers of persons with addiction problems. Mental health professionals need to be aware of the devastating impact of addiction problems on all family members in order to validate their experiences and support them in recovering from trauma and loss in the family.

E. Missouridou (✉) · E. Stefanou · V. Sakellaridi · M. Gremou · E. Kritsiotakis · P. Kokori · S. Parissopoulos
Nursing Department, Faculty of Health and Caring Professions, University of West Attica, Aigaleo, Greece
e-mail: emis@uniwa.gr

E. Segredou · V. Karahaliou · I. Rizavas
Psychiatric Hospital of Attica, Athens, Greece

E. Roditi
Kapodistrian University of Athens, Athens, Greece

A. Vasiliou
Primary Education, Athens, Greece

S. Patseas
Secondary Education of Etoloakarnania, Patras, Greece

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Addiction treatment · Mothers · Family · IPA · Qualitative · Alcoholism · Trauma

10.1 Introduction

The first author's interest in the family recovery after treatment for addiction problems was promoted by her clinical experience, working as an advanced practice addiction nurse in the family unit of the drug dependency unit of the Psychiatric Hospital of Attica. Over my therapeutic sessions, I was often impressed by the resilience of mothers of adult children with substance use problems in the landscape of trauma and loss. Additionally, the mothers' strong will to help their children, accompanied by a positive outlook to their future, used to astonish me, as I used to observe a sense of self-empowerment to persevere in their recovery period. For these mothers, family recovery was synonymous with discovering communication, connection, and love. For some mothers, it entailed a period of empowerment so as to get out of depression and mute stigmatized grief and adopt coping strategies to motivate their adult children towards change and a new way of life. Narratives of genuine honesty are like lamps which can show clearly one's previous life and can be pathways for other people's recovery. Realization of the impact of addiction in a mother's life can be a torch for other mothers' recovery. It can help them articulate the specific ways in which a child's problem use has impacted their lives.

Although research evidence points to the continuing effects of trauma in the lives of both addicted individuals and their families [7–10], the dominant discourse on drug and alcohol affected carers has historically viewed them in a pathological light [11, 13]. Within this discourse, the codependency model and the family system perspective attribute the onset, development, and maintenance of addiction problems to family behavioral patterns, practices, roles, relationships, and structure. The codependency suggests that family members may be "addicted" to the substance user needing them [3]. On the other hand, current contemporary family systems practices have progressed away from a strict emphasis on homeostasis towards more open reflective perspectives, valuing both the earlier family therapy attention to relationship patterns and the different contemporary family therapy practices of reflection [4]. In contrast, the stress-strain-coping-support model (SSCS) can be seen as having its origins in investigations putting forward a perspective that would contrast with the dominant family pathology model (Orford et al. [12, 13]). This model expressed a clear shift in research interests since before the advent of the stress-strain-coping-support model (SSCS) almost no research had been conducted that examined the impact of problem drug and alcohol use on families [16]. The aim of the present study was to illuminate the process of family recovery through the eyes of mothers caring for an adult child with addiction problems.

Setting and Theoretical Framework for Treating Addiction

The study was conducted at the drug and alcohol treatment unit of a psychiatric hospital of Attica, Greece, which has six inpatients units, providing 2-, 6-, 9-month treatment, and four specialized units (i.e., Family, Adolescent, Mother, Out-patient).

The theoretical approach that guided the clinicians' interventions in this particular setting was based on group analytic and systemic principles [4]. The goal of clinicians who worked in this setting was to create a therapeutic context which functions as a container, enabling all parties to handle anxiety and, therefore, avoid projections, acting outs, scapegoating, and siding up with the patient's vilification of the parents while concurrently accepting the parents' views with caution. In this therapeutic context, individuals and families are offered opportunities to reflect upon their suffering, find new meanings and (re)connect with self and each other. Ethical approval to conduct the study was obtained from the Scientific Counsel of the hospital.

Family Services
Families were offered biweekly or monthly multi-family group sessions, throughout the inpatient and rehabilitation phases of treatment. Service provision depended on the unit's capacity and length of treatment. The alcohol treatment unit offered, in addition, psychiatric assessment, as well as brief couple-therapy treatment, long-term family support groups that focused on motivational issues and self-development. Finally, the family unit offered comprehensive assessment sessions, psychoeducational seminars, two levels of family groups focusing on motivation/rehabilitation, drama therapy groups, as well as family and couple therapy.

10.2 Method

This study employed interpretative phenomenological analysis which requires a small homogenous sample [14]. Purposive sampling was used to approach 10 mothers with a son/daughter having had addiction treatment. Participants were recruited from among mothers attending family services in the drug and alcohol addiction treatment unit of a psychiatric hospital of Attica.

Procedure
Ethics approval was granted by the psychiatric hospital of Attica research ethics committee. Informed consent was obtained from all participants. All names have been changed in order to protect confidentiality. A semi-structured interview schedule was devised, aimed at understanding how addiction and trauma have impacted on their lived experiences and recovery. An introductory question (Can you tell me about impact of addiction and trauma in your life and the lives of the other members of your family?) generated lively discussions about their lived experiences. This was followed by probes on different aspects of their recovery. Special consideration was given to their relationship with their addiction prior to and after engaging in treatment. The duration of interviews ranged from 90 to 110 minutes. Group discussions were tape recorded and transcribed.

10.2.1 Data Analysis

Each interview was analyzed in isolation of the others so as to maintain as much objectivity and open-mindedness with regard to emergent themes. Analysis was conducted following the interpretative phenological analysis guidelines of Smith et al. [14]. Upon the initial reading of the text, there was an annotating phase of analysis. Descriptive, linguistic, and conceptual comments were noted followed by identification of emergent themes within the text. Similar themes repeated throughout the text were then consolidated and given an appropriate theme title. The emergent themes were then clustered into superordinate themes. This process was undertaken for each participant's interview. Once all ten interviews were analyzed in this way, they were compared looking for the convergence and divergence captured within each participant's lived experience. To ensure the credibility of findings, consensus was reached among three researchers.

10.2.2 Introducing the Participants

Table 10.1 presents the pseudonyms of the participants, each mother's age and the age of their child or children with addiction problems. Then, the narratives of the participants are briefly presented, and lastly, we present the concepts that emerged from their respective stories. The participant mothers' healing experience was part of a much larger life composition that was woven into each woman's story. The study enabled each mother to tell and share her own story. Although some of the participants had progressed more than others in their personal and family recovery process, at the time of the study they were all able to verbalize their experience and also felt that they had succeeded in achieving small but significant—for them—changes.

Table 10.1 Description of the participants

Mothers' pseudonym	Mothers' age	Age of child with addiction problems
Emmelia	52	29
Athena	54	30
Aphrodite	57	28 and 27
Hera	57	27
Nona	46	27
Anthousa	62	35
Persephone	63	41
Maria	68	33
Elpida	54	32
Lito	44	25

Emmelia, a mother to two sons, is crying while she describes the lack of emotional contact and support that she experienced in her marital relationship while raising their children. Her husband was emotionally absent due to his ongoing gambling preoccupation. Emmelia explains to us that when the couple finally adopted the same approach and while they were full of anger, they confronted their son in order to set some boundaries, the son attempted suicide twice, apparently out of anger. His attempts provoked intense anger and rage in all members of the family. In a relapse after trying to rehab, the father collapsed and attempted suicide by hanging. He was saved at the last moment by this wife and their son. The father started treatment, the son went into rehab and the mother continued her treatment. The other son quit his postgraduate studies. Emmelia describes her journey as one from death to life; Emmelia feels that she has moved from a state of lack of communication and anger to accepting others and recognizing their good sides. At the end of the interview, she tearfully admits that her husband is actually a loving person.

Athena describes the long abusive relationship she had with her husband and how she managed to defend and protect herself and her children. Her husband has repeatedly accused her of being incompetent as a mother, and has attacked her with constant insults, taunts and humiliations in relation to her role as mother to his children. Her husband questioned the way she raised the children while he was away traveling. He, the husband, controlled her financially as he did not directly send any money to her but only to her in-laws. Athena perceives her child's life journey as a reaction to his father's insults and non-acceptance of him. The father's disappointment has to do with what he expected his son to be. Athena believes that the individual sessions and the group she later joined actually helped her raise her stature and stand up; they also helped her to be able to say “no” to her husband and son and improve her communication with them. Nevertheless, at the end of the interview, she admits that she still loves her husband, and her husband confesses that he has just “discovered” love.

Aphrodite is a 57-year-old nurse who describes herself as playing a secondary role in her life, living in the shadow of her husband. Her husband was the “pillar” of the family and had a very good relationship with their two sons. However, she lost her husband to cancer when their children were at high school.Then, a few months after her husband's death she found out about her sons' drug use and she “fell apart.”

Aphrodite describes episodes of being subjected to physical abuse by her children when they tried to extract money from her; she discusses their trip to the parks and their descent into the underworld of drug usage. Her colleagues helped her seek assistance. Therapy is helping her re-compose herself, is helping her to have a voice that is heard, and is helping her engage both of her sons in therapy. Therapy helps her learn to laugh again, to feel hopeful for what the future holds, and to sense again the freedom she had lost when her children were using drugs.**Hera** describes her family's happy life before the drug problem. Motherhood was a dream that came true later in her life. She explains that having three children gave meaning to her life and increased her love towards her husband. When they discovered the addiction problem, her husband retired and they moved to Athens so that their son could escape the meeting places of their old area so he could join a treatment program. The whole family finds guidance in the program is empowered and manages to motivate the son to change.

Nonna explains that she ended up marrying a man with psychiatric problems in her attempt to escape the unbearable daily sadness and panic she had experienced while watching her mother being abused by her alcoholic father. Her husband had similar childhood with parental fights and lack of communication. Her brother and sister use drugs, and after unsuccessful attempts to divorce her husband who is now in and out of psychiatric hospitals, she herself starts alcohol abuse. Nonna, an attractive 46-year-old mother who was not able to leave her house due to depression and recurrent panic attacks, describes her journey of counseling as one of healing and lifesaving. She has achieved her main goals, to stop using alcohol, she improved her communication with her children, she was able to motivate her son towards change, she found a job, and she occupies her free time with beautiful activities. She notices her own daughter's silent grief which is caused by the abuse of her own boyfriend, which is in a way a repetition of their past family problems. She hopes she will be able to help her daughter escape from this situation.

Anthousa has been physically abused by her husband several times in front of her children. He eventually died and this was caused by alcohol abuse. Anthousa explains that her husband was also physically abused in his childhood and she discloses two incidents of incest. She also describes a scene in which her 3-year-old son threatened the father—her husband—with a knife to protect her from physical abuse. She says she has a warm and strong relationship with her young son who used drugs. They communicate well with each other. She believes that the therapeutic program helped her to be stronger. Thanks to therapy she managed, though she struggled greatly, to motivate her son change.

Persephone has difficulty coming to terms and understanding the changes she has gone through her life journey. Persephone is a widow. She is on anti-depressants. She describes how her extended family informed her of her son's addiction problem. Six months after her husband's death, her family arranged an appointment for her and enrolled her on the therapy program. When she first realized that her husband was going to die, she started taking anti-depressants to cope with his impeding loss.

Persephone's husband and her son's girlfriend both died before they even knew that the son had an addiction problem. She worries that she might be too soft to her son and his addiction, echoing her own father's soft attitude to her own mother. Persephone's father, orphaned and raised by his grandparents because his mother was away from home for work, always considered Persephone's mother a weak person. He supported her anti-depressant treatment and was very lenient with her alcohol abuse. In fact, he encouraged his children to adopt the same attitude towards their mother.

Maria describes her emotional distance and conflicts with her husband in the early years of their marriage due to their involvement in gambling in a wealthy family context. They belatedly discovered the addiction of G., who managed to get into the university, in the department of social work and get his degree. She describes, full of guilt, that she worked as a nurse, while her husband was busy gambling; the children were taken care alternately by her mother and mother-in-law, so she was not close enough to them. In the therapy program, she found the strength to talk about this problem, stop crying, and urge her son to join a therapy program.

Elpida grew up with two parents over 50 years old and describes a lonely childhood without affection and communication with her parents. Her father's health deteriorated soon after her birth and she was ashamed of him. She married a man 20 years older than her and they immediately had a child even though she did not want to get pregnant so quickly and she was not ready for the birth of the child. Her husband and mother argued over the naming, so she felt even more alone and without any help. Elpida was very harsh with her firstborn son—as her mother was with her—and she feels guilty that she did not give him love and was not close to him like she was with her other children. When she discovered her son's addiction problem, she wanted to kill herself. She suffered from anorexia and her husband suffered from severe inflammatory bowel disease. Her narrative is full of guilt, but her contact with the treatment program, her husband's involvement, efforts to improve communication with their first-born son, and the son's inclusion in the treatment program steadily built an effort for change.

Lito, an attractive 44-year-old woman, came to the treatment program for her 25-year-old son.

She compares her mother's story to her own. Lito's father was physically abusing her mother in front of her, and her husband had been abusing Lito in front of her son. Both women had abundant material possessions, and their husbands were very jealous of them. Lito convinced her husband to get involved in therapy and he has changed since then. Now, every time his son challenges him, he doesn't react in a bad way, he just listens to him. They don't hit each other anymore. She believes that this change is very important ~~and optimistic~~ for all of them.

10.3 Results

The mothers describe scenes of violence, neglect, hidden family secrets. They were emotionally charged during the interview. Through their eyes, addiction appears as threatening, unpredictable, disruptive, and unexpected. Addiction is described as "plague" that erodes everything healthy in the family. All mothers describe it as a traumatic experience. Overall, four themes outlined the mothers' lived experience of the long journey from traumatic loss and isolation to posttraumatic growth and connection: a) trauma and despair. Loss of relationships and healthy family life, (b) coping with the problem of addiction: Strategies for dealing with the problem, (c) meaning and re-identification and (d) connecting with others and gratitude. The key components of the themes are outlined with references to the narratives of the mothers who shared their stories as an indication of gratitude for the help they received from participating from being part of the therapy program.

(A) Trauma and despair. Loss of relationships and healthy family life

The participants described radical changes in their son's/daughter's behavior after the addiction was firmly established. They reported they were unable to recognize them. To the participants, they were a "familiar stranger." They felt they had lost half of the person they knew, because their child was at the same time alive and dead. The dream of having a normal life, the child they knew in the past, before the onset of addiction, was gone. They could not see the adult they had dreamed their child would be 1 day. All the potential they could clearly see before the substance abuse was gone. Anthousa describes the moment of her own tragic realization in her garden of her countryside house.

> As I looked at him in the daylight, I saw an old man even though he was 24 years old… When I saw him, I knew that my child was suffering a lot… Anthousa

Their child was physically present but at the same time psychologically absent. They could not recognize in their son's behavior the child they knew. Substance abuse rendered them "another person" with other characteristics. Like in the Strange Case of Dr. Jekyll and Mr. Hyde, the good person transforms into his bad self and the nightmare becomes a reality in everyday life, with the expectation that the bad man will eventually transform back into his good self.

> There were times when I couldn't bear to see them [she means her two sons]… They were kicking… Shouting… They had bruised my shins… At first, I gave them money because I was scared for my wellbeing... not get hurt and then what would happen to them… who will look after them? How will they be saved Aphrodite.

The realization of loss is described as a journey into an unknown and terrifying world. It is a real nightmare the dark world of drugs:

> We went to that town square together, and I saw him between the dealers and trying to find drugs… and there I felt sorry for my child… I understood the seriousness of the issue, it was a tragic mistake, in his adolescence... 'he will pay for it until he dies' I said to myself, but I didn't cry because of fear that he might return and see me... At some point after many hours he took the pills and we left and went to our house... Anthousa

Aphrodite searches alone on the park benches for her children in a state of despair. You don't usually come back to life after a trip like that. Feelings of hopelessness and helplessness, inability to react and resignation are evident in her words.

> I had a day off and I was looking to find out where they were... I was looking in the parks... People saw me looking for the needle in the parks... I found them on the benches there, "What are you doing here?" "We didn't have school" and "we will return to school." That was just an excuse since they didn't go to school. B [initial] wasn't absent so much, but K [initial] didn't make it to the next year of school because of truancies. Aphrodite

The participant mothers describe the overturning of their internal order, the changes in which they lose themselves, the sequence of events and the "falling apart." Aphrodite and Persephone describe the process/the events that led them to start taking anti-depressants. The traumatic loss of the relationship they once had with their child, and the reliving of the nightmares in the participants' lives. Cumulative loss, intergenerational trauma, missed opportunities, failed relationships, unfulfilled dreams and unappreciated grief run through their narratives. Their families have been suffering for years as they watch in agony the lives of their loved ones gradually being destroyed. They stay awake at nights not knowing if they [children] are still alive. This sort of traumatic loss is described as a vortex, a spiraling vicious cycle of descent into despair and eventual recovery. Unfortunately, the emotional breakdown they experience can even lead to acts of suicide, as in the case of Emmelia's family. Traumatic loss is described as an insidious process that destroys family relationships over time. The family sinks deep, fails completely, and breaks up. Everything seems to be lost, destroyed, out of control.

> The house fell on me and crushed me, I disappeared from the face. My whole body was shaking… Anthousa

The narration of the experience of addiction evoked troubled feelings among the participants. These feelings often reflected their own past experiences or losses. The participants in this study shared long-lasting stories of loss or dysfunctional and sometimes abusive relationships that often were repeated within their own family. Several of the mothers' narratives demonstrated that the reality of their lives included high rates of loss, which wake up from the oblivion, through the problem of addiction. The drama of repetition between generations reawakens nightmares.

> My mom had everything, just like me, cars, houses, everything. When he attacked her, I remember her saying 'But why? I did nothing!'. It was jealously. It seems that history is repeating itself" Lito "I lost my father at the age of 18 when I was in nursing school. I still miss him and would still like to have him. History is repeating itself. I lost him, my children also lost their father and not only that, they also got into trouble. It hurts. Aphrodite

> The traumatic loss that happens in the relationship with the child with addiction problems is a silent traumatic loss. This loss is secretly experienced since it does enjoy social acceptance and support. Mothers expressed feelings of intense shame and guilt as a result of the attached social stigma. They resorted to secrecy out of embarrassment and shame and in order to protect themselves and the child with the drug addiction. But the secret brought on alienation among family members and members of their support network. The heavy burden of the terrifying secret appeared to have a paralyzing, isolating, and corrosive effect on the mental pain on the mothers.

> "I avoid my girlfriends… as I can't explain what is the reason for my behaviour, I consider this an issue of K' [initial]... It's personal, that's how I see it... I recently told a dear cousin of mine and to a friend of mine that 'this is the issue and I have this serious problem with K., that's why I don't call', and we don't meet but I don't want it to be the object of any discussion.... They know K. These are the differences in my life…". Persephone

> Guilt for their child’s problems prevented the participants from allowing them any feelings of joy. How do you rejoice with the joy of your child when the other child is in the “park of death”? Anthousa experiences guilt for not sharing the joy of one of her sons and for the exposure of her other son to the risk of dying from addiction.
>
> “One child was on the streets; the other child was getting married... I felt so guilty that I didn’t feel happy at my son’s wedding...” Anthousa

(B) Confronting the problem of addiction: Strategies for dealing with the problem

In the beginning, there is disbelief about the existence of the problem and the difference of opinions among the family members. The family delays to realize the problem of the member with addiction. The evidence-based ascertainment of the problem unites the family, which then rushes united to ask for help:

> They said I was pushy and they didn’t believe me, but then when they caught G. they told me ‘mom, you were right, now our brother is sick and we run to support our mother and all together G... and we have this result...’ Hera
>
> “I saw that when he returned from work, he would go and sleep… The following day he would get up and go to work as usual... At that point he tricked me. He is a good actor, he didn’t cause any concern… Then he lost a lot of weight in a period of time, and I told him that something was happening, he was eating but not gaining weight… until he was caught [taking drugs], and everything was revealed.” Hera

The participant mothers and the rest of the family members, who tried to cope with their child’s addiction, used almost all possible strategies. Some actively tried to control their relative’s addiction or even (as another way of controlling it) assisted their children in getting hold of alcohol or drugs. At that stage, they thought of this behavior as the best way of helping their child, especially in those early times when the substance use/ addiction gave rise to situations that were difficult for them to manage.

> At first he got me worried a lot and I gave him money because I was afraid of the dealings… this problem disturbed my sleep... Maybe he is in trouble, and they are blackmailing him like this…

Now I have overcome this because I hear from other parents in the groups that these guys have deals with the police... at his previous job they had asked him for his criminal record, it was clean. Now I don’t know how he is managing…” Persephone

The complexity of coping strategies is evident in the narratives: feelings, outcomes, expectations, difficulties, sources of help, behavioral control intertwine, and evolve over time. Some participants who may be described as more dynamic, for instance Hera, looked for ways to cut the child off from those “drug” groups and meeting places in the early stages, even by moving to another place. Quite often, the control of the person is intensified in the interviews, and the acknowledgement of their limits is clearly stated—by them—regarding the addiction and the people who accompany their child to the drug use. Violation of behavioral control, rules or boundaries are often followed by threats and sometimes actual punishment at a relational level, such as decrease of contact and affection for the individual with addiction problems.

> I put a wall between him and me… I put food for all of us and for him on the table, but I never asked him to come join. And this helped him understand. Hera
>
> I learned to have a different type of contact with him, to be calmer, less pushy because I’m stressed... Elpida

(C) Giving meaning and re-identification

The mothers, each in their own time, realize that they have reached a very low point in their lives. They experienced intense emotional pain—a reaction to the loss caused by addiction that awakened the ghosts of their own past. This pain weaved their narrative. The first involves awareness. This realization led to the judgment of the personal significance of events, persons, or things. The realization involved a shift in their perception that restored relationships, meaning and hope, a turning point as a starting point for how they perceived and related to themselves, others and the world. Athena describes getting out of the "well" she had fallen into because of the addiction problem.

> They helped me overcome the pain I was feeling… I came out of the well! Sometimes when I'm not feeling psychologically well, my brain stops to work again but now I have learnt to clear it myself. Now I have strength, when I say something, I mean it... Athena

For those mothers who were given the opportunity to talk about addiction, it was an important step. Emmelia described other ways of trying to get help without success. She was getting help from the hotline but "couldn't continue it." She tried getting help from a parenting group without the participation of the father but failed to intergrade because "over there they did psychotherapy but didn't explain what drugs are" and as a result "I did not understand." Thus, she was stagnant for some time in what she calls a silent loss. In the following excerpt, Maria explains how she came out of inertia and immobility of traumatic loss and she discusses the value of being able to talk about the problem with her son.

> I learned how to help G. [initial] to get rid of drugs and how I will also get rid of the misery… I didn't know what to do, how to react, don't give him money… but from here I got the strength… I was looking at his bag full of drugs and I did nothing I didn't have the strength to throw them away...
>
> I have a tendency to cry... now I have been helped… I can talk about drugs, tell the truth to G. 'I'm giving you this money for this and this reason' … to tell him that 'you have to go to the programme because if you don't, I can't help you'. Maria

Once they get out of the vicious circle of mutual blame and conflict, the participants look back to the past to search for the causes of addiction that reinforced their guilt. Their attempts to answer to questions as "why did this happen to my son or daughter?" lasted several years. Their own understanding of what was happening was essential perquisite in their attempt to rebuild their relationship with their son/daughter. Making sense of their experience involved gradual construction of a meaningful story that allowed each member of the family to be understood. It involved a constant process of redefining the relationships in their family and to the social world. They adopted a philosophy of life that helped them integrate their experiences.

> My question has always been 'why would he do that' and from what I've seen and from parents on the team, we all have the same question... Persephone

> My priority was to get closer to my child… don't forget that the problem was that I had no contact with the child…. Elpida

Gradually, during the course of them making sense of their experience, the guilt became bearable and the mothers began to become free from their heavy burden.

Happy memories and support from others help them get released from the guilt they had experienced, and enabled them to live with unanswered questions.

> My husband looked at him and cried. 'Why did this happen?' he said. Then I told him that something was definitely wrong, but don't search for it. 'Let's move forward', we said, and supported each other with love. Our love was built on solid ground, otherwise we would have been destroyed. If there is no love in a couple, the house falls apart with the first 'wind' [she means stormy situation]. Hera

> K. [initial] beats himself up and says that it is not our fault and says that all his friends tell him that they wish that our parents were like yours... Persephone

(D) Connecting with others and gratitude

Reconnecting with others involved moving towards others as a key transition that enabled them to benefit from support and also renewed their sense of belonging. Their parents and siblings helped them to share and embrace their suffering, and at the same time step out of social isolation. Anthousa had received active support from her brother and her child's godfather. The godfather became like a father to her child. The children's gratitude towards their mothers was very important. Perhaps the word "thank you" meant that she was a "good mother" in the eyes of her child.

> And he told me 'thank you mother...' This 'thank you' of my child touched even the last cell of my body, I have never felt a thank you so much in my life. Anthousa

> And he'll just say 'mom thank you', nothing else... like the time I went to some graduation of some children and all I had left with was the 'mom thank you'.... that's what I want, nothing else. Nona

The mother of the child with addiction reconstructs her identity. At the same time, the family also reconstructs the identity. Essential elements of identity are connection to others and communication.

> I was singing at home and my heart was racing [from agony]. Blood was dripping when one of my family members was lost and especially since it was my child… As a parent I felt like I failed, I gave everything to these children… I'm going crazy thinking that I will see something bad happen to him… I gave a lot of things wholeheartedly, I supported all my dreams for my children and now my son tells me that my dream is a bad dream… our family didn't deserve to go through all this… It's a nice thing for the family to be united and I succeeded, and I got this from my mother and my father to have a united family, it's a big thing but it takes time, you have to give, to get, and we gave. Hera

> A united family… even if they get married and live alone, we'll be a close family… and if there's a problem, we'll talk about it. Emmelia

The improvement in the relationship between the child who is facing addiction problems and the mother but also with the rest of the family but with clear boundaries that protect the feeling of security in the relationship is a central point in the mothers' narratives. The mothers' love for their children stands out as a dominant emotion in all the interviews. This love, even though they emphasized they had the right way to express it, remained unchanged throughout the process of addiction. The love covered the strong negative feelings of fear, terror, prolonged anxiety, anger, frustration, and the exhaustion that they experienced as witnesses of the course in the destructive paths that their children followed. The mothers openly declared their love and this was coming through their accounts in their words and in the feelings they expressed during the interviews. However, they also struggled to maintain the motherly love relationship, while they went through a process of reconstructing the relationship with their children. This was hard when they faced great difficulty.

> The most important thing for a person near someone with drug addiction problem is to have hope, to find hope, that their child can be saved, it gives me so much hope... I may talk about it now and get emotional, but when I'm alone at home, or when I'm shopping, when I go with my girlfriend shopping for vegetables.... when I go to the beach and so on there is hope that N. will make progress and he will succeed, I find strength… This is all I want, nothing else for me. He is a wounded child. Until I die, I will fight for him! Because I love him! Anthousa

> When it gets better, I will go to the sea... I will see them married with a child. I will feel free… Aphrodite

Therapy greatly increases communication within the family. Parents have come closer. They talk to the son and try to find solutions through communication. The son sets boundaries on what he wants and what he doesn't. According to the mother, they are far from each other, but they are united because they share sorrows and joys. The therapist emerges against the bleak background of multiple losses (loss of relationships, communication, dignity and trust) as a shadow of a goddess in a modern Asclepius offering hope and strength.

> The treatment here opened my eyes! It showed me the way. Hera

> I didn't want to look at myself in the mirror. I owe my life to my therapist! If it wasn't for her, I don't know where I'd be right now. There are people who care about you! I trusted this center, I love this place! Nona

10.4 Discussion

Overall, four themes were outlined in the personal experience of the mothers in the long journey from traumatic loss and isolation to posttraumatic growth and connection: a) Trauma and despair. Loss of relationships and healthy family life, (b) Coping with the problem of addiction: Strategies for dealing with the problem, (c) Finding meaning and constructing a new identity and (d) Connection and gratitude. The participants describe an unbearable personal low point that seems to demonstrate the hard, barren land on which the person with addiction problems and their significant others fall suddenly, an experience of complete agony, hopelessness, and helplessness. Generally, the halt of the course towards despair included a change of perception that restored the meaning, relationships, and hope, and relieved participants from the emotions of chronic grief and agony for the addiction of their children.

According to Smith-Genthos et al. [15] and the authors of the present narrative, the recognition of loss can be perhaps best captured by the seminal work of Boss "ambiguous loss" (e.g., [1]). Two fundamental models reside at the core of his theory: (a) physical absence with psychological presence and (b) psychological absence with physical presence. Boss [1] defines ambiguous loss as "an incomplete, uncertain loss of a loved one, where ambiguity interferes with meaning making, causing lack of resolution" (p. 3). Ambiguous loss is a loss that remains unclear. While communities traditionally comfort those who face clear losses, less attention is paid to ambiguous loss. Yet the trauma devastates family members' lives because it is incomprehensible, painful, and immobilizing. The ambiguity freezes the grief process and prevents cognition, thus blocking decision-making processes. Closure is impossible. Grief is frozen. Family members have no other option but to construct their own truth about the status of the absent person. Siblings cannot name their experience. They need a name which will not pathologize their experience such as "what you are experiencing is an ambiguous loss, the most difficult kind of loss because there is no closure" ([2], p.138). They need validation for their feelings of helplessness and sadness as well as hope and meaning behind their chronic experience of suffering. According to Boss [2], hope lies in discovering that suffering is not an assault on our personal comfort but a process of becoming more spiritual and of discovering patience and forgiveness.

However, although the recognition of loss by the mother of a person with addiction problems can be very potent, yet there must also be a recognition of trauma which pervades the present narrative. According to Smith-Genthos et al. [15], trauma of non-using family members can be better understood through the lens of the "loss of illusions" framework developed by Janoff-Bulman & Frantz [6]. "Three fundamental assumptions reside at the core of our inner world: (a) my world is benevolent, (b) my world is meaningful, and (c) I am worthy" ([6], p. 135). For mothers and other family members, the assumption of a benevolent world was shattered by the chaos and communication blockage brought about by the stigmatizing secret of substance use which affected severely social support recourses. The meaningfulness of this world was challenged which is also explicated in the lengthy personal accounts of mothers in qualitative research. Finally, the illusion of self-worthiness was shaken by an adored substance-abusing member for whom a caring co-sibling was simply not important when compared to the gratification provided by "using." Life illusions are important recourses of strength for adolescents and traumatized individuals of all ages.

Acknowledging that the theoretical framework for the lived experience of family members of substance using individuals could be embedded in the trauma and loss literature has several implications for mental health professionals. Mothers' experiences need to be validated so that denial of their feelings comes to a halt bringing about relief. Development of treatment options and support structures in the addiction field is necessary. Further research could illuminate the relational patterns of co-siblings who may have a reduced ability to think reflectively about themselves and about relationship experiences. Mental health professionals having a therapeutic relationship should focus on enhancing their ability to reflect on their relationships to other people instead of focusing on recovering memories. Cultivating a trauma awareness culture in the addictions appears to be a core pursuit in this attempt. Routine care interventions should also focus on parental trauma and loss experiences in the face of overwhelming chronic anxiety brought about by the fear of death. Clinical supervision may protect professionals from compassion fatigue and support them in this challenging task.

The current study concerned mothers that were in a therapeutic process. As a result, the narratives of their personal stories were influenced by personal and collective findings that emerged from the individual sessions with mental health care professionals or parent groups. Social and cultural particularities—for example, the sense of honor to the Greek family [5]—seem to be related to the traumatic dimension and the stigma of addiction and could be studied further.

In the field of clinical practice, traumatic loss involves the totality of the being a person and therefore a holistic approach is needed for understanding the prevention of addiction and its treatment. The deep psychological wounds need time and sometimes support from capable professionals to heal. Unfortunately, in the area of addiction there was a reluctance from the professionals to be involved with the families of the people with addiction problems. Nevertheless, there is a slow response in a recognized

need, to educate addiction professionals in family interventions. Finding meaning in the experience of addiction is important because most often mothers are unaware that distress, confusion and immobility should be attributed to the inherently ambiguous condition of addiction and not to themselves [2]. Realizing the difficulties that are involved in the traumatic experience of addiction can be an important step towards helping mothers to reorganize their perspective so they can start using coping mechanisms instead of remaining "stuck" in the mute persistent despair. Furthermore, they need validation for the feelings of helplessness and grief, like in the socially acceptable, not overlooked grieving process. They need others to participate in the process, to become witnesses of the loss. Furthermore, the skills of the mother to make decisions concerning gaining access in services for the child could be impaired if they are not able to acknowledge the ambiguous loss and the unpredictability of addiction. In those cases, helping mothers to increase their tolerance for living with addiction, so that their children can receive the appropriate services, can have long-term implications for children's outcomes. Understanding traumatic loss of addiction could help the professionals that cooperate with members of the family to be more supportive and with empathy towards the burdened members of the family.FundingOur project was funded by the University of West Attica.

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Post-traumatic Stress Disorder as a Risk Factor for the Development of Risky Behavior Among Adolescent Offenders: A Systematic Review

Eleni Zaverdinou, Maria Katimertzi,
George P. Chrousos, Christina Darviri,
Dimitrios Vlachakis, Christina Kanaka-Gantenbein, and Flora Bacopoulou

Abstract

The purpose of this research study was to obtain greater insight into the associations of post-traumatic stress disorder (PTSD) and trauma-exposed experiences with the development of offending behavior in adolescents. Using the PubMed and Scopus databases, we performed a systematic review of recent cross-sectional studies between 2016 and 2022, investigating the associations of PTSD and trauma with the social and mental behavior of adolescents. Fifty-three articles were initially identified. Due to duplication, eight articles were excluded, leaving 45 remaining articles. In addition, 34 articles were excluded due to year of publication, review, abstract, or irrelevant title. Seven articles were included in this systematic review after excluding the remaining due to different study types or samples. Included studies primarily examined the associations of PTSD symptomatology and expression of externalizing symptoms with risky behavior and the commission of a crime. The strongest outcomes were increased levels of violent behavior, violent delinquency, and total risk in correlation with PTSD symptoms, emotional numbing, use of drugs, and in some

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E. Zaverdinou · M. Katimertzi · C. Darviri
School of Medicine, National and Kapodistrian University of Athens, Athens, Greece
e-mail: cdarviri@med.uoa.gr

G. P. Chrousos
University Research Institute of Maternal and Child Health & Precision Medicine, and UNESCO Chair in Adolescent Health Care, Aghia Sophia Children's Hospital, National and Kapodistrian University of Athens, Athens, Greece

D. Vlachakis
Laboratory of Genetics, Department of Biotechnology, School of Applied Biology and Biotechnology, Agricultural University of Athens, Athens, Greece
e-mail: dimvl@aua.gr

C. Kanaka-Gantenbein
First Department of Pediatrics, School of Medicine, Aghia Sophia Children's Hospital, National and Kapodistrian University of Athens, Athens, Greece
e-mail: ckanaka@med.uoa.gr

F. Bacopoulou (✉)
Center for Adolescent Medicine and UNESCO Chair in Adolescent Health Care, First Department of Pediatrics, School of Medicine, Aghia Sophia Children's Hospital, National and Kapodistrian University of Athens, Athens, Greece
e-mail: fbacopoulou@med.uoa.gr

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cases maltreatment. The results of the systematic review suggest that PTSD symptoms and risky behavior, which can be also fueled by maltreatment activities in the family circle, are associated with criminal behavior. Future research is needed to confirm these findings.

Keywords

PTSD delinquency · Risky behavior · Juvenile offenders · Trauma · Post-traumatic stress disorder · Adolescent offenders

11.1 Introduction

Youths are commonly exposed to trauma and maltreatment during childhood, and many of them consequently develop post-traumatic stress disorder (PTSD). By the age of 18 years, roughly 8% of traumatized youth meet the criteria for a diagnosis of PTSD, with numbers rising to 40% in cases of sexual abuse and assault [1]. Apart from the psychological suffering, PTSD is associated with lower academic achievement, and increasing incidence of depression, suicide attempts, and substance abuse in adulthood [2]. Over the past decades, a significant amount of research has brought to light strong evidence linking trauma and elevated post-traumatic stress symptoms in childhood with tremendous outcomes in adolescence. Juvenile offending represents one particularly troublesome outcome that is associated with both previous exposures to trauma and elevated post-traumatic stress. Protective factors associated with juvenile offending can be drawn from the theoretical approach of developmental traumatology [3]. Even though the developmental procedures underlying youths' engagement in post-traumatic risky behavior are a matter of debate in the literature [4–6], the extant research has indeed demonstrated elevated rates of risky behaviors in trauma-exposed adolescents, including those involved in the juvenile justice system. These adolescents have a tendency of engaging in antisocial behavior and antisocial acts, such as interpersonal violence [7, 8].

Nowadays, juvenile offending and violent actions are considered a perplexing public health problem. An individual's odds of participating in violent acts are associated with PTSD, which has been identified as a risk factor [9, 10]. Juvenile offenders with a similar history of disturbance are a population at high risk for preservation of violent behavior across the life course. Juvenile offending is related to mental illness [11]; however, the link between PTSD and the developmental course of violent offending has not been examined in this population. The purpose of this research study was to obtain greater insight into the associations of PTSD and trauma-exposed experiences with the development of offending behavior in adolescents.

11.2 Methods

This work complies with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [12]. Eligible studies for inclusion in this systematic review were cross-sectional studies examining trauma-exposed adolescents, PTSD symptomatology, and antisocial behavior/juvenile offending.

11.2.1 Search Strategy

The electronic databases PubMed and Scopus were thoroughly searched according to the nature of the research hypothesis. Search terms were "post-traumatic stress disorder", "post-traumatic stress disorder", "PTSD" and "risky behavior", "high risk behavior" and "adolescent offenders".

11.2.2 Eligibility Criteria

11.2.2.1 Inclusion

This systematic review included only recent studies evaluating the presence of PTSD as a risk factor for the development of a risky behavior and involvement with justice. Participants were adolescents aged between 12 and 18 years with a recorded arrest history. Included studies were peer-reviewed articles published in English between 2016 and 2022.

11.2.2.2 Exclusion

Studies were excluded from the review if they were reviews or interventional studies. Adolescents should not have experienced trauma after the expression of a risky behavior or arrest. Studies, with samples diagnosed with other psychiatric disorders, were also excluded.

11.2.2.3 Study Selection Criteria

After duplicates were removed, the authors screened all titles and abstracts to identify potentially relevant studies. Abstracts and full-text versions of potentially eligible studies were independently assessed by two senior authors. The studies excluded after this point were adjusted to the exclusion criteria of the research.

11.3 Results

The search strategy identified a total of 53 titles, 26 were identified by searching through the electronic database PubMed and 27 through Scopus. After the removal of duplicates ($n = 8$), 45 titles and abstracts were reviewed by two authors (EZ and MK). Of those, 30 studies were excluded based on the inclusion/exclusion criteria, leaving 15 studies potentially relevant to the research question. The 15 abstracts were examined by the two authors (EZ and MK), and four articles were excluded. Both researchers independently examined the full text of 11 articles, of which four articles were excluded. The four articles excluded pertained to psychotherapy intervention or different study samples from those required. The seven remaining articles were identified as meeting the criteria for quality assessment (Fig. 11.1).

11.3.1 Study Characteristics

Table 11.1 presents an overview of the seven articles, including the number of participants and their characteristics, the research design, method, assessment instruments, and outcomes. All seven studies, [13–19] were cross-sectional studies, which primarily examined the associations of PTSD symptomatology and expression of externalizing symptoms with risky behavior and commission of a crime. Two studies [15, 16] presented if PTSD symptomology moderated the relationship between substance use disorder (SUD) symptoms and externalizing behaviors and commission of a violent crime. Additionally, one study [14] examined, as a major risk factor for later delinquency and violent offending, familial abuse, whereas empirical evidence about the contribution of experienced organized violence to the cycle of violence is less clear. Another study [19] examined whether emotional reactivity was associated with violent juvenile offending in a sample of detained boys.

11.3.2 Sampling

Participants in most of the studies were adolescents involved in the juvenile justice system and youth coming out of detention or reintegration centers mostly in the United States of America [15, 17–19] and two studies in Canada [13] and Africa [16]. One study [14] included participants who fulfilled different criteria, such as unaccompanied refugee minors from youth care institutions, refugee centers, nongovernmental organizations, and legal guardians of youth welfare services. The sample size of the studies was on average 250 participants. There are two studies that deviated from the average either in the maximum sample of 1354 [17] or in the minimum of 49 [14]. The recruitment was accomplished after clinical interviews, psychological assessments, or a letter clarifying that the participation would be voluntary at every stage of the investigation. The exposure factors for the participants were specific and focused on experience of traumatic events, past participation in violence, PTSD, and externalizing symptomology, while two studies presented as a requirement SUD symptoms [15] and patterns of drug abuse prior to

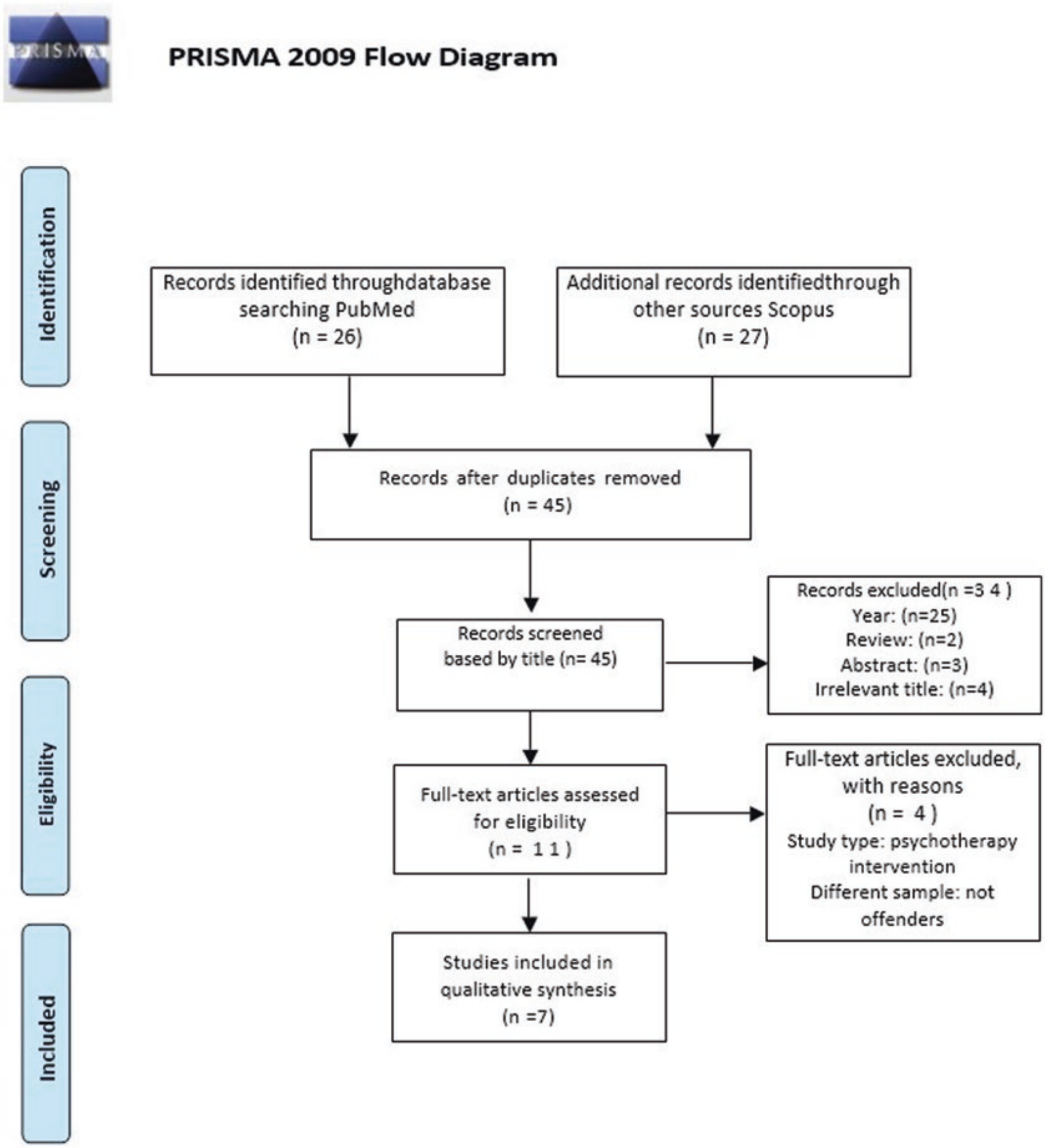

Fig. 11.1 Flow diagram of study selection

the perpetration of violence simultaneously with appetitive aggression [16]. Also, one study [14] examined as an exposure factor organized and familial violence. In addition, the selection of the sex in the studies encompasses a big number of boys. Girls on the other side conquer low or no percentages in sampling at least in six studies. The mean age for the participants in all studies was 16.86 years.

11.3.3 Evaluation Tools

The assessment instruments used to measure the outcomes were diverse. In most of the studies, DSM-5 has been used to diagnose PTSD symptomology. Some other tools have also been used for the same reason, such as the UCLA PTSD reaction index for DSM-5 (RI-5) and the PTSD Symptom Scale-Interview (PSS-I). Additionally,

Table 11.1 Characteristics of included studies

Results table

References	Study type	*N*	Sex		Age	Sample description	Exposure factors	Evaluation tools	Main outcome
			Female	Male					
Modrowski and Kerig [18]	Cross-sectional	400	25% (99 girls)	75% (301 boys)	12–19 years, *M* = 15.97, *SD* = 1.25	Adolescents involved in the Utah Juvenile Justice system	4 potentially traumatic events (*SD* = 2.71) –10 legal charges (*SD* = 5.05)	(1) Self-reports for demographic data, (2) UCLA PTSD reaction index for DSM-5 (RI-5), and (3) Self-report of delinquency	Trauma-exposed youth may be particularly vulnerable to engaging in risky, reckless, or self-destructive behaviors during adolescence. Such behaviors may influence adolescents' offending
Wojciechowski [17]	Cross-sectional	1354	184 (13.6%)	1170 (86.4%)	14–18 years *M* = 16.05 (males) and 15.99 (females)	All participants had been convicted of a serious offense	PTSD prevalence: M: 5.48%, F: 13.41%. Past participation in violence: M: 76.46%, F: 68.48%. Frequency of engagement in violence: M: 10.53%, F: 4.66%	Self-reports DSM-5	Clinical criteria for a diagnosis of PTSD predict membership in trajectory groups characterized by violent behavior relative to abstaining trajectory group
Miller [19]	Cross-sectional	198	–	100%	12–19 years, *M* = 15.37, *SD* = 1.21	Study participants at one of three juvenile detention centers in Southeast Louisiana and predominantly African-American (82%)	Violent juvenile offending and arrest history (African-American 82%)	(1) Reaction index (RI), (2) abbreviated dysregulation inventory (ADI), (3) inventory of callous-unemotional traits (ICU), (4) peer conflict scale (PCS), (5) self-report of delinquency scale (SRD)	Post-traumatic stress symptoms of hyperarousal and emotional numbing, like emotional reactivity profiles, associated with distinct patterns of antisocial behavior

(continued)

Table 11.1 (continued)

Results table

References	Study type	*N*	Sex		Age	Sample description	Exposure factors	Evaluation tools	Main outcome
			Female	Male					
Sommer et al. [16]	Cross-sectional	290	–	100%	15–40 years, $M = 21.96$, $SD = 4.53$	All respondents were black Africans of Xhosa ethnicity from low-income areas in Cape Town	Traumatic events experienced, PTSD symptom severity, appetitive, aggression, committed offenses, patterns of drug abuse prior to the perpetration of violence	(1) Children's exposure to violence checklist (CEVC), (2) PTSD symptom scale-interview (PSS-I), (3) DSM-5, (4) appetitive aggression scale (AAS)	Traumatic event types exhibited strong positive relationships with appetitive aggression, PTSD symptoms – PTSD symptom severity positively related to appetitive aggression
Winningham [15]	Cross-sectional	194	21.6%	78.4%	9–18 years, $M = 15.36$	Juvenile justice youth in a US city	PTSD symptoms, SUD symptoms, externalizing behaviors, commission of a violent crime	(1) Youth self-report externalizing broad-band scale (YSR), (2) adolescent substance use subtle screening inventory (SASS I-A2), (3) report by youth's probation officer, (4) post-traumatic stress problem scale (PTSP)	Association between SUD symptoms and externalizing symptoms may be best explained by the presence of PTSD symptomology
Mueller-Bamoubi et al. [14]	Cross-sectional	49	–	100%	13–21 years, $M = 17.37$, $SD = 1.35$	Unaccompanied refugee minors exposed to both violent types	(1) organized and (2) family violence	(1) Interviews, (2) checklist of family violence, (3) DSM-5, (4) vivo international checklist of war, detention, and torture events, (5) appetitive aggression scale for children (AAS-C), (6) UCLA PTSD index for children and adolescents	(1) Violent experiences within the family positively related to aggressive acts and (2) there was no significant relationship between PTSD symptom severity and self-committed violent acts

Results table

References	Study type	*N*	Sex		Age	Sample description	Exposure factors	Evaluation tools	Main outcome
			Female	Male					
Vitopoulos et al. [13]	Cross-sectional	100	50%	50%	13–19 years, $M = 15.98$, $SD = 1.48$	Youth from a juvenile justice clinic of a mental health agency in a large urban city in Canada	Childhood: Maltreatment adversity and PTSD symptomology	Measures: (1) the youth level of service/case management inventory (YLS/CMI), (2) youth self-report (YSR), (3) reports and interviews, (4) core clinical characteristics measure, and (5) police databases	Youth in the high adversity group had significantly higher scores across criminogenic need domains than their low adversity counterparts; post-traumatic stress symptoms were not correlated with youth's total risk

when it comes to the factor of delinquency, the Self-report of Delinquency Scale (SRD) has been used. One study [19] that examined emotional reactivity has added for this purpose the abbreviated dysregulation inventory (ADI), the Inventory of Callous-Unemotional Traits (ICU), and the Peer Conflict Scale (PCS). Two studies [14, 16] have used the Appetitive Aggression Scale (AAS). Also, one study [13] has used the youth level of service/case management inventory (YLS/CMI) and the youth self-report (YSR). In every single study, self-report, checklists, interviews, or even police databases have been used.

11.3.4 Outcomes

This section describes the relationship between PTSD symptomatology and risky behavior in the 7 studies reviewed. The analytic process requested to examine the connection of ever meeting criteria for a diagnosis of PTSD as a measure, to comprehend the commitment to the extracted violent offending trajectory groups. The multinomial logistic regression was used and PTSD doubled the risk of assignment to all three trajectory groups, which indicated violent behavior at some point of life in adolescence in relation to the abstaining reference group [17]. In another study, one-way ANOVA was computed to determine whether the three groups with elevated hyperarousal and/or emotional numbing symptoms differed in their level of trauma exposure. The post-traumatic stress symptom scores were all lower than 1, which supports the classification of this group as the low symptoms group. The low symptoms group scored significantly lower in violent delinquency than the high combined and the arousal and numbing groups. This finding partially supports the hypothesis that individuals with emotional numbing would exhibit higher violent delinquency [19]. In two studies [15, 16], the outcomes indicate that PTSD symptomatology was a significant predictor of externalizing behaviors ($b = .21$, $p = .012$), explaining an additional 3.1% of the variance in externalizing behaviors. The model revealed that the number of traumatic event types exhibited strong positive relationships with appetitive aggression, PTSD symptoms, the number of offense types committed, and drug abuse prior to the perpetration of violence. Furthermore, PTSD symptom severity was positively related to appetitive aggression, which itself was highly correlated to the number of offense types committed. Additionally, results indicate that using drugs before committing violence seems to exacerbate the attraction to cruelty and the extent of perpetrated violence. The results showed that post-traumatic risky behavior significantly predicted self-reported offending. Furthermore, consistent with the results of the primary analyses, there were no ethnic or sex differences between the groups, and youth categorized into the high post-traumatic risky behavior group also reported more severe overall post-traumatic stress symptoms, higher levels of previous exposure to trauma, and higher self-reported offending [14]. In contrast, there was a minority of studies in which the results indicate that there were no significant correlations between the YSR PTS problems scale and youths' criminogenic need or total risk score. However, for both females and males, the number of maltreatment types was positively correlated with total risk and criminogenic need scores in the domains of family and personality. The number of childhood adversities was also correlated with total risk as well as with need scores in the domains of family, substance abuse, and personality. Also, there was no significant relationship between PTSD symptom severity and self-committed violent acts ($r = 0.14$, $p = 0.34$), nor was there any correlation between appetitive aggression and PTSD symptom severity ($r = 0.06$, $p = 0.67$) [13, 18].

11.4 Discussion

To the best of our knowledge, this is the first review examining PTSD as a risk factor for the development of risky behavior among juvenile offenders. We identified four articles representing four studies on PTSD symptomatology in juvenile offenders published before May 2022. Past research points out that risky behavior is common and associated with juvenile offending among adolescents, who have experienced trauma and are involved in the juvenile justice system [20]. Nevertheless, the risk factors associated with post-traumatic risky behavior are still a blurry space. In addition, research has a lot of distance to traverse to test whether post-traumatic risky behavior as assessed with a PTSD measure is associated with offending behavior. Furthermore, evidence suggests that a fundamental subset of individuals who experience trauma demonstrate high levels of post-traumatic risky behavior in the aftermath of exposure to trauma [21], and exploring whether this finding holds true in youth could potentially identify youth who may benefit from targeted interventions aimed to address post-traumatic risky behavior. A study, which was based on Agnew's [22] general strain theory, has stipulated that exposure to violence predicts the commitment to violent behavior [23–25]. Such research understands this exposure as a form of strain/stress, which leads to a need to cope with the negative effect that arises from the experience. Evidence has shown that individuals with PTSD have greater sensitivity to stress [26]. There is a major possibility for individuals who had violent experiences to project greater reactivity to stressful stimuli relative to their noninflicted peers, manifested in the form of increased propensity for violence. In line with the evidence of previous studies in the perspective of traumatology, the current study sought to address these gaps in the literature by assessing the independent association between PTSD symptomatology, post-traumatic risky behavior, and offending in adolescence.

11.4.1 General Findings

The combined studies in this systematic review examined the factors of different types of trauma, PTSD symptomatology, and violent behavior that contribute to the development of criminogenic activity and offending. The factors analyzed in each study were multiple. Two of the studies [13, 14] examined the factor of trauma and maltreatment experienced in the familial milieu and according to these, the number of maltreatment types experienced was positively correlated with total risk as well as elevated criminogenic need scores in the domains of family and personality, and both organized and familial violence were significantly associated with PTSD symptom severity. Accepting the fact that children, who have been maltreated, are most often exposed to trauma in the family environment, it is not surprising that number of maltreatment types was significantly related to youths' risk scores in the family criminogenic need domain. In a similar manner, factors that built up the childhood adversity scale involved experiences directly related to parental absence, illness, or behavior such that the relationships between this scale and the family criminogenic need domain logically follow. On the other hand, while there is acceptance of the connection of the family criminogenic need domain, childhood adversity, and maltreatment variables, they remain distinct concepts both theoretically and statistically. Even though associations between the presence of "high need" in the family domain and an elevated score on the maltreatment variable are possible (and indeed likely in families where maltreatment has occurred), this relationship is not inherent to the definition of the constructs, and scores on the family domain may also be elevated in circumstances where no maltreatment has occurred. In addition, both studies [14, 16] accept that apart from the correlation between family violence and self-committed violence, young people with high appetitive aggression scores are at a higher risk of engaging in aggressive acts and there is a significant relationship between PTSD and appetitive aggression. This may then encourage an individual to join criminal subcultures or gangs for revenge, groups that are commonly characterized by violent and aggressive masculinity, providing a fertile ground for the development of cruel behavior [27]. In agreement with this, one study [17] demonstrated that having ever met the clinical criteria for a diagnosis of PTSD can be prognostic of participation in groups exhibiting violent behavior. Adolescents who had ever met the criteria for PTSD at baseline remained at a high risk of not being completely abstinent from violence during adolescence. The findings of another study [19], which examined emotional reactivity and antisocial behavior, suggest that although trauma exposure alone may increase the risk for antisocial behavior, this risk becomes more clearly delineated when considering how the individual responds and reacts to the trauma. In this point of view, regardless of trauma exposure severity, youth in this study showed distinct post-trauma reaction patterns that were associated with different types and levels of antisocial behavior. In contrast to these results, two studies ended up with no significant relationship either in the link between PTSD symptoms and a violent crime (due to methodological issues) [15] or post-traumatic risky behavior and formal offending [18]. However, at this point, it is important to refer that contrary to the results of the primary analyses of the last study, post-traumatic risky behavior was significantly associated with self-reported offending behavior. This finding suggests the possibility that post-traumatic risky behavior may be, in fact, related to self-reported offending, although it will be necessary to continue pursuing this line of research with larger sample sizes and more diverse populations to generalize the results concerning the relation between post-traumatic risky behavior and juvenile offending.

11.4.2 Limitations

This systematic review included a small sample size, yet it was conducted with the maximum number of studies possible. There were difficulties during the phase of article identification due to the lack of available studies, which had the suitability to match the research hypothesis. Additionally, the primary and secondary aims of each study held back our research because of the examination of different factors in each study related to trauma, PTSD symptomatology, and juvenile delinquency.

11.4.3 Short- and Long-Term Effects

Future research would benefit from attempting to replicate the current findings in other samples of trauma-exposed adolescents from the community and juvenile justice samples. Additionally, future research should investigate the influence of other risk factors that may be associated with post-traumatic risky behavior, such as the type of exposure to trauma, other co-occurring emotional or behavioral problems, and peer influences, as this line of research could provide further insight into which youth may be at the greatest risk for evidencing this problematic post-traumatic stress symptom.

11.5 Conclusions

Our systematic literature search of PubMed and Scopus resulted in seven articles representing the associations of PTSD and trauma-exposed experiences with the development of criminogenic behavior. The study type was strictly cross-sectional. All seven articles were examined and used for information harvesting. Given the low number of recent relevant articles according to our methodology, research on the effects of PTSD symptoms and risky behavior remains an uncharted area. The outcomes of the studies suggest that such PTSD symptoms experienced from post-traumatic stressing behaviors and often maltreatment in the family circle may lead to violent behaviors and delinquencies. However, no firm conclusions can be drawn about the effects of such symptoms on self-committed violent acts and aggression for different target groups varying from sex to ethnicity.

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Depression and Atherosclerotic Cardiovascular Disease (ASCVD) Risk Estimator in Women

12

Moschoula-Mina Iordani, Maria Polikandrioti,
Theodore Kapadohos, Andriana Maggita,
Kallirrhoe Kourea, Ioannis Koutelekos,
Evangelos Dousis, and Afroditi Zartaloudi

Abstract

Introduction: Cardiovascular disease remains a major cause of morbidity and premature mortality worldwide. The aim of the present study was to investigate the association of atherosclerotic cardiovascular disease (ASCVD) risk estimator with depression in women undergoing cardiological evaluation. Material and method: Three hundred women undergoing cardiological evaluation completed the Zung Self-Rating Depression Scale (ZSDS) questionnaire which included women's characteristics. Results: A percentage of 57.4% of our participants exhibited ASCVD risk <5%; while the 18.3% had ASCVD risk between 5% and 7.4%, the 18.3% between 7.5% and 20%, and the remaining 6% > 20%. In terms of depression, 50% of the women had a score of less than 38 (median), according to Zung scale and mean score was 38.4. In addition, 25% of women had a score below 32. These scores indicate low levels of depression in women. Statistically significant higher rates of depression were found in women who were not involved with physical activities ($p = 0.030$). Conclusions: The negative impact of depression on the ASCVD risk could potentially be prevented by modifying individuals' behavior with regard to their engagement in physical activity.

Keywords

Depression · Atherosclerotic cardiovascular disease · ASCVD risk · Outpatient clinic

12.1 Introduction

Cardiovascular disease remains a major cause of morbidity and premature mortality worldwide. The American Heart Association (AHA) and American College of Cardiology (ACC) offer cardiovascular disease prevention guidelines, which include cardiovascular risk assessment by ASCVD risk score, as well as lifestyle changes, management of elevated cholesterol, and increased body weight, in order to reduce cardiovascular risk. The purpose of this index is to estimate during patients' first visit their 10-year risk of having a cardiovascular disease. The ASCVD risk score is given as a percentage. A 0–4.9% risk is considered low, a 5–7.4% risk borderline, a

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M.-M. Iordani · M. Polikandrioti · T. Kapadohos ·
I. Koutelekos · E. Dousis · A. Zartaloudi (✉)
Department of Nursing, University of West Attica,
Athens, Greece
e-mail: azarta@uniwa.gr

A. Maggita
T.Y.P.E.T., Athens, Greece

K. Kourea
Cardiology Clinic, "Melathron" T.Y.P.E.T.,
Athens, Greece

P. Vlamos (ed.), *GeNeDis 2022*, Advances in Experimental Medicine and Biology 1425,
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7.5–20% risk intermediate, and, finally, a greater than 20% risk high. The calculation of the ASCVD risk score is extremely useful for health professionals to prevent cardiovascular diseases, as it distinguishes patients with a high cardiovascular risk, who should visit their primary care provider and modify their lifestyle or their medication treatment to reduce the risk. To assess cardiovascular risk, information collected includes age, sex, race, total cholesterol, high- and low-density lipoprotein, systolic and diastolic blood pressure, medication treatment, diabetes, and smoking habits [1]. Four factors related to people's behavior, namely, smoking, poor diet, overweight/obesity, and sedentary lifestyle, which implies lack of physical activity, could be modified [2, 3]. In addition, the aforementioned behaviors aggravate hypertension, hypercholesterolemia, and diabetes, which are also risk factors for the ASCVD index. An individualized approach could start with the assessment of cardiovascular risk. The prevention of cardiovascular diseases is largely based on the modification of the risk factors, in order to reduce the probability of their occurrence [2].

Depressive symptomatology has been detected in approximately 20% of patients with atherosclerotic cardiovascular disease (ASCVD) [4]. In the 10-year study by Sun et al. [2] on 11.956 residents of Liaoning province, China, the ASCVD index was associated with depression in both men and women with more pronounced effects in women [5]. In a study by Jee et al. [6] of 481.355 Korean outpatients, aged 40–80 years, it appeared that depression increased ASCVD risk by 41% for men and 48% for women. Participants who were depressed had a higher risk of developing heart disease during their 8-year follow-up. It is noteworthy that patients who suffer from depression are less likely to comply with medical recommendations related to their health problems. For example, patients with a depressive disorder are less likely to quit smoking. Behavioral and lifestyle factors adopted by depressed patients including increased smoking, alcohol abuse, physical inactivity, and obesity could increase the likelihood of developing cardiovascular disease [7].

The purpose of the present study was to investigate the association of the atherosclerotic cardiovascular disease (ASCVD) risk score with depression in women undergoing cardiac evaluation.

12.2 Material and Methods

The sample of the study consisted of 300 women undergoing cardiological evaluation during their regular appointment in the outpatient clinic of a private hospital located in Athens. Data was collected from their medical files during the period from December 2020 to February 2021 after receiving informed consent from each respondent. Criteria for the inclusion of patients in the study were: (a) to be >18 years old, (b) to speak, read, and write in Greek, and (c) to come only for diagnostic examination. Exclusion criteria were (a) age < 18 years old, (b) insufficient knowledge of the Greek language, (c) to come not only for diagnostic examination, and (d) to have cognitive or perceptual disorders. Participation was voluntary and anonymity was assured. Before collecting data, approval was obtained by the Scientific Council of the hospital (Code number: 49/15-12-2020). The research complied with the General Regulation for the Protection of Personal Data (GDPR) and the ethical standards of the Declaration of Helsinki (1989) of the World Medical Association.

12.2.1 Instruments

Participants were administered a structured questionnaire about sociodemographic and clinical characteristics, and the Self-rating Depression Scale (SDS) – Zung [8], which was used to assess the depression of women undergoing cardiological evaluation. Respondents are asked to rate the frequency of occurrence of each symptom on a 4-point Likert-type scale. Positive items are scored inversely. All items are summed to form a total score, which ranges from 20 to 80. Higher score values indicate higher levels of depression. A total score of less than 40 is interpreted as normal or no depression, 40–47 indicates mild depression, 48–55 indicates moderate depression, and 56–80 indicates severe depression. The scale has been translated in the Greek language and validated in the Greek population [9–11]. Internal consistency for the questionnaire has been found satisfactory (Cronbach's alpha = 0.84) indicating high reliability [12].

12.2.2 Statistical Analysis

Categorical data are presented in absolute and relative (%) frequencies, while continuous data are presented with median and interquartile range (IQR) and expressed as means and standard deviations. Kruskal-Wallis, Mann-Whitney, Spearman rho coefficient, and multiple linear regression were used. The observed significance level of 5% was considered statistically significant. All statistical analyses were performed with IBM SPSS 25.0.

12.3 Results

12.3.1 Sample Description

The sample consisted of 300 women undergoing cardiological evaluation with a mean age of 61.1 years (SD = 9.8) and a mean BMI of 28.8 (SD = 5.3), which indicates that a person is slightly overweight. The majority of the participants were married (78.7%) and had children (86.5%), while 51.7% were retired and 42.7% working. The main characteristics of the women in our sample are presented in Table 12.1.

Table 12.1 Demographic and physical characteristics of the sample ($N = 300$)

Demographic characteristics		
Marital status	***N* (%)**	
Married	236 (78.7%)	
Unmarried	16 (5.3%)	
Divorced	22 (7.3%)	
Widowed	26 (8.7%)	
Number of children		
0	41 (13.7%)	
1	57 (19.0%)	
2	173 (57.7%)	
3	25 (8.3%)	
4	4 (1.3%)	
	Mean (SD)	**Median (IQR)**
Age in years	61.1 (9.8)	62 (57–67)
Height	160.5 (6.3)	160 (156–165)
Weight	74.1 (13.9)	73 (64–82)
BMI	28.8 (5.3)	28 (25–32)

The clinical characteristics of the women are presented in Table 12.2. The most dominant comorbid diseases among the respondents were hyperlipidemia (60.3%), hypertension (37.8%), and diabetes (9.9%), while 40% had family cardiological history, 21.7% were smokers, and 22% used to smoke in the past. A significant percentage of 54.2% were engaged in physical activity. Moreover, 26.7% were taking statins antihypertensives/anticoagulants/antiarrhythmic drugs and 2.3% were taking antidepressant treatment. The ASCVD risk score was <5% for the 57.4% of the participants, 5–7.4% for the 18.3%, 7.5–20% for the 18.3%, and >20% for the remaining 6% of the participants.

12.3.2 Depression Levels

From the results in Table 12.3, regarding the depression of women undergoing cardiological assessment, it is suggested that at least 50% of women had a score of less than 38 (median) in Zung depression scale and correspondingly the mean value was 38.4 ± 8.0. In addition, 25% of women had a score of less than 32. These values are indicative of low levels of depression.

12.3.3 Association Between Patients' Self-Reported Characteristics and Depression

Table 12.4 presents the association of women's depression with their characteristics. A statistically significant correlation was observed between women's depression score and physical activity ($p = 0.030$). Women who were not physi-

Table 12.2 Clinical characteristics of the sample ($N = 300$)

Clinical characteristics	***N* (%)**	
Hypertension (Yes)	110 (37.8%)	
Hyperlipidemia (Yes)	181 (60.3%)	
Diabetes mellitus (Yes)	29 (9.9%)	
Inheritance history (Yes)	120 (40.0%)	
Smoking		
Yes	65 (21.7%)	
No	169 (56.3%)	
Former smoker	66 (22.0%)	
Physical activity (Yes)	162 (54.2%)	
Medication		
Statins/antihypertensives/anticoagulants/antiarrhythmics	80 (26.7%)	
Thyroid/osteoporosis	43 (14.3%)	
Antidepressants	7 (2.3%)	
Others	75 (25.0%)	
More than three drugs	95 (31.7%)	
Atherosclerotic cardiovascular disease (ASCVD) risk score		
0–4.9%	144 (57.4%)	
5–7.4%	46 (18.3%)	
7.5–20%	46 (18.3%)	
>20%	15 (6.0%)	
	Mean (SD)	**Median (IQR)**
Smoking cessation (years)	9.4 (7.8)	9 (5–10)

Table 12.3 Measuring the levels of depression in women ($N = 300$)

	Mean (SD)	Median (IQR)
Depression Zung (range 20–80)	38.4 (8.0)	38 (32–44)

cally active had higher levels of depression (median 39) than women who were physically active (median 37).

12.3.4 Effects of Patients' Characteristics on Depression Questionnaire

Multiple linear regression was performed in order to estimate the effect of women's characteristics (independent factors) on the depression scale (dependent variable). Female patients being engaged in physical activity had −1.8 points statistically significantly lower depression scores compared to women who had no physical activity ($b = -1.8$, 95% CI: −3.7–0.0, $p = 0.050$) (Table 12.5).

12.4 Discussion

The ASCVD Risk Estimator [13, 14] evaluates the variables gender, age, obesity, cholesterol, blood pressure, diabetes mellitus, and smoking habits to estimate the 10-year cardiovascular risk [13]. The majority of the sample of the present study was not obese, did not smoke, and did not have diabetes or a serious problem of hypertension or dyslipidemia. This could be a possible explanation for the fact that the majority of the female sample showed a satisfactory value regarding the ASCVD risk index. More specifically, 57.4% of women exhibited low (<5%) cardiovascular risk and only 6% high cardiovascular risk (>20%). In a study conducted in a health center in Alagoas, only 11% of the patients were considered to be of high risk. Considering the risk factors in the aforementioned study, 6.3% were smokers, 48.8% had hypertension, 19.7% had diabetes, and 43.1% had dyslipidemia [15].

Women in our study were overweight but not obese, with an average body mass index of 28.8 kg/m^2. According to Wilson et al. [16], peo-

Table 12.4 Correlation of depression with women's characteristics

	Mean (SD)	**Median (IQR)**	***p*-value**
Marital status			
Married	38.4 (8.3)	38 (32–44)	0.905
Unmarried	38.3 (7.7)	36 (31–44)	
Divorced/widowed	38.6 (7.2)	38 (34–44)	
Children			
No	38.3 (7.7)	38 (33–42)	0.847
Yes	38.4 (8.1)	38 (32–44)	
Arterial hypertension			
Yes	39.3 (8.1)	39 (34–45)	0.100
No	37.8 (7.9)	37 (31–43)	
Hyperlipidemia			
Yes	38.5 (8.3)	38 (32–44)	0.924
No	38.2 (7.6)	38 (33–44)	
Diabetes mellitus			
Yes	37.1 (7.6)	36 (31–40)	0.248
No	38.6 (8.1)	38 (32–44)	
Family history			
Yes	38.9 (7.9)	38 (32–45)	0.357
No	38.1 (8.2)	38 (32–43)	
Smoking			
Yes	38.4 (7.7)	37 (34–43)	0.400
No	38.0 (8.2)	37 (31–44)	
Former smoker	39.5 (7.9)	40 (33–44)	
Physical activity			
Yes	37.4 (8.1)	37 (31–44)	**0.030**
No	39.6 (7.9)	39 (34–45)	
Medication			
Statins/antihypertensives/anticoagulants/antiarrhythmics	37.8 (8.1)	37 (32–44)	0.250
Thyroid/osteoporosis	37.5 (8.4)	36 (32–43)	
Antidepressants	42.6 (4.2)	43 (40–44)	
Others	37.9 (7.5)	38 (32–43)	
More than three drugs	39.4 (8.4)	40 (34–46)	
Atherosclerotic cardiovascular disease ASCVD			
0–4.9%	39.1 (7.6)	40 (33–44)	0.398
5–7.4%	36.9 (8.5)	35 (30–43)	
7.5–20%	38.7 (9.4)	39 (30–45)	
>20%	39.2 (7.1)	37 (35–45)	
	Spearman's Rho	***p*-value**	
Age in years	−0.029	0.617	
Height	0.109	0.161	
Weight	0.054	0.352	
BMI	0.020	0.729	

ple who are overweight (BMI 25.0–29.9 kg/m^2) and especially people who are obese (BMI 30 and above) show a greater risk of developing a cardiovascular disease in the future compared to people with a normal body weight (BMI 18.5–24.9 kg/m^2).

A percentage of 60.3% of the sample reported having hyperlipidemia and 37.8% hypertension. Both of them have been recognized as risk factors for the ASCVD index score [17, 18]. However, only 26.7% of the participants were receiving medication treatment (e.g., statins/antihyperten-

Table 12.5 Assessment of the effect of women's characteristics on depression

	95% CI for *b*	*p*-value
Arterial hypertension		
Yes	0.7 (−1.2 to 2.7)	0.447
No	Reference category	
Physical activity		
Yes	−1.8 (−3.7 to 0.0)	**0.050**
No	Reference category	

sives/anticoagulants/antiarrhythmic drugs), a fact that indicates that the hypertension or dyslipidemia problems they were experiencing were in very early stages or not severe enough to be under medication treatment. On the other hand, only a small percentage of the sample (9.9%) had diabetes.

The vast majority (78.3%) of the sample did not smoke. Of this percentage, 22% had quit smoking. The onset of a cardiovascular disease could motivate women to quit smoking. Smoking is associated with an increased risk of cardiovascular disease. Smoking cessation significantly reduces atherosclerotic cardiovascular risk (ASCVD risk) [19].

Additionally, 54.2% of the sample was engaged in physical activity. Women's adherence to lifestyle guidelines that included exercise and smoking cessation was associated with a low risk of coronary heart disease in this study and others [20]. In a recent study of a sample of middle-aged women, non-smokers, those who were not overweight, and who had adopted a healthy diet and exercised half an hour a day had up to 80% lower incidence of cardiovascular events than the rest of the female population. Also, a large reduction in cardiovascular risk was seen in the population that quit smoking, with a reduction in cardiovascular cases of up to 70% compared to women who remained smokers [21]. Increasing physical activity helps reduce cardiovascular events [22].

Finally, 40% of women had a positive family history, which may increase cardiovascular risk. Family history is considered an independent risk factor, especially if a first-degree relative has had a heart attack or stroke under the age of 55 for men and 65 for women [23]. In a total of 12.149 participants in the ARIC (Atherosclerosis Risk in Communities) study with a mean age of 54 years, 3.144 cardiovascular cases were recorded over 21 years of follow-up. Positive family history was found to be independently associated with a 17% increased cardiovascular risk [24].

The mean value of depression was 38.4 ± 8.0, based on the Zung scale, which is indicative of very low levels of depression. Additionally, only 2.3% of the sample was taking antidepressant medication. The particularly low levels of depression of our sample weren't an obstacle to the adoption of healthy behaviors and habits, which could explain the low ASCVD risk index and, consequently, the low cardiovascular risk (<5%) for the majority of our participants (57.4%). Indeed, the largest percentage of women who participated in the present study had adopted healthy habits and behaviors as 54.2% of the sample were physically active and 78.3% did not smoke. Maintaining the aforementioned healthy behaviors requires the absence of depression [25], a finding that is confirmed in the present study.

Women being engaged in physical activity had a statistically significant ($p = 0.050$) lower depression score (−1.8 points) than women with no physical activity. The negative statistically significant correlation of physical activity with depression could suggest the possible positive effect of the absence of depression on women's commitment to exercise and conversely the possible effect of exercise on depressed mood. The absence of depressive symptoms favors the maintenance of regular physical activity. Engaging women in physical activity could have a positive effect on reducing their depressive symptoms. Moderate aerobic exercise of 30 min, five times a week, is beneficial in alleviating symptoms of major depression [26]. Physical activity has been suggested to be beneficial for depression levels, but also for improving body weight, triglyceride, and cholesterol levels [27]. The involvement of the majority of our sample in physical activity could possibly explain their good health status regarding hypertension, hyperlipidemia, diabetes, etc., which in turn may reduce the ASCVD risk index. From this point of view, the engagement in physical activity could have contributed to keeping depression and the ASCVD index at low levels in the present study. Exercise could improve both depressive symptoms and cardiovascular risk index [28, 29].

On the other hand, women who were not physically active had statistically significantly higher levels of depression (median 39) than women who were physically active (median 37). This may be related to the lack of energy or motivation to exercise among depressed participants [30]. In the Cardiovascular Health Study, in which researchers followed 5888 people for an approximate period of 10.3 years, physical inactivity accounted for about 25% of the risk of cardiovascular mortality in older adults with depressive symptoms [31]. Depressed people are less likely to comply with the recommendation for regular physical activity or smoking cessation, which is included in standard guidelines for the prevention of cardiovascular disease. Lack of exercise could also lead to the appearance of obesity [22]. The close relationship between depression and cardiovascular diseases, as well as the association of depression with obesity, hyperlipidemia, hypertension, and diabetes, could be explained, on the one hand, by the adoption of unhealthy habits and behaviors, such as unhealthy diet, smoking and physical inactivity more frequently [25] and, on the other hand, by the tendency of depressed patients with cardiovascular diseases to neglect their health and show lower rates of treatment compliance compared to non-depressed patients [7].

The study by Whooley et al. [32] of 1017 outpatients with coronary artery disease concluded that physical inactivity was the most important behavioral factor determining the relationship between depressive symptoms and cardiovascular risk. Researchers concluded that the negative effect of depression on the ASCVD risk index and, consequently, the increased cardiovascular risk associated with depression could possibly be prevented by modifying people's behavior, particularly regarding their involvement with physical activity. The relationship between depression and cardiovascular events could be modified by behavioral interventions. Treating depression could probably increase physical activity, and physical activity could improve depressed mood [32]. According to the "The Ongoing Understanding Prognostic Benefits of Exercise and Antidepressant Therapy (UPBEAT)" study, which has compared the effect of exercise on depressive symptoms and cardiovascular risk biomarkers as opposed to antidepressant medication, increased physical activity has the potential to reduce the excessive cardiovascular risk associated with the presence of depressive symptoms in patients with coronary heart disease [32].

The present study investigated depression and physical activity simultaneously, so it is not possible to determine whether physical activity was the cause or the outcome of low depression levels. This kind of association is bidirectional because depression may lead to an absence of physical activity [33] and the absence of physical activity may worsen depressive mood [34]. This may lead to a kind of vicious cycle in which depression and lack of physical activity reinforce each other. The long-term goal is the implementation of an intervention that could improve the outcome of both depression and cardiovascular disease.

12.4.1 Limitations of the Study

The study sample (convenience sample) included women undergoing cardiac evaluation in an outpatient clinic of a private hospital in Athens. Thus, the findings cannot be generalized. Also, measures were self-administered in subjective inventories.

12.5 Conclusions

Physical exercise could possibly be a moderating factor between the ASCVD risk index and depressive symptoms in the female population. Appropriate knowledge could significantly help health professionals in the field of planning and implementation of personalized nursing care. Early recognition and treatment of depression in daily clinical practice could reduce the risk of comorbidity and improve the outcome of a cardiovascular disease. Appropriate education of the public as well as female patients who come for a cardiological check-up regarding the multiple biological and psychological benefits of physical exercise should be emphasized. Future studies associating depression and cardiovascular risk are expected to provide a clearer picture of the contribution of underlying mechanisms and interactions.

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13

Greek Adaptation and Validation of the Bad Sobernheim Stress Questionnaire-Brace and the Bad Sobernheim Stress Questionnaire-Deformity

A. Kastrinis, G. Koumantakis, M. Tsekoura,
E. Nomikou, M. Katsoulaki, M. Takousi,
N. Strimpakos, and Z. Dimitriadis

Abstract

Adolescent idiopathic scoliosis (AIS) is a progressive condition responsible for spinal deformity in all three planes. Spinal deformity and how the rib hump affects the aesthetics, and the functionality of the trunk can be a cause of psychological distress as well. Bracing as a treatment can have a negative impact on QoL, cause pain, affect participation levels in physical activities, and cause isolation and depression. Brace-induced stress may affect the patient's compliance with the treatment which may lead to scoliosis progression. The purpose of this study was to adapt and validate in the Greek language two instruments that can evaluate stress levels induced by bracing treatment and by deformity. The process of cross-cultural adaptation and validation of the Bad Sobernheim Stress Questionnaire-Brace (BSSQ-Brace) and the Bad Sobernheim Stress Questionnaire-Deformity (BSSQ-Deformity) followed the International Quality of Life Assessment Project (IQOLA) guidelines. Forty-seven AIS patients with a mean age of 14.4 ± 1.51 years, mean Cobb angle of 30.08 ± 9.25, and mean duration of the bracing treatment at 20.5 ± 12.2 months participated. The mean score for GR-BSSQ Brace was 14.04 ± 6.42, which is interpreted as medium stress, whereas the mean score for GR-BSSQ Deformity was 20.34 ± 3.78, which is interpreted as low stress. GR-BSSQ Brace demonstrated good internal consistency with Cronbach's $\alpha = 0.87$. GR-BSSQ Deformity demonstrated acceptable internal consistency with Cronbach's $\alpha = 0.73$. Both GR-BSSQ Brace and GR-BSSQ Deformity exhibited excellent test-retest reli-

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A. Kastrinis (✉) · N. Strimpakos · Z. Dimitriadis
Physiotherapy Department, Health Assessment and Quality of Life Research Laboratory, School of Health Sciences, University of Thessaly, Lamia, Greece

G. Koumantakis
Department of Physiotherapy, Faculty of Health and Care Sciences, University of West Attica, Athens, Greece

M. Tsekoura
Physiotherapy Department, School of Health Rehabilitation Sciences, University of Patras, Rio, Greece

E. Nomikou
The House, Rehabilitation Center for Children, Athens, Greece

M. Katsoulaki
PhysioDrasis, Physiotherapy Clinic, Athens, Greece

M. Takousi
Polydynamo, Center for Emotional Development, Athens, Greece

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ability with ICC values of 0.94 (95% CI 0.89–0.97) and 0.92 (95% CI 0.86–0.95), respectively. BSSQ Brace and BSSQ Deformity questionnaires have been cross-culturally adapted into the Greek language and have been proven to be valid and reliable instruments measuring brace and deformity-induced stress. Both questionnaires can be used for clinical and research purposes in Greek-speaking population.

Keywords

BSSQ · Quality of life · Brace stress

13.1 Introduction

Adolescent idiopathic scoliosis (AIS) is the most common type of scoliosis. It's a progressive condition responsible for a tridimensional deformity [14]. It is common for the AIS to be diagnosed during the period of life when many changes take place. These changes involve the emotional status, body image, being more independence, and physical changes [15]. Being uncertain about the scoliosis progression can be stressful and possibly affect the adolescent's behavior [20]. AIS affects male and female patients during their puberty leading most of them to be concerned about their appearance. The extent of the stress varies on an individual level. Spinal deformity and how the rib hump affects the aesthetics and the functionality of the trunk can be a cause of psychological distress as well. It appears though that bracing may cause even more disturbing feelings [9]. Bracing as a treatment can have a positive effect on controlling the progression of the AIS, improving the physical appearance, and eventually improving the quality of life [10]. Nevertheless, scoliosis patients under bracing treatment may experience more stress. A Brace may have a negative impact on QoL, cause pain in the pressure areas, affect the participation levels in physical activities, and cause isolation and depression [17]. Adolescents receiving brace treatment fear that this might affect their social relationships and acceptance by their peers. It has been suggested that female patients tend to worry more about their self-image as they grow and thus show greater signs of anxiety, low self-esteem, and depression [13]. Brace-induced stress may affect the patient's compliance with the treatment. Studies suggest that lack of compliance with the treatment increases the risk of progression of scoliosis [7, 22, 23]. For these reasons, assessing stress levels is of great significance since quality of life and psychological status are correlated with compliance to bracing treatment [8, 22].

The Bad Sobernheim Stress Questionnaire-Brace (BSSQ-Brace) and the Bad Sobernheim Stress Questionnaire-Deformity (BSSQ-Deformity) have been developed as instruments for the evaluation of stress in scoliosis patients. Both questionnaires, in their original German version, show high internal consistency and are deemed reliable for the evaluation of the psychological condition and the measurement of quality of life in patients with scoliosis [6, 25]. The BSSQ has been validated in Polish [18], Spanish [11], Turkish [27], Chinese [26], Persian [21], and Japanese [3]. However, these instruments have not been translated into Greek and their psychometric properties have not been examined on the Greek population.

Therefore, the aims of this study were (1) to cross-cultural adapt the BSSQ-Brace and the BSSQ-Deformity questionnaires and (2) to determine their psychometric characteristics.

13.2 Methods

The study was approved by the Ethical Committee of the Physiotherapy Department, University of Thessaly, Greece. The cross-cultural adaptation of the Greek versions of the BSSQ-Brace and the BSSQ-Deformity was accomplished using the International Quality of Life Assessment Project (IQOLA) guidelines [1]. The permission to start this cross-cultural adaptation was obtained by the developer of the questionnaires.

13.2.1 Procedures

The procedure included two phases for both questionnaires:

13.2.1.1 Phase 1. Translation

1. The initial forward translation from German to Greek was conducted by two independent bilingual translators, who were both Greek native speakers.
2. The two forward translations were synthesized and produced the first consensus Greek version of the BSSQ-Brace and the BSSQ-Deformity.
3. The synthesis versions were back translated in German by one independent bilingual translator.
4. An expert committee compared the backward translation with the original questionnaire and produced the pre-final BSSQ-Brace and the BSSQ-Deformity.
5. The pre-final versions of both questionnaires were tested in a pilot study. The questionnaires were administered to 15 Greek-speaking individuals with a history of scoliosis in order to fill in, to rectify any errors in terms of spelling or comprehension.
6. Development of the final version of the BSSQ-Brace and the BSSQ-Deformity questionnaires for further psychometric evaluation.

13.2.1.2 Phase 2. Psychometric Evaluation

The psychometric evaluation included reliability testing (test-retest reliability and internal consistency estimation) and validity testing (convergent validity).

13.2.2 Participants

Forty-seven AIS patients under brace treatment volunteered from Scoliosis SLC Clinic in Athens for a period from April to December 2021. Sociodemographic data were taken, as well as medical history and X-rays, to confirm the diagnosis. All participants were using the same type of asymmetric brace "Scoliosis Brace by SLC." The inclusion criteria were the following: (a) prescribed bracing treatment for AIS, for a period of more than 3 months and at least for 12 h/day, (b) age 10–17 years, (c) Risser sign 0–IV, (d) Cobb angle 20°–45°. Patients with other types of scoliosis, mental problems, or history of surgical procedures in the torso area were excluded. Written informed consent was obtained from the participants and their parents before their participation in the study.

13.2.2.1 Outcome Measures

The questionnaires used were the following:

1. BSSQ Brace that evaluates how brace treatment can affect stress level and mood and BSSQ Deformity evaluates how the spinal deformity affects stress level and mood. Both questionnaires have been developed in German language and include eight items each. The response to each one of these items is provided on a 4-point ordinal scale. Each item can be scored within a range from 0 (worst) to 3 (best). The total score of each questionnaire may range from 0 to 24. Low scores signify greater stress and high scores signify less stress. A total score of 0–8 is an indication of high-stress level. A total score ranging 9–16 shows a moderate level of stress and high scores of 17–24 indicate a low level of stress [25].
2. The Greek version of the Scoliosis Research Society 22 (SRS22) questionnaire was used. This questionnaire has already been evaluated for its psychometric values on the Greek population with adolescent idiopathic scoliosis and it is valid and reliable [2]. The SRS22 contains five domains: the function/activity domain (five items); the pain domain (five items); the self-image/appearance domain (five items); the mental health domain (five items); and the satisfaction with management domain (two items). For each item of the domains, the score ranges from 1 (worst) to 5 (best). The total score of SRS22 is within the range of 22 to 110 points and the higher the score, the better QoL.

13.2.2.2 Psychometric Evaluation

Following translation, an evaluation of psychometric characteristics was performed for both questionnaires. After providing information about their medical history and providing sociodemographic data, all the participants were asked to complete GR-BSSQ Brace and GR-BSSQ Deformity and SRS22 as reference instruments. All participants completed the GR-BSSQ Brace and GR-BSSQ Deformity questionnaires within 3 days to examine test-retest reliability. For the convergent validity evaluation, the participants completed also the SRS22 questionnaire. During this period, they were asked to continue with their daily routines. The questionnaires were completed in the presence of a physiotherapist who was responsible to gather the data and counsel the parents not to provide any help during the completion of the questionnaires.

13.2.2.3 Statistical Analysis

For the statistical analysis, SPSS v.26 was used (SPSS Inc., Chicago IL). The normality of data was examined with the Shapiro-Wilk test and non-parametric tests were used for further analysis. Internal consistency was assessed using Cronbach's alpha. Depending on Cronbach's α values, internal consistency was classified as unacceptable ($\alpha < 0.5$), poor ($\alpha = 0.5$–0.6), questionable ($\alpha = 0.6$–0.7), acceptable ($\alpha = 0.7$–0.8), good ($\alpha = 0.8$–0.9), and excellent ($\alpha > 0.9$) [12]. Test-retest reliability was assessed using the Intraclass Correlation Coefficient (ICC) as well as their corresponding Standard Error of Measurement (SEM) and Smallest Detectable Difference (SDD). ICC values of 0–0.5, 0.5–0.75, 0.75–0.9, and 0.9–1 were considered indicative of poor, moderate, good, and excellent reliability, respectively [16]. For the purposes of this study, SEM values of <15% of the grand mean were considered satisfactory [19], whereas SDD values of <30% were considered satisfactory and of <10% were considered excellent [24]. The convergent validity of each one of the GR-BSSQ Brace, GR-BSSQ Deformity, and SRS22 was examined by using Spearman (*rs*) correlation coefficients. The strength of these associations was interpreted as very weak (0–0.19), weak (0.20–0.39), moderate (0.40–0.59), strong (0.60–0.79), or very strong (0.80–1.00) [5]. Statistical Significance was set at $p < 0.05$ for all analyses.

13.3 Results

13.3.1 Translation

The questionnaires of both questionnaires (GR-BSSQ Brace and GR-BSSQ Deformity) were translated without any major difficulties.

13.3.1.1 Psychometric Analysis

A total sample of 47 scoliosis patients participated in this study, with the majority of them being females (male/female: 1/46). The mean age was 14.4 ± 1.51 years with a mean Cobb angle of 30.08 ± 9.25 and the mean duration of the bracing treatment at 20.5 ± 12.2 months. The time needed to fill out both GR-BSSQ Brace and GR-BSSQ Deformity was no more than 1.5 min for each questionnaire (Table 13.1).

The mean score for GR-BSSQ Brace was 14.04 ± 6.42, which is interpreted as medium stress, whereas the mean score for GR-BSSQ

Table 13.1 Participants' characteristics ($n = 47$, males/females 1/46)

Variable	Min	Max	Mean	SD
Age (years)	11	17	14.4	1.51
Height (cm)	145	182	163.7	6.97
Weight (kg)	33	74	53.17	8.51
Risser sign	0	4	1.69	1.33
Initial Cobb angle of the main curve (°)	20	45	30.08	9.25
Brace wearing (months)	3	57	20.53	12.24

Table 13.2 Mean Scores of GR-BSSQ Brace and GR-BSSQ Deformity during the test and retest session ($n = 47$)

Instrument	Time point	Min	Max	Mean	SD
GR-BSSQ Brace	Test	2	24	14.04	6.42
	Retest	4	24	14.72	5.88
GR-BSSQ Deformity	Test	6	24	20.34	3.78
	Retest	6	24	20.78	3.6

Table 13.3 Within group score distribution of GR-BSSQ Brace and GR-BSSQ Deformity across different levels of stress

	GR-BSSQ Brace		GR-BSSQ Deformity	
	N	%	*N*	%
Strong	12	25.53	1	2.12
Medium	16	34.04	4	8.51
Low	19	40.42	42	89.36

Deformity was 20.34 ± 3.78, which is interpreted as low stress (Table 13.2).

Score distribution, of the GR-BSSQ Brace and the GR-BSSQ Deformity, the second time the questionnaires have been filled out, was 14.72 ± 5.88 and 20.78 ± 3.6, respectively. Proportionally, within group score distribution of GR-BSSQ Brace and GR-BSSQ Deformity across different levels of stress (Table 13.3) revealed that 12 participants (25.53%) experienced strong Brace-related stress whereas only 1 (2.12%) of them experienced strong Deformity-related stress. Sixteen participants (34.04%) experienced medium Brace-related stress whereas only 4 participants (8.51%) experienced medium Deformity-related stress. Finally, 19 participants (40.42%) experienced low Brace-related stress whereas 42 participants (89.36%) experienced low Deformity-related stress.

13.3.1.2 Internal Consistency

GR-BSSQ Brace demonstrated good internal consistency with Cronbach's $\alpha = 0.87$. GR-BSSQ Deformity demonstrated acceptable internal consistency with Cronbach's $\alpha = 0.73$. Eliminating item 8 of GR-BSSQ Brace leads to an improvement of the Cronbach's value to 0.89. Eliminating item 8 of GR-BSSQ Deformity leads to an improvement of the Cronbach's value to 0.76 (Table 13.4).

13.3.1.3 Test-Retest Reliability

Both GR-BSSQ Brace and GR-BSSQ deformity exhibited excellent test-retest reliability with ICC values of 0.94 (95% CI 0.89–0.97) and 0.92 (95% CI 0.86–0.95), respectively. SEM and SDD values of both questionnaires were also acceptable as they were found to be below the criterion values of 15% and 30%, respectively (Table 13.5).

13.3.1.4 Convergent Validity

GR-BSSQ Brace was found to have a strong significant correlation with GR-BSSQ Deformity ($rs = 0.63$, $p < 0.01$). GR-BSSQ Brace demonstrated a moderately significant correlation with SRS22 ($rs = 0.54$, $p < 0.01$) and its self-image ($rs = 0.42$, $p < 0.01$) and mental health subscales ($rs = 0.55$, $p < 0.01$). Weak correlations were demonstrated between the GR-BSSQ Brace and the SRS22 subscales of pain ($rs = 0.30$, $p < 0.05$) and satisfaction ($rs = 0.33$, $p < 0.05$) and a very weak non-statistically significant correlation with the SRS22 subscale of function ($rs = 0.22$, $p > 0.05$).

GR-BSSQ Deformity demonstrated a weak significant correlation with SRS22 ($rs = 0.37$, $p < 0.01$). A moderate significant correlation was demonstrated between the GR-BSSQ Deformity and the SRS22 subscale of self-image 0.41 ($p < 0.01$), weak significant correlation with the SRS22 subscale of function 0.34 ($p < 0.05$), and no statistically significant correlation with the subscales of pain 0.27 ($p > 0.05$), mental health 0.22, ($p > 0.05$), and satisfaction 0.13 ($p > 0.05$) (Table 13.6).

13.4 Discussion

The findings of this study show that the GR-BSSQ Brace questionnaire has good internal consistency (Cronbach's $\alpha = 0.87$). These values do not

Table 13.4 Internal consistency and item to total analysis for the GR-BSSQ Brace and the GR-BSSQ Deformity questionnaires

	Cronbach's α	Corrected item-total correlation				Cronbach's alpha if item deleted			
		GR-BSSQ Brace		GR-BSSQ Deformity		GR-BSSQ Brace		GR-BSSQ Deformity	
GR-BSSQ Brace	0.87	Q1	0.69	Q1	0.61	Q1	0.84	Q1	0.67
		Q2	0.70	Q2	0.54	Q2	0.84	Q2	0.69
		Q3	0.83	Q3	0.41	Q3	0.82	Q3	0.71
GR-BSSQ Deformity	0.73	Q4	0.76	Q4	0.34	Q4	0.83	Q4	0.73
		Q5	0.73	Q5	0.62	Q5	0.84	Q5	0.67
		Q6	0.64	Q6	0.53	Q6	0.85	Q6	0.68
		Q7	0.45	Q7	0.33	Q7	0.87	Q7	0.72
		Q8	0.13	Q8	0.11	Q8	0.89	Q8	0.76

deviate much from the internal consistency of the Polish (α = 0.80) [18], the Spanish (α = 0.81) [11], the Turkish (α = 0.88) [27], the Chinese (α = 0.80) [26], the Persian (α = 0.72) [21], and the Japanese (α = 0.84) [3] versions of the questionnaire. The original German version has a Cronbach's α value of 0.97 [6].

In this study, GR-BSSQ Brace demonstrated excellent test-retest reliability (ICC = 0.94). The test-retest reliability of the Greek version of the instrument is also quite similar to the German (ICC = 0.88) [6], the Polish (ICC = 0.82) [18], the Spanish (ICC = 0.90) [11], the Turkish (ICC = 0.88) [27], the Chinese (ICC = 0.85) [26], the Persian (ICC = 0.97) [21], and the Japanese (ICC = 0.75) [3] which all demonstrated good to excellent test-retest reliability.

GR-BSSQ Brace demonstrated a moderate correlation with SRS22 (*rs* = 0.54) and its subscales of self-image (*rs* = 0.42) and mental health (*rs* = 0.55), whereas the correlations with the subscales of pain (*rs* = 0.30) and treatment satisfaction (*rs* = 0.33) were weak. No statistically significant correlation was found with the subscale of function (*rs* = 0.22). It seems that the Greek version of the questionnaire can measure Brace-related stress that derives from the image and self-esteem and to some extent can measure the aspects of pain and treatment satisfaction. The Spanish version [11] also shows a strong correlation with SRS22 (*rs* = 0.66) as well as with the subscales of self-image (*rs* = 0.6) and mental health (*rs* = 0.6).

In this study, 25.5% of the participants experienced severe stress because of the brace, at the time that the questionnaire was administered. This percentage is similar to that of the German (27%) [6] and Polish (23%) [18] studies, but higher when compared to the Persian (17%) [21], Chinese (12%) [26], and Japanese (4.3%) [3] studies. It is obvious that brace treatment may cause moderate to severe stress to adolescents affecting their image and the way they interact.

GR-BSSQ Deformity questionnaire was found to have acceptable internal consistency (Cronbach's α = 0.736). This is similar to the internal consistency of the Persian study (α = 0.72) [21], but inferior to the internal consistency of the Polish (α = 0.87) [18] and Chinese (α = 0.85) [26] studies, which both demonstrate good internal consistency.

GR-BSSQ Deformity questionnaire demonstrates excellent test-retest reliability (ICC = 0.92). This finding is similar to the test-retest reliability values found in the Chinese study (ICC = 0.90) [26] and slightly superior to those reliability values of the Polish (ICC = 0.88) [18] and Persian (ICC = 0.88) [21] studies.

GR-BSSQ Deformity questionnaire was found to have weak concurrent validity in correlation with the SRS22 questionnaire. Regarding the correlations of the GR BSSQ Deformity with the subscales of the SRS 22, there was a moderate correlation with the self-image subscale (*rs* = 0.41), a weak correlation with the function subscale (*rs* = 0.34), and no statistically significant correlation with the subscales of pain

Table 13.5 Test-retest reliability of the GR-BSSQ Brace and the GR-BSSQ deformity questionnaires

	ICC (95% CI)	SEM	SDD
GR-BSSQ Brace	0.94 (0.89–0.97)	1.39	3.85
GR-BSSQ Deformity	0.92 (0.86–0.95)	1.01	2.81

ICC Intraclass Correlation Coefficient, *95% CI* 95% Confidence Intervals, *SEM* Standard Error of Measurement, *SDD* Smallest Detectable Difference

Table 13.6 Convergent validity of GR-BSSQ Brace and GR-BSSQ deformity instruments with the SRS22 and its subscales

	GR-BSSQ Brace	GR-BSSQ Deformity
GR-BSSQ Brace	–	0.63**
GR-BSSQ Deformity	0.63**	–
SRS22 total	0.54**	0.37**
Function	0.22	0.34*
Pain	0.30*	0.27
Self-image	0.42**	0.41**
Mental health	0.55**	0.22
Treatment satisfaction	0.33*	0.13

Convergent validity is expressed as the Spearman correlation coefficient (*rs*)
$^*p < 0.05$, $^{**}p < 0.01$

(*rs* = 0.27), mental health (*rs* = 0.22), and satisfaction (*rs* = 0.13). According to Xu et al. [26], the Chinese version of BSSQ Deformity demonstrates a strong correlation (*rs* = 0.66) with SRS22, moderate correlations with the SRS22 subscales of self-image (*rs* = 0.48), mental health (*rs* = 0.44), and satisfaction (*rs* = 0.48) and weak correlations with the SRS22 subscales of pain (*rs* = 0.39) and function (*rs* = 0.44).

In this study, only 2.1% of participants experienced strong stress because of their deformity. This is similar to the Polish study [18] in which 2.9% demonstrate severe deformity-related stress but less than the stress reported in the Persian study (7%) [21]. This is expected since the participants' condition is mild and there are not any significant limitations in daily activities.

The number of participants in this study was sufficient since 47 AIS patients participated in testing the BSSQ Brace questionnaire and the BSSQ Deformity questionnaire. Beaton et al. [4] suggests that at least 30–40 participants should be tested as the prefinal version of a questionnaire that undergoes the process of cross-cultural adaptation. The participants all came from the same center located in Athens and all were under brace treatment with the same 3D orthosis. It is suggested that a multicenter study should be conducted in the future that would provide larger samples and would permit more generalizable findings. Another suggestion would be to include participants who use other brace designs as well since different types of braces are being prescribed in Greece.

It has been established through literature that brace-induced stress and stress related to aesthetics may cause disturbing feelings and lead to adherence to treatment. Adherence has been connected this to the progression of the deformity [7, 22, 23]. The GR-BSSQ Brace and the GR-BSSQ Deformity are two instruments that can provide information about the level of stress that adolescents experience during bracing treatment or because of their deformity. These instruments are easy to use and may be filled in about 1 min. Monitoring the stress levels will help the treating team address the situation by modifying possible clinical decisions, informing the family, or providing support.

13.5 Conclusion

BSSQ Brace and BSSQ Deformity questionnaires have been validated in Greek language adding two significant tools that are very quick to administer and analyze, providing the critical information of stress levels in a clinical setting.

The GR-BSSQ Brace questionnaire has been found to have good internal consistency and excellent test-retest reliability while the GR-BSSQ Deformity questionnaire exhibited acceptable internal consistency and excellent test-retest reliability. As high levels of stress may lead to adherence, the clinicians using those tools will have the opportunity to make necessary adjustments to the treatment and involve the family or other specialists based on the results. Further investigation is suggested as a multi-center study and with participants who use a variety of brace designs.

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14

Burnout in General Surgeons. A Systematic Review

Petros Loukas Chalkias,
Georgia Goulidaki Vosynioti,
Maria Charalampopoulou, Dimitrios Vlachakis,
Christina Darviri, George P. Chrousos,
and Flora Bacopoulou

Abstract

Occupational burnout is particularly widespread amongst surgical professionals. During the past 10 years, both the awareness and the ability to reliably measure and classify "burnout" in medical professionals have increased. The purpose of this systematic review was to summarize the current evidence on the burnout levels of general surgeons. Online searches were carried out using the scientific search engines PubMed, Embase, Cinahl, and Google scholar, from 2010 to 2020, before the COVID-19 pandemic. Articles that met the inclusion criteria were critically evaluated using the critical appraisal skills programme (CASP) tool. Five studies pertaining to 669 subjects were included in this review. As expected, "burnout syndrome" was mainly due to the exhaustive and demanding conditions of working life and was strongly observed in general surgeons. The incidence of the burnout syndrome increased with their years of service, compromised their quality of life, and had detrimental effects on their mental and physical health. Personal achievements and emotional satisfaction were protective for the occurrence of the syndrome. We conclude that valid recognition and prevention of the burnout syndrome are necessary. Further research is needed to manage

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P. L. Chalkias
School of Medicine, National and Kapodistrian University of Athens, Athens, Greece

Plastic Surgery Department, General Oncology Hospital "Agioi Anargyroi", Athens, Greece

G. Goulidaki Vosynioti · C. Darviri
School of Medicine, National and Kapodistrian University of Athens, Athens, Greece
e-mail: cdarviri@med.uoa.gr

M. Charalampopoulou
First Department of Propaideutic Surgery, School of Medicine, National and Kapodistrian University of Athens, Athens, Greece

D. Vlachakis
Laboratory of Genetics, Department of Biotechnology, School of Applied Biology and Biotechnology, Agricultural University of Athens, Athens, Greece
e-mail: dimvl@aua.gr

G. P. Chrousos
University Research Institute of Maternal and Child Health & Precision Medicine, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece

F. Bacopoulou (✉)
Center for Adolescent Medicine and UNESCO Chair in Adolescent Health Care, First Department of Pediatrics, School of Medicine, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece
e-mail: fbacopoulou@med.uoa.gr

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this phenomenon within the healthcare settings and the surgical departments.

Keywords

Occupational burnout · Occupational exhaustion · Surgeons · Burnout · Burnout syndrome

14.1 Introduction

The field of medicine is constantly and rapidly evolving, constituting the working environment for its professionals more demanding and complex. The goal for most of the hospitalization organizations is to achieve greater efficiency with the lowest possible cost, thus raising insecurity in health professionals [1].

Burnout is a long-lasting condition in which the employee drops all interest in his/her job, which can lead to a major calamity in his/her life. It can be considered as shortage of energy, self-confidence, and excitement. The levels of burnout expose the employee's relationship with the organization [2]. Its effects translate into extreme fatigue, little effort, role divergence, and "discounts" on the quality and quantity of work, which can even lead to higher employee turnover rate [3]. This is a complicated process that can cause distress at both biological and spiritual/mental level [4]. Employees with occupational burnout can go through either some or all of the following stages before fully developing burnout syndrome: the need of the individual to prove that he/she is worthy; more intense and harder work to achieve unrealistic goals; obsession with controlling what is happening in the need to constantly prove that he/she cannot be replaced by others; neglect of personal needs, such as food and sleep; separation from friends and family; belief that this "sacrifice" is heroic and thus he/she performs better in work [5]. The individual does not actually acknowledge the problem and becomes cynical with others [5] and antisocial and may even resort to alcohol or other psychoactive substances to find relief. At this point, the antisocial behavior is obvious, and the employee becomes apathetic and shy, considers him/herself and the needs of others insignificant, has no future plans, acts "robotically" [5], and feels "empty." Finally, the employee may feel depressed and helpless and ends up professionally exhausted. The individual may suffer complete psychological and physical collapse needing immediate medication [5] or suicidal tendencies that may lead to death.

In the context of the institution in which the person works, negative phenomena include absence of motivation, a permanently stagnant state, which is responsible for the sensation of "satiety" and monotony of employees [6]. Burnout manifests in stages, initially with boosted obligations/commitment to work goals and then with depletion of "personal energy reserves." The entire procedure continues with a reduction in work commitment levels, substantial undesirable emotional feedbacks, abandonment and apathy, causing a variety of psychosomatic responses and, eventually, hopelessness. Burnout, as a long-lasting condition, can also prime depression [7] and make the psychological well-being of employees exceptionally precarious.

Occupational burnout is particularly widespread among surgical professionals. The Medscape Physician Lifestyle Survey in 2015 showed that burnout rates fluctuated between 37% and 53% among all surgical healthcare workers, whereas the general surgeon rate alone was 50%, one of the highest rates among medical professionals [8]. These employees are under daily and intense pressure in their work environment, with a strong sense of responsibility about their profession. Burnout has significant adverse outcomes, such as drug misuse, harmful behavior, nonattendance, turnover, tense personal and professional relationships, despair, suicidal ideation, and suicide [9–11]. During the past 10 years, both the awareness and the ability to reliably measure and classify burnout in medical professionals have been increased. The Maslach Burnout Inventory (MBI) constitutes the main evaluation tool for burnout syndrome in medical workers [12].

The purpose of this systematic review was to summarize the current evidence on the burnout levels of general surgeons. The psychosomatic effects of occupational burnout and the factors contributing to it were also investigated.

14.2 Materials and Methods

14.2.1 Search Strategy

A comprehensive search was conducted in the PubMed, Embase, Cinahl, and Google Scholar databases from 2010 up to 20 November, 2020 (before the COVID-19 pandemic) to identify articles relevant to the topic. Search terms were "occupational burnout," "occupational exhaustion," "burnout syndrome," "burnout risk," and "general surgeons." The terms used were investigated in titles, abstracts and keywords of the studies.

14.2.2 Eligibility Criteria

Studies were considered eligible if they met the following inclusion criteria: (1) investigated the burnout syndrome in general surgeons only and not other surgical specialties, (2) published in peer- reviewed journals, (3) published from 2010 onwards to ensure updated information, and (4) written in the English language. Reasons for exclusion included the following: (1) interventional studies, (2) other systematic or meta-analytic reviews, and (3) insufficient data provided.

14.2.3 Bias Assessment

Articles that met the inclusion criteria were critically evaluated with the use of the CASP (Critical Appraisal Skills Programme) tool. Numerous critical appraisals are available for systematic reviews, but as recommended by Aveyard [13], these should be employed to ensure the freedom and precision of an evaluation. The CASP tool has many advantages, the most important being the assessment of internal strength, outcomes, and relevance to clinical practice.

14.3 Results

14.3.1 Study Selection

After the removal of duplicates the search concluded in a total of 40 studies. After applying the inclusion/exclusion criteria, five studies were deemed as eligible. The flowchart of the studies' selection is presented in Fig. 14.1.

14.3.2 Data Extraction

The included studies were published between 2012 and 2019. All of them were observational studies; four of them were longitudinal/prospective studies and one was a cross-sectional study (Table 14.1). The studies included 669 subjects, participants' mean age in two of the studies was 30.4 years, two studies included subjects younger than 29 years of age, while one did not report the mean age of participants. The most frequently used questionnaire for burnout was the Maslach burnout Inventory. The basic characteristics and the CASP assessment of each study are outlined in Tables 14.2 and 14.3, respectively.

14.4 Discussion

Research regarding occupational burnout has been conducted in various occupational health fields (e.g., oncology, nursing). The factors that influence and contribute to the level of burnout vary among studies. However, they can be categorized into environmental ones, which are mainly associated to the work background, and the so-called demographic factors, which incorporate the demographic characteristics of employees. Research has focused on the influence of the aforementioned factors on the burnout of surgical workers compared to other

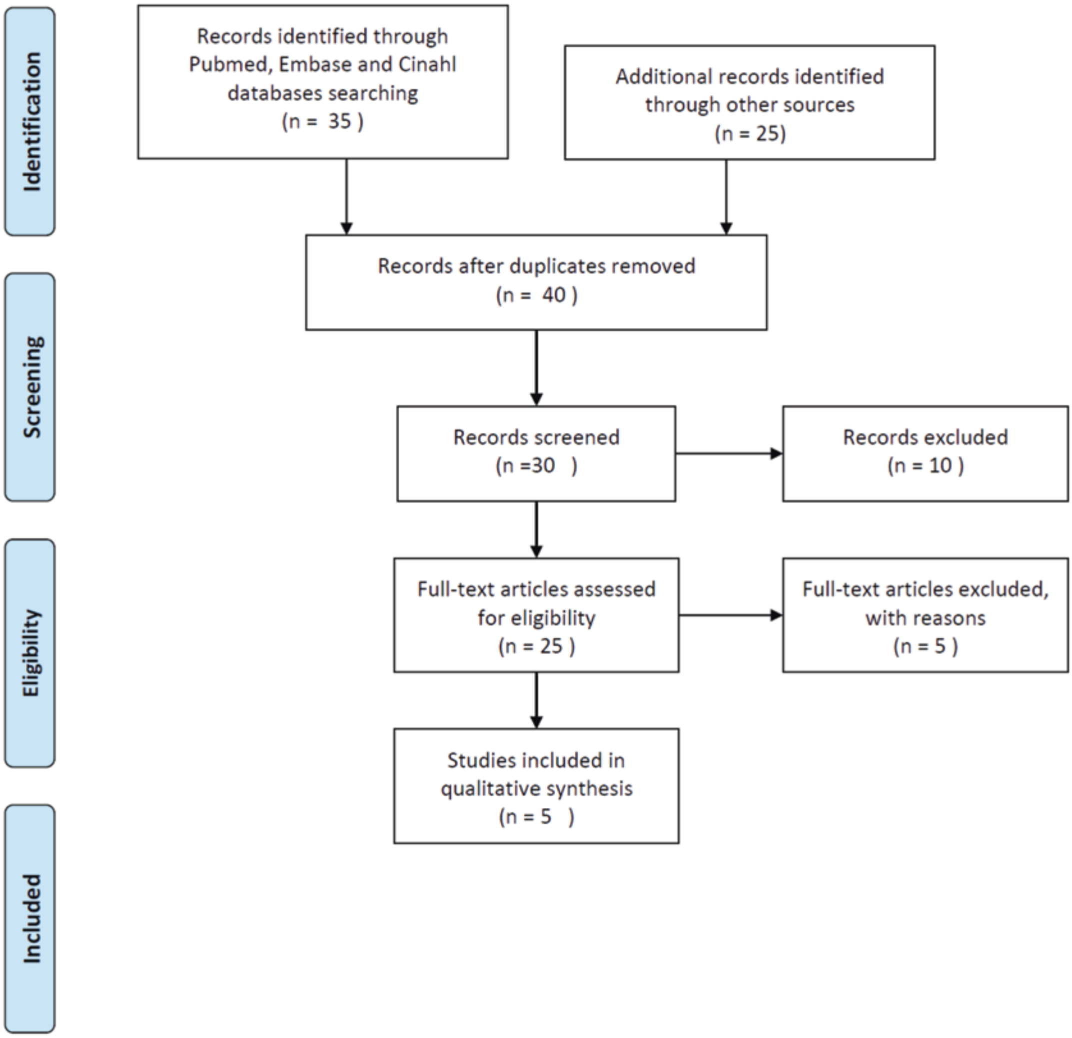

Fig. 14.1 Flowchart of the included studies

occupational health teams and even less on the burnout rates of general surgeons.

Our review showed that the causes most often reported by general surgeons for their occupational burnout included exhaustive work, substantial workload due to lack of workforce, acceptance that the health division will not alter for the better, beliefs that their contribution is not acknowledged by supervisors and colleagues, lack of recognition of the importance of their work by their partners/family and social environment, the nature of work setting, the stressful day-to-day care of individuals who are helpless and suffering, unbalanced working hours, low incomes, and lack of communication and good administration. The systematic review of Dimou, Eckelbarger, and Riall in 2016 [14] indicated the same occupational burnout hazards in professionals of general and surgical subspecialties. They reported that 40% of surgeons in all specialties met the occupational burnout criteria, indicating a very elevated emotional exhaustion score and/or a high depersonalization score. Furthermore, they categorized the burnout signs exhibited by all surgical

subspecialties and reported 31.7% emotional exhaustion, 26% change of personality traits, and 12.8% low appreciation of personal achievement.

Table 14.1 Summary of included studies

Author	Date	Type of study	Sample size	Objectives
Antiel et al.	2012	Longitudinal study	215	To identify the viewpoints of surgical interns on the effects of the policy on duty-hour training of the accreditation Council for Graduate Medical Education (ACGME)
Antiel et al.	2013	Longitudinal study	213	To determine the consequences of the newfangled accreditation Council for Graduate Medical Education duty hour guidelines for training, welfare, and burnout
Lin et al.	2016	Longitudinal study	73	To identify the relationship between emotional intelligence and Well-being among surgical residents
Zubairi and Noordin	2016	Cross- sectional survey	82	To investigate the frequency of burnout among residents participating in direct patient care and to assess the risk factors related to it
Beierle et al.	2019	Prospective study	86	To assess the relationship between emotional intelligence and burnout as a possible educational goal

Table 14.2 Characteristics of included articles

Author/ date	Sample size	Age (years)	Assessment group	Assessment tool	Parameters assessed	Results
Antiel et al. (2012)	215	≤ 29	General surgery interns and directors	3-point scale indicating increase, no change and decrease for each parameter assessed	Safety of patient care, medical knowledge gain, practice-based learning and improvement, interpersonal and communication skills, professionalism and systems-based practice	Regarding surgical interns, 80.3% reported decrease in continuity with patients, 67.4% actual surgery time decrease, 48% decrease in acquisition of surgical knowledge, 52.8% anticipated decrease of surgical skill acquisition, 57.6% anticipated poorer quality of care regarding coordination, 61.5% believed that the new standards would decrease resident fatigue. Surgical directors had more pessimistic attitudes ($P < 0.05$ for all comparisons).
Antiel et al. (2013)	213	≤ 29	General surgeons at internship	Maslach Burnout inventory	Burnout, balance between personal and professional life, career satisfaction	32% of general surgery interns showed weekly symptoms of emotional exhaustion, 28% change of character, 28% indicated that their personal- professional balance was either “very poor” or “not great,” 67% reported weekly questioning their fulfillment, 1 in 7 considered giving up their career.
Lin et al. (2016)	73	30.4 (SD = 2.9)	General surgery residents	Trait emotional intelligence questionnaire-short form, Dupuy psychological general Well-being index, Maslach Burnout inventory, and Beck Depression inventory- short form	Well-being, burnout, depersonalization	Emotional intelligence was strongly prognostic of wellness ($\beta = 0.76$; $p < 0.001$), mental exhaustion ($\beta = -0.63$; $p < 0.001$), change of personality ($\beta = -0.48$; $p = 0.002$), and depression ($\beta = -0.60$; $p < 0.001$).

(continued)

Table 14.2 (continued)

Author/ date	Sample size	Age (years)	Assessment group	Assessment tool	Parameters assessed	Results
Zubairi and Noordin (2016)	82	Not reported	Surgical residents	Maslach burnout inventory and occupational risk factors	Burnout risk factors and patient care outcomes	High burnout levels on one subscale recorded by 74.4% of surgical residents, 41.5% in two components, and 12.2% of surgical residents scored high on all three subscales. 59.8% showed emotional exhaustion. No disparity in burnout rate between junior and senior residents. Dissatisfaction with workload, length of work hours, relationship with co-workers and lack of autonomy were significantly correlated with high burnout rates.
Beierle et al. (2019)	86	30.4 (SD = 2.9)	General surgery residents	Maslach Burnout inventory, scale of emotional functioning: Health service	Well-being, burnout, depersonalization, personal achievement	Modifications in the personal achievement section of the MBI showed the highest association with time-based alternations in EI with $r = 0.606$ and $r = 0.616$ respectively. 62% showed moderate to severe mental exhaustion, 73% depersonalization and 37% for personal achievement.

MBI Maslach Burnout inventory, *EI* Emotional intelligence

Table 14.3 CASP assessment report of included studies

Criteria	Study				
	Antiel et al. (2012)	Antiel et al. (2013)	Lin et al. (2016)	Zubairi and Noordin (2016)	Beierle et al. (2019)
Clear statement of the aims of the research?	Yes	Yes	Yes	Yes	Yes
Qualitative methodology appropriate?	Yes	Yes	Yes	Yes	Yes
Research design appropriate to address the aims of the research?	Yes	Yes	Yes	Yes	Yes
Recruitment strategy appropriate to the aims of the research?	Yes	Yes	Yes	Yes	Yes
Data collection appropriate?	Yes	Yes	Yes	Yes	Yes
Relationship between researcher and participants considered?	No	No	No	No	No
Ethic issues into consideration?	Yes	Yes	Yes	Yes	Yes
Data analysis sufficiently rigorous?	Yes	Yes	Yes	Yes	Yes
Clear statement of findings?	Yes	Yes	Yes	Yes	Yes
Valuable research?	Yes	Yes	Yes	Yes	Yes

In addition, 36% of this professional medical group were worried that their family and social life were suffering due to their work obligations and load, and their mental and physical exhaustion.

This review demonstrated an age-dependent difference in the responses of participants, with younger participants showing higher degree of optimism and lower levels of burnout than older participants. On the other hand, younger surgeons were worried that increase in non-surgical workload would result in poorer educational and skill acquisition, whereas older surgeons were less worried about these aspects. Stanetic and Tesanovic [15] reported that age and duration of provision have a direct effect on the level of stress and burnout syndrome; the elder the surgeon and the lengthier the provision, the greater the stress level and the probability of burnout syndrome. This could be attributed to the natural age–related decrease of physical and mental endurance and the natural optimism of younger people.

Emotional intelligence (EI) is characterized as the ability to be conscious, regulate and convey one's emotions and to manage personal relationships cautiously and sensitively. Business studies have identified emotional intelligence as an impartial indicator of performance as a manager. Supposing that the characteristics that are appreciated in a manager (e.g., compassion, public duty, and self-confidence) could be equally attributable for the characterization of surgeons, it is thus rational that emotional intelligence is accounted as an additional asset for general surgeons. This idea was highlighted by Lindeman et al. [16], who associated emotional intelligence to clinical abilities, while Weng et al. [17] associated emotional intelligence to patient satisfaction with physicians. In the study of Beierle et al. [18], all types analyzed (emotional fatigue, depersonalization, PA, and EI) showed increase in scores across three evaluations with the Maslach Burnout Inventory, and the Scale of Emotional Functioning: Health Service following the implementation of emotional intelligence interventions. Prospective studies should focus on personality assessment in relation to burnout as it could have the greatest potential to calculate burnout indirectly. Designing emotional intelligence interventions and applying them in the hospital settings could help avoid surgical burnout.

14.5 Conclusion

Burnout syndrome is mainly due to the exhausting and demanding conditions of working life. This phenomenon was strongly observed in general surgeons. The incidence of the burnout syndrome increased with their years of service, compromised their quality-of-life, and had detrimental effects on their mental and physical health. Personal achievements and emotional satisfaction were protective for the occurrence of the syndrome. Thus, valid recognition and prevention of the syndrome are necessary. Further research is needed to manage this phenomenon within the healthcare settings and the surgical departments.

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15

When the "Scytale" of Alcohol Runs in a Family and Alcohol Use Becomes a Transgenerational Issue: Case Report of a Father and Son Attending the Same Therapeutic Program

Eirini Segredou, Vasiliki Sakellaridi,
Paraskevi Nikolaidou, Kyriaki Therapou,
Stamatia Lagou, Aikaterini Filippi,
Evangelos Poulis, Konstantina Thanopoulou,
Marilena Gkremou, Maria Tzaferi,
and Evdokia Missouridou

Abstract

Children whose parents are diagnosed with alcohol use problems are exposed to genetic and environmental risk factors and face a greater risk of developing mental health and behavioral problems and a higher risk of alcohol use. In this study, we present the case of a father and his son, both diagnosed with alcohol use disorder, who both attended, 12 years apart, the Inpatient Alcohol Treatment Program of the Alcohol Treatment Unit, in the Psychiatric Hospital of Attica, in Athens. The Alcohol Treatment Unit offers two inpatient treatment programs that have been operating since 1996 and are based on the principles of the Therapeutic Community. It was the first time that both a father and son coming from the same family attended one of these programs. The aim of this study is to extract useful information regarding the dynamics of a family in which alcohol dependence is transferred from generation to generation. Therapists try to decode this transference and interpret attitudes and behaviors under these circumstances.

Keywords

Inpatient rehab · Inpatient program · Alcohol use · Alcohol · Alcoholism · Transgenerational issue · Intergenerational transmission · Family · Fathers · Sons

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E. Segredou (✉) · P. Nikolaidou · K. Therapou · S. Lagou · A. Filippi · E. Poulis · K. Thanopoulou · M. Tzaferi
Alcohol Treatment Unit, Psychiatric Hospital of Attica, Athens, Greece

V. Sakellaridi (✉) · M. Gkremou · E. Missouridou
Department of Nursing, Faculty of Health and Caring Professions, University of West Attica, Athens, Greece

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15.1 Introduction

The children, whose parents are diagnosed with alcohol use problems, are exposed to genetic and environmental risk factors and face greater stress, a greater risk of developing mental health [7] and behavioral problems, and a higher risk of alcohol use [15, 35, 38], smoking or having premature sexual contacts [17]. The consequences, apart from being physical or psychological, are developmental, social, and interpersonal and require a trauma informed approach to treatment [18, 20, 21]. Strong feelings of anxiety [33], fear, shame [7], loneliness, confusion, and anger [28] are very common among children whose parents face problems due to alcohol use [1]. In many cases, they feel inadequate [27] and have low self-esteem [26]. Erdim [5] and Park and Schepp [27] pointed out that it is not uncommon for those children to engage in serious criminal behavior or commit suicide.

In the general population, 11% of all cases of maltreatment are related to parental alcohol use [31]. Rates of child abuse due to alcohol use appear to be much higher concerning children for which the child welfare system takes action. As far as those children involved in the welfare system are concerned, it is estimated that 40–80% of their parents face problems related to alcohol use [9, 40].

In Europe, the percentage of children under the age of 20, whose parents face problems due to alcohol use, ranges from 5.7% in Denmark to 23% in Poland [6].

Pomini [29] states that every family with a member with alcohol use problems confronts a condition that: (1) is chronic, (2) has a cyclical pattern, (3) is associated with specific repetitive behaviors, (4) is influenced by the use of substances, and (5) has a specific course with detrimental consequences to the biological and psychological health of the addict, as well as of the other family members [30].

Velleman [37] suggested that seven basic aspects of family life could be negatively affected due to alcohol use, including roles, rituals, routines, social life, finances, communication, and conflict [12, 27, 32]. The functioning of family life is negatively altered because the individual with alcohol use problems cannot satisfy adequately the needs and expectations of the spouse and other family members. Indeed, alcohol use has a suppressive influence on the person, making them less able to discuss. At the same time, the addictive behavior leads the person to be constantly concerned with the acquisition and taking of the substance, thus neglecting important family issues and roles [28]. Consequently, it is quite probable that the rest of the family members take on additional responsibilities to fill the void created by the member with alcohol use problems. This situation has a multifaceted effect on the other family members, which is not only limited to their mental health or self-esteem, but can also lead to physical illness, particularly stress-related illnesses [25]. Verbal, physical, and emotional abuse is common in family environments with parents who drink alcohol on a regular basis, and, as a result, members of such families face many traumatic experiences [5, 27, 28]. Social and cultural particularities—for example, the sense of honor to the Greek family [8]—seem to be related to the traumatic dimension and the stigma of addiction [19, 22].

Problematic alcohol use influences the family structure and affects several aspects of its function such as leisure time, activities, intrafamilial and social relationships, and finances. The family functions in an escalating equilibrium, in which the behavior of one reinforces and sustains the behavior of the other, while at the same time increasing the costs and emotional consequences for its members. Peter Steinglass and Stefanie Brown described parental alcohol use as the central organizing factor of intrafamilial interactions and considered it to be a determining factor in the development of the family as an entity as well as of each individual member [4].

Children whose parents suffer from alcohol addiction are eight times more likely to develop alcohol use problems themselves than children whose parents do not drink alcohol on a regular basis [13]. Alcohol use “runs” in families through generations and is often passed down from generation to generation.

15.2 Facts About the Greek Family

In the rural-agricultural and pre-industrial societies of Greece, the patriarchal–extended type of family is common. It is based on kinship and consists of several conjugal families (due to the cohabitation of married sons), which constitute an economic unit. It is characterized by a strict hierarchy of members' roles [24]. The father has a leading role, while the mother is subordinate to his decisions and her role contributes to the coordination and connection among the family members. The purpose of the extended family is the economic and biological survival of all family members, as well as the transference of family tradition (values, morals, property) from father to son [10, 39].

The technological and industrial development, as well as the consequent internal migration from the countryside to the urban centers (the 1950s and 1960s), led to the transformation of the extended agricultural family, but without losing its traditional structure [16]. The nuclear family, which consists of the two spouses and their children, prevails nowadays. It is child-centered, and the wife plays a decisive role in decision-making.

15.3 Purpose

In this study, we present the case of a father and his son, both diagnosed with alcohol use disorder, who both attended, 12 years apart, the Inpatient Alcohol Treatment Program of the Alcohol Treatment Unit of the Psychiatric Hospital of Attica in Athens. It was the first time that both a father and son coming from the same family attended one of these programs. The aim of this study is to extract useful information regarding the dynamics of a family in which alcohol dependence is transferred from generation to generation.

15.4 Method

The Alcohol Treatment Unit offers two inpatient therapeutic programs that have been operating since 1996 and are based on the principles of the Therapeutic Community. They host approximately 70 people annually and are the only public inpatient alcohol treatment programs in Greece. These programs consist of three phases: (a) the preparation phase for admission, (b) the closed inpatient phase, and (c) the social reintegration phase. As far as the particular program the cases presented in this study attended, the closed phase lasts for 6–8 months and the social reintegration phase for 18 months. It was the first time that both a father and son coming from the same family attended the same therapeutic program. Data on the progress of the treated patients were collected both from their clinical interviews conducted by the treating psychiatrists and from the therapeutic procedures they attended in the program (individual and group psychotherapy, occupational therapy, drama therapy, and clay constructions groups).

15.5 P.'s History (Father)

P., a high-school graduate, was born in 1965 in a semi-mountainous village in central Greece. He is the eldest son of his family, having a younger brother.

His parents were farmers. His father used to drink a lot of alcohol on a regular basis. Actually, P. remembers him always drinking. From an early age, he accompanied his father to work, as well as the traditional coffee shop of the village and local festivals. His father gave him to drink, which was not unusual at that time in this.

Greek rural area. From the age of 15, P. drank alcohol systematically. Both father and son used to drink together until they got drunk and returned home late at night.

His mother and younger brother remained at home. She did not speak about that but used to send the little brother to the traditional cafe, who, without saying a word, used to overturn the table where father and brother were drinking and leave. In 1997, the father died of lung cancer at the age of 63.

After graduating from high school, P. came to Athens and worked in a supermarket. At the age of 25, he got married and went with his wife to

Germany where her parents were already immigrants. P. and his wife had two children, F. (1990) and V. (1993). In Germany, he worked as a builder. The systematic use of alcohol continued. After ten years, due to professional difficulties, P. and his family returned to Greece, to Athens, where they remained for 5 years, and then returned to his native village because of financial difficulties. There he became again professionally active and worked in the construction industry. Alcohol use continued and increased gradually, as there were financial problems. He experienced severe anxiety, which he didn't express to other people. His wife was resentful due to poverty. P. claims that she was indifferent regarding alcohol use, which was convenient for P. at the time, but now he criticizes it ("she didn't do anything to help me", "she liked that I drank"). In 2004, his wife left her family and went to her home island where her parents were living after returning from Germany. In the beginning, the daughter went with her, and a little later the son followed them, but very soon the children returned to the father's village due to conflicts mainly concerning the mother's new partner. Their mother's behavior made it for P. easy to believe that he was a good father, appeasing and covering up his guilt.

P., deeply hurt and angry, increased the alcohol use even more. At the same time, other problems appeared: sleep disturbance, anxiety, liver, and gastroesophageal problems.

In November 2009, he attended the Counseling Station of the Alcohol Treatment Unit because "he can't continue any further". He was accompanied by his brother. He was determined to quit drinking because "he would lose everything: children, work, health". Six months earlier, he had consulted a private psychiatrist, who had prescribed him benzodiazepines. In December 2009, he was accepted into the inpatient alcohol treatment program. At that time, his daughter was a student and his son, who studied at the high school, lived in the village with his paternal grandmother. While P. was attending the program, he found it difficult for a long time to focus and go deep into his problems. It was not easy for him to comprehend and express his emotions and expose himself to others. He rather adhered to the rules and formal procedures of the program. The main topic of discussion was his children, who, according to him, wanted him back.

In September 2010, after nine months, he completed the program and returned to his village, where his son's behavior worried him. He suspected that his son used substances, and he might also have anorexia nervosa. Father and son started to sleep in the same bed, and it was difficult for them to separate from one another.

P. started to work again as a builder. He got aware of the financial problems of the family and began to settle them. His daughter asked him for money to pay off the negative consequences related to his use and absence. His wife reappeared asking for money and seeking reconnection. He didn't accept his wife back, which was a source of satisfaction for him. However, all these distracted him from his needs, his difficulties, and his treatment.

He continued rather reluctantly in the next phase of Social Reintegration, which he interrupted after two months, considering that it didn't help him because "the same things are recycled".

He returned to the program after six months as he struggled to manage his daily life and was afraid of relapse. He participated in the Outpatient Program of the Alcohol Unit (6/2011), which he completed successfully (7/2013). One of the main topics discussed was his concern for his son V.

During the same period, he got divorced and his ex-wife remarried. His daughter got also married on the island. Due to his daughter's permanent settlement on the mother's island and as he was unemployed in the village, P. also moved there with his son, V. He started a relationship with E., and he was fine. He faced a health problem (a cyst on the left and then on the right carotid artery) and had an operation to fix it. He mentions that he is close to his children as "both mother and father", which is very important to him. He cares for and advises V. in relation to alcohol.

P. cares about his son's career and helps him to find a job in Athens, thanks to his acquaintances. He is happy and believes that in this way V. will escape from alcohol use. On the contrary, the son's alcohol use increases, and he is fired and luckily survives a serious traffic accident, which he himself caused. That's the moment when they both realize the seriousness of the situation.

V. asks his father for help to stop drinking. P. advises him to participate in the closed Alcohol Treatment Program where he also underwent treatment and V. agrees. V. feels weak and defeated and trusts his father, whose acquaintances and experience guarantee that everything will be fine.

P. is happy but the shock is greater. Why should his own child face problems due to alcohol use? He is tormented by the realization that he didn't make it: "I can't believe I didn't make it with the little one." He is shocked and experiences intense anxiety as if he himself entered again the closed program seeking treatment.

15.6 V.'s History (Son)

V. at the age of 12, when his parents divorced, started drinking alcohol occasionally. Gradually, father and son developed a strong bond. In this context, V. adopted his father's lifestyle, his attitudes, and his opinions, among which the most dominant was that his mother did not care about her children. While the father was attending the inpatient treatment program, his paternal grandmother took care of him. However, V. had already started to drink systematically.

In the following five years, V. drank huge amounts of alcohol on a regular basis and lived with his sober father. He graduated from EPAL High School (high school of technical education) obtaining a specialty in Mechanical Engineering and completed his military service. At the age of 22, he moved with his father to the island (where his mother and sister already lived) and worked there with him. His mother remarried. His relationship with her was typically too distant. His social network consisted mainly of people who use alcohol and drugs. He mentions occasional relationships with women and one long-term relationship in the past that lasted 6 years. Also, he occasionally uses cannabis and cocaine.

During his four-year stay on the island, V.'s alcohol use peaked. As a result, V.'s behavior was impulsive and risky and became the subject of negative commentary in the local community. Eventually, he moved to Athens and, following his father's advice, attended the same treatment program as him.

Both during his admission and during his treatment in the program, he often refers to his father as his role model. In fact, he tries to implement the advice or information given by the father about the program, sometimes questioning even his therapists. It is difficult for him to differentiate his attitude in relation to his father and see himself as an independent, autonomous entity.

15.7 Discussion

Alcohol use, regardless of age, is often socially acceptable, especially in rural areas, and to some extent is gender-enforced. It is common to be inherited from father to son and then to grandson.

Women are presented as either weak or indifferent, accepting and consenting to alcohol use, enduring without complaint. In the case presented in this study, one female member of the family (P.'s mother) endures and becomes a heroine. The other (P.'s wife) "breaks" the agreement, betrays the system, leaves, and as a result is removed from her role as wife and mother. Neither of them could emotionally contain either the husband or the son who faces alcohol use problems.

As far as P. is concerned, the divorce from his wife and the separation from his daughter, when she left for studies, played a major role in his loss of control over his use and his subsequent realization of his alcohol use problems. The risk of "losing" both his children motivated him to ask for help.

He struggled to commit to his treatment for the sake of his children. He then committed himself to abstinence from alcohol and sobriety by becoming "mother and father" to them. He constantly takes care of his son V., who is weak. He is always with him (in the village, on the island), sends him to Athens to meet his acquaintances and find work, and brings him to “his” Alcohol Treatment Program. V. accepts his father’s attitude, considering it as a guarantee that everything will be fine. Thus, for some time during his participation in the program, he considers himself to be treated by representing or being represented by his father.

V’s alcohol addiction urges P. to think about whether he was a responsible father, and at the same time it reflects his own addiction and it reflects his own self. As the trauma is repeated and passed down to the next generation, he desperately seeks a way to embrace and contain the deficit and trauma of both “little” V. and little P. himself. “I can’t believe I didn’t make it with the little one,” he says.

V. experiences a double abandonment. He is abandoned both by his mother, who is emotionally distant, and by his father, who was absent during the years of use and his admission to the Alcohol Treatment Program. He seeks to find his father in the coffee shop, in the bars, in the use, and in the Program. For whom did he come to the Program? Who is to be treated? The father or himself? Surely, he came to treat the child. But which child? V. came to the program as if it was the only way and place for father and son to meet (it’s noteworthy that father and son have never been sober at the same time). In this way, they can meet each other: the old can meet the young (little), the young (little) can meet the old, the “little” can meet the little, the adult can meet the child, the child can meet the adult and each one himself. Besides, it is difficult to maintain a double identity: being both the person who drinks alcohol and the parent of the son, who drinks alcohol and seeks treatment, and the child of the parent who drinks alcohol and undergoes treatment. Often the traumas merge. During their treatment, the individuals feel uncertain and ambivalent about where to start. Some must put childhood issues aside to maintain sobriety. Others can’t stop drinking, let alone get sober, without delving into the past. It is especially difficult for the adult with alcohol use problems to allow the emotional memory from childhood to be brought back because this often brings a flood of guilt as he himself became involved in alcohol use following the example of his parent [3].

P.’s paternal function is inadequate. The father is the third person who can potentially cut off the son from his binary symbiotic relationship with the mother. According to Lacan, the Father is divided into the Real, the Imaginary, and the Symbolic one. The Real Father is the natural father or his substitute and is defined through language, as he gives his name to the child. The Imaginary Father represents all the imaginary constructions the child makes of the father and range from ideal to “evil”. Whatever the case, he is certainly an omnipotent father. The Symbolic Father is both a function and a position and represents the Law. V.’s father seems to have entered a deeply competitive position with the mother, apparently due to her inadequate role. So, the relationship V. developed with his father is probably symbiotic (as if his father were his mother) and his father did not become a “third person”.

While attending the Alcohol Treatment Program, V. often talked about his father being supportive, helpful, and understanding, in a way that everything else—on a deeper level and in an unspoken form, even his own therapy—was defeated and questionable. Besides, that’s exactly what he has been taught: Members of a family with a member who suffers from alcohol use problems may speak of sympathy and companionship, even though the real situation belies that claim. There is an undeniable disparity between conscious views and desires and unconscious learned images, thus confusing the development of values within the family [36]. The distance between family members can grow and shrink on a continuum. In our case, the family members moved relatively easily and often. They were trying to find the right position/distance where they would feel safe from each other. Sometimes, the distance took the form of a syncytium. Father and son slept together in the same bed. Was this a way for them to receive or show affection, care, and affirmation, or was each one part of the other’s identity?

Indeed, in this study, it is noteworthy the fact that both father and son maintain a counterpart dual identity. They are both victims and perpetrators of family dysfunction resulting from parental alcohol use. It is remarkable that even in the treatment process they maintained a double identity. They both found themselves twice in the same place but in a different role. The first time the teenage son was there to support his father's effort to recover from alcohol use. The second time the now sober father was there to support his son's recovery effort. Did their perspective change because of changing positions? Could it be that the other is here as an idol of the self, like being trapped in an image in the mirror? And if so, which image? Which part of the self? And what happens when the mirror image is frozen, like a Medusa-like gaze, so that evolution pauses causing an inner quagmire and a sense of self as a psychical and physical fossil? How and to what extent can therapy modify such a situation and provide hope and meaning?

Children of parents with alcohol use problems often face inconsistency, unpredictability, vague boundaries, vague roles, arbitrariness, and changing pattern of reasoning, conflict, violence, physical and emotional neglect, and financial problems [4]. Kroll [14] describes the "don't talk" rule that urges those children not to talk. If children try to talk about what is happening, even if they cannot identify the exact problem, then their perceptions and feelings are called into question. Thus, gradually, this "conspiracy of silence" is installed. Children become distrustful of strangers, reluctant to trust and fearful of others' attempts to help or support them. In addition, they may have difficulty recognizing, differentiating, and expressing their emotions which leads to behavioral problems and to some extent of alexithymia [23].

There is an ancient Greek myth, the myth of Theseus and his father Aegeus. According to the myth, Aegeus could not have children. So, he visited the oracle of Delphi where he received an incomprehensible oracle. Plutarch mentions that on the way back, Pytheas, king of Troizina, having understood the true meaning of the oracle, deceived Aegeus. He got him drunk and made him have intercourse with his daughter, Aithra, with the aim of obtaining a descendant for the Athenian kingdom. When Aegeus realized what had happened, he asked Aethra, in case of pregnancy and birth of an offspring as a result of their union, to raise the child without revealing the identity of his father until the child was a teenager. He hid his sandals and sword under a rock and asked her to urge the boy, when he would be strong enough, to lift the rock to get these items and then look for him in Athens.

Indeed, the story unfolded this way and Theseus set off for Athens and went through numerous trials in order to meet his father. Aegeus, before recognizing him, assigned him various tasks which Theseus successfully completed. However, Theseus' greatest achievement is considered to be Minotaur's execution. Before departing for Crete, Theseus had agreed with his father that if he succeeded in the mission, his ship would have white sails on its return, but if he failed, his companions would leave the black sails flying as a sign of mourning. Theseus returned victorious, but for unknown reasons the black sails remained on the ship's masts. When Aegeus saw the ship that brought the sad news of his son's failure, he threw himself into the sea, being in despair. This is how the Aegean Sea got its name.

The myth of Theseus demonstrates the father's prolonged absence, as well as the son's hidden anger. Aegeus, who was absent during the hero's childhood, left him to grow up by himself so that he was strong enough to take his sandals and sword and go to find him. But even when he found him, through a long and dangerous journey, he assigned him a lot of tasks, as a prerequisite to accepting him as his son. Returning from Crete, Theseus for an unknown and unexplained reason "forgot" to put the white sails on the ship and as a result Aegeus killed himself. "What unconscious anger is hidden behind this carelessness? Theseus had unparalleled courage as a warrior and was not afraid to risk proving himself worthy of being called the son of Aegeus. He endured fear and anxiety throughout his life and his struggle for survival. At the same time, however, his anger and bitterness because of the deprivation of his father led the story to unfold in an uncontrollable way" [2].

A father with alcohol use problems is absent, non-available, and unavailable. “Parental absence leads to a child’s feelings of insecurity, fear, and anger. It also inhibits the establishment of the child’s normal identifications with his father and the subsequent inductive structuring of his personality” [34]. The father, lost in the watery fortress of alcohol, leaves his son to grow up by himself. P.’s father left P. to grow up alone and the same did P. to his own son, V. Father’s sword, which as a baton is passed from father to son, depicts drinking. Therapists are asked to decode this baton as a “cryptic or lacedaemonic” [11]. This task is very difficult since only the baton holders themselves know the unconsciously agreed way of deciphering it.

The cryptea scytalys (baton) or “Lacedaemonic scytalys” is considered to be one of the oldest encryption systems. A baton of random dimensions was cut in half. One part of it was guarded by the stewards of Sparta and the other was taken by the head of the army. When one of the two parties wished to communicate with the other, they wrapped a long narrow strip of cloth or parchment around the piece of baton they had. The way of wrapping was prearranged. There they wrote the message again in a way that was prearranged. Sometimes they used a mirror so that the letters were written upside down. Finally, the sender of the message unrolled the strip of cloth on which the message could no longer be read. The receiver wound the strip again in the pre-agreed manner and since the baton had the same diameter the letters coincided. Then they used the agreed way, which might be mirror reading or transposing syllables or some other way of reading and deciphering the text.”

15.8 Conclusions

Through unspoken codes, information regarding alcohol dependence is transferred through the generations. Therapists are required to decode this transference and interpret attitudes and behaviors of both paternal and nuclear family members-a difficult task indeed. Through therapeutic processes that contain both generations, family members are helped to discover new meanings.

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16

Pathways to Mental Health Care in a Defined Geographic Area of Athens

Afroditi Zartaloudi

Abstract

The purpose of the present study was to explore the duration between the onset of psychopathology and the first contact either with a sectorized Community Mental Health Centre (CMHC) of Athens area or other mental health services, identify the pathways to the CMHC as well as possible sociodemographic and clinical factors affecting help-seeking behavior. The sample consisted of 355 individuals who visited the CMHC, but had sought help from another mental health care source prior to their visit to the Centre (group A), and was compared with 398 individuals who had no previous contact with any other psychiatric service (group B). The average duration of untreated mental disorders was found to be 19.85 (SD 23.113) for males of group A and 26.26 (SD 41.158) for males of group B. Among females the mean duration was found to be 18.11 (SD 27.293) for group A and 22.21 (SD 29.440) for group B, a statistically significant difference. In group A, the intervening services referred the clients at an earlier stage. The striking difference is that only eight individuals (2%) of group B (first timers) were diagnosed as suffering from schizophrenia contrasting to the 61 (17.4%) counterparts of group A. Individuals in our study diagnosed with psychosis seemed to have sought help first from other mental health services and delay to visit a CMHC. People who face problems resulting from their interpersonal or professional relationships often choose to have a first contact with a CMHC. Reduction of the delay in treatment will require clearer understanding of the contributing factors. Liaison activities with public and mental health sector services and outreach interventions to increase awareness on the early recognition of psychopathologic symptoms and the need for early referral could reduce the duration of untreated mental disorders.

Keywords

Duration · Untreated mental disorders · Community mental health · Help-seeking

16.1 Introduction

Increasing attention on early intervention in mental disorders underscores the importance of identifying factors in delaying of help-seeking and referrals for those with mental health problems. Help-seeking is a multidimensional process. The patterns of pathways to care for individuals suf-

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A. Zartaloudi (✉)
Department of Nursing, University of West Attica, Athens, Greece
e-mail: azarta@uniwa.gr

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fering from a mental disorder have been studied extensively [1–4].

One of the key issues is that of decision-making of the individual with a serious psychological problem to seek help and the possible delays in treatment, especially for those suffering from psychoses [5–8]. A prolonged duration of untreated mental disorder is associated with worsening psychopathology, increased risk for violence toward the self or others, family burden, elevated treatment costs, and increased likelihood of compulsory hospitalization [9–11].

Birchwood et al. [12] underlined the duration of the first five years of psychosis as a crucial period for treatment initiation. However, studies reported significant delays in treatment [5, 7]. The lack of public awareness, the reluctance of caregivers in seeking help for the suffering member, and the underestimation of the importance of early intervention among general practitioners and the lay public contribute to treatment delays [13–15].

In Greece, the phenomenon of psychiatric help-seeking has also been explored. In two neighboring boroughs of greater Athens in 1979–1981, a two-stage cross-sectional community survey with a large probability sample provided evidence that in these two areas, 13.6 per 1000 of the population came into contact with mental health services during a period of one year prior to the survey [16]. However, a much higher proportion of the general population amounting to 14% was found to suffer from some form of mental disorder based on the clinical interview. A nationwide home survey on the identification of factors affecting help-seeking behavior for psychiatric reasons was carried out in a sample of 3754 adults in Greece [17]. Of the total of 570 respondents who reported that they had a serious psychiatric problem, only 40.8% reported that they had sought help from a physician or a psychiatrist, and only 47.6% of this population had visited a psychiatrist. In the year 2000, 21 years after the opening of the first Community Mental Health Centre (CMHC) in greater Athens (and Greece), another CMHC, which belongs to the University of Athens, was established. The CMHC is staffed by a multiprofessional team. It should be noted that mental health care is provided free of charge at the point of access [18].

The aim of this study was to investigate the pathways of help-seeking in the community residents who visited the center during the first four years of its operation, the duration of their untreated psychopathology as well as possible sociodemographic and clinical factors affecting help- seeking behavior.

Research questions:

- Were there any differences in the sociodemographic characteristics between those who had sought help from other health and mental health services before reaching the center (group A) and those who visited the center as a mental health service for the first time in their lives (group B)?
- Was there any difference in the duration of untreated mental disorders between groups A and B?
- Were there any differences in the diagnostic profiles regarding the duration of the untreated psychopathology between the two groups?

16.2 Materials and Methods

The sociodemographic and clinical characteristics of all consecutive individuals who visited the Zografou CMHC (n = 1008) during a four-year period were analyzed. Out of the total population of 1008, 255 were excluded from the analysis because they had come to the center for reasons other than seeking psychological counseling or psychiatric treatment (e.g., to ask for a certificate). The final proportion in our analysis was 753 individuals divided according to their pathways to the CMHC, firstly, into those 355 individuals who had sought help from other health or mental health non-sectorized services during the previous 12 months prior to their visit to the center (group A) and, secondly, into those 398 individuals who had no previous contact with any psychiatric service before their visit to the center—this means that the center has been the first mental health service they visited in their life (first-timers, group B). The ethics committee at the University of Athens approved the study protocol and all participants had given their written informed consent. Data collection guaranteed anonymity and confidentiality.

16.2.1 Measures

Data were collected from the Psychosocial and Medical Record kept for each client visiting the CMHC. The period of untreated mental disorder for each individual was defined as the time (in months) between the onset of psychopathological symptoms and the time when the suffering individuals first contacted a mental health service or professional. The untreated period for each individual was recorded for each client on a routine basis through the personal psychiatric interview and especially in the section on psychological symptoms onset and the time the individual had sought help for the first time. The main source of referral to the CMHC was also recorded for group A individuals. The two groups were compared with regard to the average age (in years) of the illness onset, as well as the average duration (in months) of the "period of untreated mental disorders." Additionally, comparisons of gender, marital status, educational level, occupation, current employment status, mode of living, duration of untreated mental disorder, and current diagnosis were made between the two groups A and B in categorical forms. The current diagnosis by a CMHC psychiatrist by the duration of untreated disorder of groups A and B was analyzed.

16.2.2 Data Analysis

Student's t-test was employed to examine whether significant differences existed between numerical values. Chi-square tests were used to compare the two groups on several categorical variables. Independent variables were selected for entry into multivariable linear regression analysis on the basis of their predictive power on the period of untreated mental disorder (dependent variable). The statistical analysis was performed by the use of the Statistical Package for Social Sciences version 23.0.

16.3 Results

The mean age of our participants in groups A and B was 40.82 (SD = 14.79) and 40.99 (SD = 17.992), respectively. Table 16.1 provides the sociodemographic characteristics of the study population in groups A and B. In four out of six variables (sex, educational level, occupation, and current employment status), statistically significant differences were noticed. In both groups, there was a statistically significant difference between males and females ($p = 0.034$). In group A, the population consisted of 115 males (32.4%) and 239 females (67.3%), and in group B there were 99 males (46.4%) and 299 females (55.3%). A statistically significant higher proportion of individuals were college / university graduates in Group B (first-timers) compared to group A. There were more pensioners and housewives in group A than in group B (first-timers). The first-timers (group B) were more full-time employed, while in group A individuals had no employment for psychiatric reasons to a greater extent than individuals of group B. No difference was noticed between the two groups as far as marital status and mode of living are concerned.

The comparison of the average duration of untreated mental disorders (in months) among groups A and B has shown differences at statistically significant levels for females ($p = 0.005$), but there are no differences at statistically significant levels for males (Table 16.2). The average duration (in months) of untreated disorder for females was found to be 18.11 (SD = 27.293) and 22.21 (SD = 29.440) among groups A and B, respectively, while for males the average duration of untreated disorder was 19.85 (SD = 23.113) and 26.26 (SD = 41.158) among groups A and B, respectively.

With regard to the mode of referral, the majority (28.8%) of our participants were referred to the CMHC from other public health services (e.g., General Hospital). This was the main source of referral to the CMHC for both groups A

Table 16.1 Sociodemographic characteristics of participants in groups A and B (N = 753)

	Sociodemographic characteristics	Group A		Group B		
		N	%	N	%	P
Sex	Male	115	32.4	99	46.4	0.034
	Female	239	67.3	299	55.3	
	Total	355	35.2	398	39.5	
Marital status	Single	169	47.6	182	45.7	0.227
	Married	121	34.0	161	40.4	
	Divorced/widowed	65	18.4	59	14.8	
	Total	355	100.0	398	100.0	
Live with	Parental family and with relatives	120	33.8	119	29.9	0.535
	Own family	157	44.2	186	46.7	
	Lives alone	78	22.0	93	23.4	
	Total	355	100.0	398	100.0	
Education	Elementary	75	21.2	89	22.4	0.022
	High school	143	40.2	125	31.4	
	College/university graduates	137	38.6	184	46.2	
	Total	355	100.0	398	100.0	
Occupation	Professionals	70	19.7	94	23.6	0.021
	Medium/small business owners/clerks	94	25.5	105	26.4	
	Skilled workers					
	Pensioners and housekeepers	145	40.8	125	31.4	
	Students	46	13.0	74	18.6	
	Total	355	100.0	398	100.0	
Employment	Full time	108	30.4	160	40.2	0.0001
	Part time	36	10.1	50	12.5	
	None	146	41.2	181	45.5	
	None/for psychiatric reasons	65	18.3	7	1.8	
	Total	355	100.0	398	100.0	

Table 16.2 Average duration (in months) of untreated mental disorder among groups A and B and gender

	Males		Females	
	Group A	Group B	Group A	Group B
N	107	94	229	287
$\bar{x}$	19.85	26.26	18.11	22.21
SD	23.113	41.158	27.293	29.440
R	119	239	155	239
p	0.328		0.005	

and B (N = 753). A high proportion (22.3%) of the sample of this study was referred by family members, neighbors, friends, and relatives. 17.1% of individuals visited the CMHC, without being referred by anyone.

The current diagnostic categories of groups A and B are presented in Table 16.3. There is a statistically significant difference as far as diagnosis among groups A and B is concerned. The striking difference is that only eight individuals (2%) of group B (first-timers) were diagnosed as suffering from schizophrenia contrasting to the 61 (17.4%) counterparts of group A. Individuals in our study diagnosed with psychosis seemed to have sought help first from other mental health services and then visited a CMHC. There is also a significant difference between the individuals (19.6%) in group B and the individuals (3.1%) in group A with “relationship problems.” People who face problems resulting from their interper-

Table 16.3 Diagnosis of groups A and B by a CMHC psychiatrist

	Group A			Group B
	N	%	N	%
Organic mental disorders	17	4.8	24	6.1
Schizophrenia and delusional disorder	61	17.4	8	2.0
Affective disorders	160	45.6	159	40.6
Neurotic stress-related and somatoform disorders and personality disorder	93	26.5	115	29.3
Relationship problems	11	3.1	77	19.6
Mental and behavioral disorders due to psychoactive substance use	9	2.6	9	2.3
Total	351	100.0	392	100.0
			df = 5	$p < 0.0001$

A. Individuals who had previously asked for help before visiting the CMHC
B. Individuals first time in their lives help seekers from the CMHC

Table 16.4 Multivariable linear regression

	Dependent variable duration of untreated mental disorder				
Independent variables	B	Std. Error	Beta	*t*	Sig.
Gender	−2.027	11.239	−0.030	−0.784	0.434
Age	0.078	2.588	0.043	0.796	0.426
Country of origin	0.551	0.098	0.025	0.655	0.513
Marital status	−2.236	0.841	−0.055	−1.070	0.285
Live with	0.138	1.602	0.003	0.086	0.931
Education	−0.923	1.631	−0.024	−0.566	0.572
Occupation	−0.288	1.427	−0.010	−0.202	0.840
Current employment status	1.013	1.416	0.036	0.715	0.475
Medical insurance	5.584	5.867	0.037	0.952	0.342
Current diagnosis by a CMHC psychiatrist	5.106	1.055	0.192	4.840	0.000

sonal or professional relationships often choose to have first contact with a CMHC.

The multivariable linear regression results with the dependent variable "duration of untreated mental disorder" are given in Table 16.4. Several independent variables (gender, age, country of origin, marital status, mode of living, education, occupation, current employment status, medical insurance, and current diagnosis by a CMHC psychiatrist) have entered the analysis. Only one variable (diagnosis) was statistically significantly associated with the "duration of untreated mental disorder."

Table 16.5 presents the current diagnosis by the duration of untreated mental disorder among groups A and B. In group A, 15.4% of individuals diagnosed as suffering from schizophrenia sought help from the first mental health services they visited during the first month after the appearance of the symptoms, 34.3% in a time interval ranging from 7 to 12 months, and 18% of individuals suffering from schizophrenia sought help in a time greater than 12 months. The greater percentage of individuals of the same diagnostic category of group B had visited the CMHC during the first month after the appearance of the symptoms, maybe because of the sudden change from some stable premorbid mode of experiencing and behaving that can be discerned from the social network.

Table 16.5 Current diagnosis by a CMHC psychiatrist by the time period of untreated disorder in groups A and B (N = 753)

		Group A[a]		Group B[b]		Chi-square test	df	*P*
		N	%	N	%			
1 month	Organic mental disorders	2	3.8	1	2.4	5.914	5	0.315
	Schizophrenia and delusional disorder	8	15.4	5	12.2			
	Affective disorders	26	50.0	16	39.0			
	Neurotic stress-related and somatoform disorders and personality disorder	14	26.9	12	29.3			
	Relationship problems	1	1.9	6	14.6			
	Mental and behavioral disorders due to psychoactive substance use	1	1.9	1	2.4			
2–6 months	Organic mental disorders	6	5.6	5	5.1	9.051	5	0.107
	Schizophrenia and delusional disorder	7	6.5	2	2.0			
	Affective disorders	58	54.2	48	49.0			
	Neurotic stress-related and somatoform disorders and personality disorder	29	27.1	27	27.6			
	Relationship problems	6	5.6	16	16.3			
	Mental and behavioral disorders due to psychoactive substance use	1	0.9	0	0.0			

(continued)

Table 16.5 (continued)

		Group A[a]		Group B[b]		Chi-square test	df	*P*
		N	%	N	%			
7–12 months	Organic mental disorders	4	5.7	9	10.8	34.991	5	0.000
	Schizophrenia and delusional disorder	24	34.3	1	1.2			
	Affective disorders	26	37.1	35	42.2			
	Neurotic stress–related and somatoform disorders and personality disorder	13	18.6	22	26.5			
	Relationship problems	3	4.3	14	16.9			
	Mental and behavioral disorders due to psychoactive substance use	0	0.0	2	2.4			
>12 months	Organic mental disorders	5	4.1	9	5.3	59.107	5	0.000
	Schizophrenia and delusional disorder	22	18.0	0	0.0			
	Affective disorders	50	41.0	60	35.3			
	Neurotic stress-related and somatoform disorders and personality disorder	37	30.3	54	31.8			
	Relationship problems	1	0.8	41	24.1			
	Mental and behavioral disorders due to psychoactive substance use	7	5.7	6	3.5			

[a] Missing information on four cases
[b] Missing information on six cases

In groups A and B, a higher percentage of individuals with affective disorders sought help for the first time in their lives within the period of two to six months. The percentage of individuals seeking help for affective disorders in a time interval greater than 12 months was also especially high in both groups. The individuals of the diagnostic category “Neurotic stress related & somatoform disorders & Personality disorder” of group B have visited the CMHC in time intervals ranging from 1 to 6, 6 to 12, and greater than 12 months almost in equal proportions, but most of them asked help for the first time after 12 months. Most of the individuals of the same diagnostic category of group A have visited a specialized service for the first time in their lives after 12 months.

16.4 Discussion

In this study, three research questions were explored. As far as the first research question is concerned—whether any differences have been noticed regarding the sociodemographic characteristics between groups A and B—our results suggested that a higher proportion of females were found in group A who had visited the center referred by the other health or mental health service they had first visited. The females overall in both groups have more than twice in number visited the center compared to males. Gender is one of the most significant factors in help-seeking practices [19, 20]. Gender differentiates the patterns of use of mental health services [21, 22]. Females tend to use these services at a greater frequency compared to males [23, 24] at an earlier stage of psychopathology. There are various explanations for this phenomenon, some of them relating to the need of women to express their inner feelings in contrast to men who don't want to open themselves since the rules of a male dominant society discourage the expression of emotions which is regarded as a sign of weakness for a man [19, 25]. Women are readier than men to recognize a mental health problem [26]. Gender differences in help-seeking were associated with the rearing practices of females and feminine roles [25, 27].

Other differences in the sociodemographic characteristics between the two groups were found to be related to educational level (more individuals with a university education were included among group B) and occupation as well as employment status (more pensioners and housekeepers were found to be in group A and a higher number of full-time employed participants were found in group B). With respect to some differences noticed in education, occupation, and employment between the two groups, it is necessary to emphasize that in group B there were more individuals asking help for relationship/interpersonal problems. This is not indicative of severe psychopathology which could lead to functional decline and substantial impairment and negatively affect the completion of educational courses as well as their employment status and work performance. Moreover, occupational status is substantially related to educational level [28].

The findings of this study related to the second research question as to whether there was any difference in the duration of untreated mental disorders between groups A and B highlight significant delays in receiving treatment for mental disorders and the complexity of accessibility of the mental health care system in a metropolitan catchment area. In fact, only 35.4% of the first-timers (group B) had contact with the center within 6 months after the onset of psychopathology compared with 45.3% of individuals of group A who had previously contacted mainly an emergency medical service before reaching the center. Another 43.4% of group B had visited the CMHC in a time period longer than 12 months. Among females, the mean duration was found to be 18.11 (in months) for group A and 22.21 for group B, a statistically significant difference. In group A, the intervening services referred the clients at an earlier stage. These findings underline the significance of the first contact with a medical professional or an emergency service. But even if the suffering person is visiting this kind of service, this does not necessarily lead to an early referral to a specialized and community-based psychiatric service. This finding coincides with that reported by Marino et al. [29]. This raises, firstly, the question of the implementation of sectorization in the Athens area and how the health professionals conceive it and, second, the issue of early recognition of psychopathology and decision-making on referral to a specialized mental health care service. In this study, the recent onset of psychiatric disorder was not followed by receiving early treatment although the group A patients had visited the center at a somewhat earlier stage of their psychiatric problem. Steel et al. [30] also found that health care visits made prior to first contact with public mental health sector services had a median time of 6 months taken to reach a mental health facility. Others argued the importance of the role of medical emergency services in reducing delays in psychiatric treatment [31]. The inadequate coordination between health care and mental health care system services in the

Athens area could have resulted in significant delays in early referrals to the CMHC [32].

Finally, our results regarding the third research question as to whether there were any differences in the diagnostic profiles regarding the duration of untreated psychopathology between the two groups concluded that a higher percentage of individuals suffering from schizophrenia came to the center after they had visited another health care service, mainly a non-sectorized emergency unit of a General Hospital (group A). These individuals with a psychosis spectrum of diagnosis were found to show prolonged delays in treatment and in many cases, this exceeded 7 or 12 months since the onset of illness, a finding compatible with several other studies [6–8]. Another study found that the most common barrier to reach a mental health care service for schizophrenia was the failure of the suffering individual to recognize prodromal psychotic symptoms as part of the illness' lack of insight [33]. Other investigators provided some explanation of this problem. They outlined the role of the lay support system as a source of help. Also, they underscored the role of the primary physicians as the first contact professional in the case of a serious mood disorder. People who had faced problems resulting from their interpersonal or professional relationships seemed to have a first contact with a CMHC in order to seek counseling and treatment. However, the majority (24.1%) of them also reported prolonged delays in treatment, 12 months and over after the onset of their interpersonal difficulties [13–15].

In group A, more than half of those with a diagnosis of mood disorder have been earlier referred to the center (between 1 and 6 months). But a significant proportion of 47.5% of the same group have visited the CMHC, 7 months and over after the onset of the symptoms of the illness. The same patterns were found in individuals suffering from emotional problems in group B. These findings are also compatible with those reported by others [34, 35]. However, no special patterns on the pathways of help-seeking were noticed among the people with an anxiety disorder in both groups. They have sought help from the CMHC in almost equal proportion at every time interval. It may be that the severity of diagnosis may influence the pathways of help-seeking being linked with prolonged duration in treatment. It is noted that, according to multivariable regression analysis, the variable of diagnosis was the only one that exhibited a statistically significant association with the duration of untreated mental disorders, a finding which coincides with other research findings [31].

The early recognition of a mental health problem and the early referral of the suffering person to the mental health care service are a result of cognitive functions or attitudinal positions and views on the stigma and effectiveness of psychiatry. Community mental health intervention could influence public attitudes and promote early recognition and referrals. In Athens, previous systematic sensitization work to promote awareness of mental health issues carried out in two neighboring boroughs provided evidence of changes in attitudes toward mental illness [20].

16.4.1 Limitations of the Research

The results cannot be generalized to other populations and other social settings unreservedly. The study sample has specific middle to lower middle-class socio-economic characteristics and the results cannot be generalized to populations from disadvantaged socio-economic areas. In addition, our study could be supplemented by a survey to identify whether public medical sector professionals are able to recognize psychopathological symptoms and whether they are aware of the need for referral to a specialized service.

16.5 Conclusion

This study aimed to explore the pathways to a CMHC serving a catchment area of greater Athens, the duration of untreated mental disorders, and the underlying factors. The fact that the majority of clients of both groups had prolonged delays in appropriate treatment underscores the significance of a coordinated referral network for early intervention of individuals suffering from severe mental illness. Our research has several implications for the implementation of sectorized community mental health care and underlines the need for liaison activities and community mental health prevention. Specialists nonpsychiatrists have a crucial role in the early recognition of a mental disorder and referral to a specialized service. Coordination and collaboration between primary care physicians or general health services (especially emergency units) and the local community mental health center should be fostered on a routine basis. Public awareness and psychoeducation on the acknowledgment of the seriousness of prodromal psychopathological symptoms and the related information on the existence of suitable services for an early recognition, referral, and treatment of the suffering individual should be a priority for any community-based mental health care service.

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Cultural Adaptation and Validation of the Spiritual Coping Strategies Scale (SCSS) for Greece

17

E. Missouridou, P. Mangoulia, V. Pavlou, K. Kasidi,
S. Parissopoulos, P. Apostolara, E. Roditi,
V. Sakellaridi, I. Koutelekos, G. Fasoi,
and E. Fradelos

Abstract

Introduction: Spirituality constitutes a central element of all health and social care professions. The Spiritual Coping Strategies Scale (SCSS) measures both spiritual and religious coping strategies

Aim: The aim of this study was to provide evidence for the reliability and validity of SCSS for Greece.

Methods: A total of 301 nurses were selected by convenience sampling and required to complete the SCSS and the FACIT-Spiritual Well-Being Scale-12 non-illness scale. Forward-translations and back-translations were conducted by two bilingual translators (English-Greek) grown up in English-speaking countries (USA, Australia) while cross-cultural adaptation followed strictly the recent WHO guidelines. The reliability and validity of the scale were evaluated by correlation analysis, t-test, and exploratory factor analysis.

Results: Convergent validity was investigated in comparison to FACIT-Sp-12. Meaning, peace, faith, and total spirituality were positively correlated to SCSS as expected (r = 0.22 for Meaning, r = 0.34 for Peace, r = 0.70 for Faith, and r = 0.66 for Total Spirituality), implying sufficient convergent validity. The Cronbach's α coefficients of the two subscales were 0.91 and 0.78, respectively. Additionally, the Pearson correlation r for both spiritual and religious strategies showed strong correlations between the two measurements ($p < 0.001$), first administration and three weeks after.

Conclusion: SCSS has good reliability and validity among nurses in Greece.

Keywords

Spiritual Coping Strategies Scale · Spirituality · Nursing · Compassion Satisfaction · Emotional work

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Nursing is an art: and if it is to be made an art, it requires an exclusive devotion as hard as preparation, as any painter's or sculptor's work, for what is the having to do with dead canvas or dead marble, compared with having to do with the living body, the temple of God's spirit? It is one of the Fine Arts. I had almost said, the finest of Fine Arts. – Florence Nightingale

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E. Missouridou (✉) · V. Pavlou · S. Parissopoulos · P. Apostolara · V. Sakellaridi · I. Koutelekos · G. Fasoi
Department of Nursing, Faculty of Health and Caring Professions, University of West Attica,
Aigaleo, Greece
e-mail: emis@uniwa.gr

P. Mangoulia · E. Roditi
Kapodistrian University of Athens, Athens, Greece

K. Kasidi
Psychiatric Hospital of Attica, Athens, Greece

E. Fradelos
Department of Nursing, University of Thessaly,
Volos, Greece

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17.1 Introduction

There has been an increase in studies on resilience and spirituality, especially since the coronavirus disease 2019 (COVID-19) pandemic [11, 12]. Spirituality and a connection to God/higher power might give hope in times of crisis and promote emotional wellness and greater life satisfaction. According to the Greek ancient philosopher Plato, man is composed of the psyche, the spirit, and the body [8]. The Greek word "psyche" is derived from the verb ψύχω which means breathe or blow (Liddell & Scott Greek-English Lexicon). Similarly, spirituality comes from the Latin word "spiritus" which means breath and refers to both respiration and wind. Beyond the body/psyche bipartition and the psyche-spirit-body tripartition, the words psyche and spirit are used interchangeably in the Old and New Testament to denote the constituent part of a human being that is invisible but constitutes the organizing element of the person. Psyche is the charioteer reigning in the body and destined to attain andreia (manliness), arête (excellence), and, finally, eudaimonia (full human flourishing) encompassing Beauty, Courage, Justice, Goodness, everlasting Truth, and Absolute Knowledge [19].

Spirituality is a broader term than religiosity [2, 18]. According to Baldacchino and Draper [2], spirituality goes beyond religious affiliation, which strives for inspiration, reverence, awe, meaning, and purpose for both believers and non-believers. It includes personal values, attitudes, rituals, perspectives, and also religious practices. On the contrary, religiosity includes organized systems of faith or religions [2, 18]. Although 84% of the world's population is religiously affiliated and 68% of unaffiliated individuals believe in a higher power spirituality appears to be ignored by academic psychiatry [16]. Koenig [7], in a systematic literature review, reported no significant relationships and/or negative correlations between religiosity and mental health. In the era of secularization, resistance to the inclusion of spirituality/religiosity in health care research is related to the argument that it constitutes a private and personal issue, which could be replaced by psychology [14].

Baldacchino and Buhagiar [1] created a Spiritual Coping Strategies Scale. It includes 20 questions answered on a 4-point Likert-type scale, ranging from 0 (never used) to 3 (often used). The questions aim to measure the frequency of religious and non-religious coping strategies using two subscales. The religious coping strategies include 9 items and the non-religious coping strategies include 11 questions. It has been translated and validated in multiple languages including English (original), Maltese (by the authors of the original scale), Spanish [6], Farsi in Iran [17], Arabic in Saudi Arabia for nursing students [3] and patients undergoing hemodialysis [3], and Filipino [4, 5].

According to Baldacchino and Buhagiar [1], two theories sustain the development of the SCS Scale, that is, the Cognitive Theory of Stress and Coping [9] and the Idea of the Holy, known as the *Numinous* experience [13]. Both theories suggest that various spiritual coping strategies (SCS) may be used to manage life crises, grief, and loss. If the individual endorses a religious belief system, these strategies may also incorporate religious coping strategies (RCS). The possible outcome of these strategies may be stress relief, spiritual well-being, and a harmonious interconnectedness between self, others, nature, and the Ultimate Other, facilitating the process of finding meaning and purpose in life [2]. Apart from being helpful to individuals in the landscape of illness, spirituality could help in the long-term journey of resolving feelings of grief and loss in nurses, who come across pain, loss, disability, chronic illness, and failure to achieve relief as part of their job [10–12].

In Western Europe, a median of 53% of people are "neither religious nor spiritual," but this is not the reality existent in Greece, where the majority say they are both religious and spiritual [15]. Although Greece is a secular state, and its constitution appears to support the separation between the church and the state, the Christian Orthodox religion is dominant in Greece. More people in Greece say religion is at least somewhat important to them (80%) than those in any other European country [15]. In this article, we describe the validation process of the SCSS for the Greek population, intending to make the understanding and intervention in spiritual coping more accessible in this specific cultural reality.

17.2 Methods

Participants
Questionnaires were distributed to ten registered and assistant nurses who worked full time in three rotating shifts at a public hospital in the greater metropolitan area of Athens, Greece.

Procedure and Ethical Considerations
The Ethical Committee of the University of West Attica approved the study protocol. Additionally, the study was conducted after review and written approval by the Administration and Scientific Society of the hospitals. Two of the researchers informed the head nurses of two units about the purpose of the study and then the head nurses informed the nursing staff. Furthermore, all participants were informed of their rights to refuse or to discontinue their participation, according to the ethical standards of the Helsinki Declaration of 1983. Participation in the study was contingent on individual signed consent. Two of the researchers (VP and EF) distributed questionnaires to nursing care providers (registered and assistant). Data were collected between May 2020 and March 2021.

Process of Translation and Adaptation of the Instrument
According to the guidelines of the WHO (WHO.int) on the achievement of different language versions of an original questionnaire that are conceptually equivalent in each of the target countries/cultures, the translation process should focus on cross-cultural and conceptual and not on linguistic/literal equivalence. Overall, the instrument should be equally natural and acceptable and should practically perform in the same way as the original one (WHO.int). To achieve this goal, we applied forward-translations and back-translations and followed strictly the WHO guidelines for cross-cultural adaptation.

Two bilingual translators (English-Greek) grown up in English-speaking countries (the USA, Australia) translated the original English version of the SCSS. One of the translators was a Native American citizen living permanently in Greece and the other was a second-generation Greek with an Australian and Greek citizenship. Both had a thorough command of the language of the original version of the instrument and were also familiar with the English-speaking culture of the original English version of the SCSS. The translators, both teachers in secondary education, were advised to aim at the conceptual equivalent of a word or phrase, not a word-for-word translation, i.e., not a literal translation, and strive to be simple, clear, and concise in formulating a question.

Then, a bilingual (in English and Greek) five-member expert panel was convened by the first author in order to identify and resolve inadequate expressions/concepts of the forward translation. Four members of the panel held a PhD and one member was a PhD candidate but also held a degree in nursing and social anthropology which was regarded as an important qualification for a panel focusing on the cultural adaptation of an instrument. All panel members were Greek but two of them had studied in the UK. All the panel members had a good command of the English language. Four panel members had been involved in the process of cultural adaptation before and all of them had numerous publications in English. All discrepancies were discussed and resolved in the first expert panel meeting round which lasted two and a half hours.

The SCSS was then translated back into English by the two independent translators. Their translation was compared to the original version of the SCSS in the second panel meeting round (two hours duration). All discrepancies were evaluated thoroughly and consensus was reached for all members of the panel. The research team then proceeded with the pretesting of the instrument to ensure its comprehensibility at an early stage. In other words, terms, words, and expressions which are not understandable or clear for participants may be identified and discussed by the expert panel.

Functional Assessment of Chronic Illness Therapy Spiritual Well-Being Scale 12

The Functional Assessment of Chronic Illness Therapy-Spiritual Well-Being Scale-12 non-illness (FACIT-Sp-12) was used to assess nurses' spirituality over the last seven-day period. This 12-item scale is used to measure three dimensions of spirituality ("meaning", "peace", and "faith") and provides a total score. Responses are given on a 4-point Likert scale ranging from 0, which corresponds to 'not at all', to 4, which corresponds to 'very much'. Higher scores in the total scale and in the three domains indicate higher spirituality. The Cronbach-α coefficient of the Greek version of FACITsp-12 was 0.77 for the total questionnaire, 0.70 for the "meaning" subscale, 0.73 for the "peace", and 0.87 for the "faith" subscale [19].

Statistics

In order to assess the construct validity of the SCSS, we performed exploratory factor analysis (EFA) and investigated its convergent validity. An exploratory factor analysis was employed to test the two-factor structure of the SCSS. Specifically, we conducted the principal component analysis with eigenvalues above 1.00. Additionally, the item convergent validity of the SCSS was evaluated by examining the correlations between the total score of each subscale and its item scores. Convergent validity was investigated in comparison to FACIT-Sp-12.

The reliability of SCSS-Greek was evaluated by assessing the instrument's internal consistency. Internal consistency was assessed with Cronbach's α coefficient. In addition, the version of Cronbach's α 'if item deleted', was calculated for each item. The Cronbach's α values were characterized as follows: 0.00–0.25, negligible; 0.26–0.49, low; 0.50–0.69, moderate; 0.70–0.89, high; and 0.90–1.00, excellent.

The following categories of Pearson's r values were used for interpretation: 0.00–0.19, very weak correlation; 0.20–0.39, weak correlation; 0.40–0.69, moderate correlation; 0.70–0.89, strong correlation; and 0.90–1.00, very strong correlation.

17.3 Results

Demographic and Work-Related Characteristics

The modal age group was 40 old and almost 22% were male (see Table 17.1). Sixty-one percent were registered nurses and held a degree in nursing. Fifty-four percent of the participants had a postgraduate education (see Table 17.1).

Construct Validity of SCSS

Regarding EFA, the model tested was equivalent to the original factorial structure of the SCSS as proposed by the authors. As suggested in Table 17.2, this model presented a reasonably

Table 17.1 Demographic and professional characteristics of the sample (N = 301)

		N	%
Sex	Male	66	21.9
	Female	235	78.1
	Single	106	35.2
Marital status	Married	170	56.5
	Widowed	5	1.7
	Divorced/separated	20	6.6
Job position	Assistant nurse	117	38.9
	Registered nurse	184	61.1
	Secondary education	117	38.9
Educational level	University education	130	43.2
	Postgraduate education	54	17.9

Table 17.2 Results of exploratory factor analysis (EFA) on the 20-item SCSS for the Greek sample (N = 301)

	Components extracted			
Items	1	2	3	4
Item 15	**0.81**	−0.29	0.00	−0.09
Item 19	**0.79**	−0.27	0.01	−0.08
Item 2	**0.75**	−0.15	−0.29	−0.24
Item 18	**0.74**	−0.23	−0.26	−0.31
Item 1	**0.72**	−0.27	−0.21	−0.32
Item 6	**0.68**	−0.33	0.05	−0.11
Item 10	**0.66**	−0.37	0.19	0.22
Item 8	**0.64**	−0.45	0.28	0.26
Item 17	**0.50**	0.27	−0.24 (0.60)[a]	0.25
Item 4	**0.49**	−0.33	0.26	0.43
Item 13	0.30	**0.60**	0.06	−0.13
Item 20	0.41	**0.60**	0.07	−0.28
Item 12	0.33	**0.58**	−0.24	0.07
Item 7	0.29	**0.58**	−0.28	0.23
Item 3	0.36	**0.55**	0.16	−0.08
Item 11	0.39	**0.53**	−0.05	0.01
Item 9	0.38	**0.41**	−0.19	0.34
Item 14	0.37	0.46 (0.83)[a]	**0.59**	−0.13
Item 5	0.48	0.38 (0.70)[a]	**0.49**	0.02
Item 16	0.40	0.02	−0.22 (0.54)[a]	**0.51**

[a] Rotated component matrix results

good fit to the data. Exploratory factor analysis (EFA) was conducted to correlate the 20 variables of SCSS. Four factors were extracted (method: principal component analysis) with eigenvalues above 1.00, but the first two factors explained 31% and 18% of the variance, respectively, and factors 3 and 4 explained only 6% of the variance. Scree plot output (Fig. 17.1) also indicates that the data have basically two main factors. The first factor is religious coping strategies, and the second factor is non-religious coping strategies. Overall, SCSS-Greek confirmed the two-dimensional structure of SCSS. As depicted, the factor loadings ranged from 0.50 to 0.81 (item 9 loading is 0.41 and item 4 loading is 0.49), meaning that all items were good measures of their respective factors. Items 14 and 5 are loading in factor 2 in the rotated component matrix. Only, items 16 and 17 don't load at the right factor 2.

Convergent validity was investigated in comparison to FACIT-Sp-12, which consists of 12 items assessing three dimensions of Spirituality (Meaning, Peace, Faith), provides a total score, and constitutes a suitable measure to evaluate the convergent validity of SCSS. Meaning, Peace, Faith, and total Spirituality were positively correlated to SCSS as expected (r = 0.22 for Meaning, r = 0.34 for Peace, r = 0.70 for Faith, and r = 0.66 for Total Spirituality), implying sufficient convergent validity (Table 17.3). The correlation of SCSS with Faith and Total Spirituality is strong.

Internal Consistency of SCSS

As regards the internal consistency assessment of the two dimensions of SCSS-Greek, Cronbach's α coefficients for each item of religious coping strategies and non-religious coping strategies point to mostly high internal consistency. The overall Cronbach's α for religious coping strategies was 0.91, ranging from 0.89 to 0.81 with individual items deleted, and for non-religious coping strategies was 0.78, ranging from 0.75 to 0.80 with individual items deleted (Table 17.4).

Test-Retest Reliability

Thirty participants completed the SCSS three weeks after the first administration. No significant differences existed between the two measurements, indicating the stability and reliability of the scale (Table 17.5). Additionally, the Pearson correlation r for both spiritual and religious strategies showed strong correlations between the two measurements ($p < 0.001$).

17.4 Discussion

This study comprises the first published data on the validation of the culturally adapted version of SCSS-Greek. According to the findings, the SCSS-Greek demonstrated reasonable psychometric properties and is a valid tool for the assessment of spiritual coping strategies of health care professionals. The WHO guidelines were followed strictly in order to accomplish the challenging task of linguistic and cultural adaptation of the English version of the instrument into Greek and detailed information on this challenging process was provided. Participants, who agreed to participate in the pretest study, verified

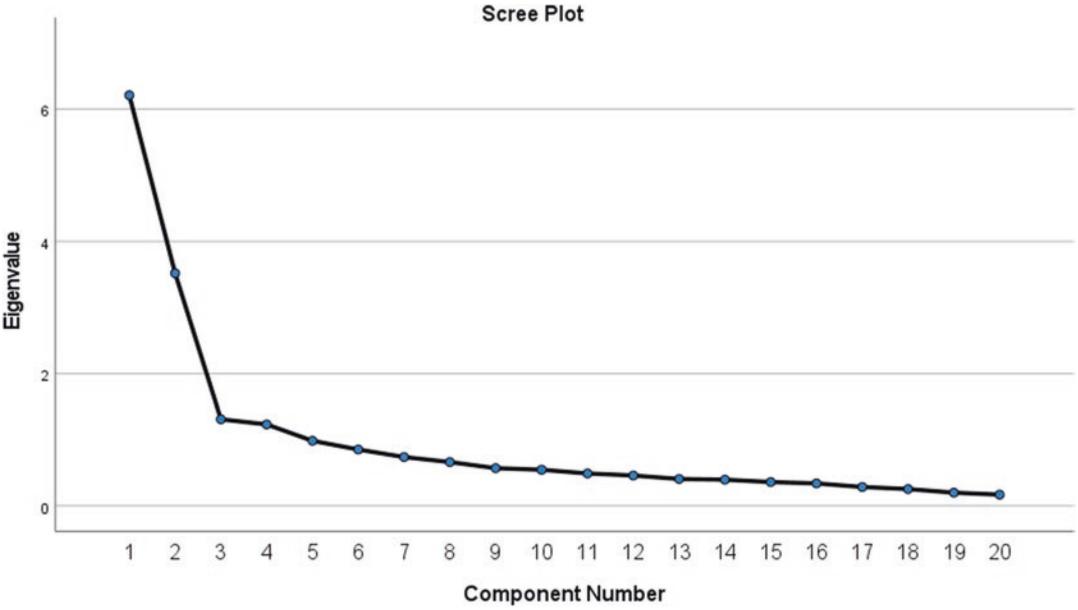

Fig. 17.1 Scree plot output on the 20-item SCSS for the Greek sample (N = 301)

Table 17.3 Convergent validity of the SCSS-Greek

	SCSS *r*	*P* value
Meaning	0.22	<0.001
Peace	0.34	<0.001
Faith	0.70	<0.001
Total spirituality	0.66	<0.001

the readability, comprehensibility, and suitability of the instrument. Our exploratory factor analysis confirmed the two-factor structure of the original questionnaire and is in line with other similar research supporting the two-dimensionality of SCSS. Our results are encouraging in terms of the item convergent validity and the reliability of the scale because all the items were related to the total subscale score and Cronbach's α values were considerably high. Additionally, the Pearson correlation r for spiritual and religious coping strategies showed strong correlations between test–retest measurements. Overall, the findings of this study are indicative of the reliability and validity of SCSS which is available to Greek researchers to compare results with those of other

Table 17.4 Item analysis of the religious coping strategies and non-religious coping strategies of SCSS-Greek

Religious coping strategies	Corrected item-total correlation	Cronbach's Alpha if item deleted
Item 1	0.72	0.90
Item 2	0.69	0.90
Item 4	0.50	0.91
Item 6	0.69	0.90
Item 8	0.67	0.90
Item 10	0.68	0.90
Item 15	0.80	0.89
Item 18	0.71	0.90
Item 19	0.77	0.89
Non-religious coping strategies		
Item 3	0.48	0.76
Item 5	0.51	0.75
Item 7	0.44	0.76
Item 9	0.52	0.75
Item 11	0.54	0.75
Item 12	0.53	0.75
Item 13	0.38	0.77
Item 14	0.21	0.80
Item 16	0.45	0.76
Item 17	0.58	0.74
Item 20	0.48	0.76

Table 17.5 Test retest reliability of SCSS-Greek

	Test (A) Mean St. Dev.	Retest (B) Mean St. Dev.	Pearson's r $^{***}p < 0.001$	Paired t-test (t) $^{*}p > 0.05$
Spiritual coping strategies	25.25 (4.50)	25.33 (4.37)	0.957***	−1000*
Religious coping strategies	10.92 (7.46)	11.03 (7.35)	0.909***	−1800*

countries in which a culturally adapted version of the instrument is available.

Overall, the results of the present study reveal outcomes similar to those of other research [3–6]. These results are indicative of the ability of the instrument to detect spiritual and religious coping strategies among participants. The implications of relevant future research are important in relation to health care management and the support and continuous education of frontline health care workers. In times of an international health care systems crisis due to COVID-19, health care providers should be adequately prepared to face the dynamics of fear and grief generated in the midst of this pandemic. Such preparation may be a valuable tool in promoting collaborative therapeutic encounters and the building of compassionate communities while, at the same time, may help professionals to get satisfaction from spiritual care.

Despite the promising findings of the present study, several limitations should be taken into account. The present study was limited by the lack of a wider variety of professionals. Participants were mainly women, which limits considerably the generalizability of our findings due to the possibility of different coping strategies among men and women. Nonetheless, the proportion of male and female nurses in our sample matches other international and national samples [3–6]. Furthermore, we used a convenience sample of institutions and nurses which may not adequately represent the population by employing a nonprobability sampling method.

Indeed, compassion fatigue constitutes a serious threat to the career of health and social care professionals and may result in a reduced ability to provide spiritual care for patients [10]. Especially in the context of the COVID-19 pandemic, health care workers on the front line who are directly involved in the diagnosis, treatment, and care of patients with COVID-19 are experiencing grief, loss, and psychological distress [11, 12]. The combination of witnessing physical suffering and death along with the immediate threat to one's own safety can induce anxiety, fear, grief, and emotional distancing. Standing by the suffering patient in the context of COVID-19 and facing pain, fear, stigma, and human misery requires moral courage in dealing with internal and external barriers to care and persistence in building resilience to emotional situations. The recent pandemic makes more than ever necessary the assessment of frontline workers' spiritual coping strategies.

The implications of relevant future research are important in relation to health care management and the support and continuous education of frontline health care workers. In times of an international health care systems crisis due to COVID-19, health care providers should be adequately prepared to face the dynamics of fear and grief generated in the midst of this pandemic. Such preparation may be a valuable tool in promoting collaborative therapeutic encounters and the building of compassionate communities while, at the same time, may help professionals to employ spiritual coping strategies and to find meaning in adversity in the landscape of grief and loss.

17.5 Conclusion

This study comprises the first published data on the validation of the culturally adapted version of SCSS-Greek. According to the findings, the SCSS-Greek demonstrated reasonable psychometric properties and is a valid tool for the assessment of the spiritual coping strategies of health care professionals. Our confirmatory factor analysis confirmed the two-factor structure of the original questionnaire. Our results are encouraging in terms of the item convergent validity and the reliability of the scale because all the items were related to the total subscale score and Cronbach's α values were considerably high. Additionally, the Pearson correlation r for spiritual and religious coping strategies showed strong correlations between test–retest measurements. Overall, the findings of this study are indicative of the reliability and validity of SCSS which is available to Greek researchers to compare results to those of other countries in which a culturally adapted version of the instrument is available. In all, it can be concluded that the SCSS-Greek shows psychometric sufficiency in its culturally adapted Greek version and can be useful for the assessment of spiritual coping strategies.FundingOur project was funded by the University of West Attica.

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18

The Validation of the COmprehensive Score for Financial Toxicity (COST) Scale in Greek Language

Evangelos C. Fradelos, Paraskevi Maria Prapa,
Konstantinos Tsaras, Dimitrios Papagiannis,
Maria Chatzi, Ioanna V. Papathanasiou,
Bob Guillen, Maria Saridi, and Kyriakos Souliotis

Abstract

The aim of this study was to investigate the psychometric properties of the Greek version of FACIT-COST, as well as to assess the levels of financial distress of patients suffering from lung cancer in relation to their quality of life and lung cancer symptom burden. This was a cross-sectional quantitative study. A self-assessment instrument was used to gather the data. The study involved 120 lung cancer patients who were treated using chemotherapy in a day clinic of a General Hospital in Athens. Data were collected with the COST-FACIT-v2 (used to assess the patients' financial toxicity), The 12-item Health Survey (SF-12), and functional Assessment of Cancer Therapy—Lung Symptom Index Questionnaire—7 items—version 4 (FACIT—FACT-LCS). Descriptive statistics as well as exploratory factor analysis performed all the statistical analyses, which were conducted using IBM SPSS Statistics 25 and had *p*-values with a significance level of 0.05. The majority of the participants were male (68.3%), married or cohabitated (81.3%), and had been diagnosed with microcell cancer (90%). The factor analysis resulted in one factor that interpreted 35% of the total variance. FACT-L ($r = 0.365$, $p < 0.001$), physical component SF-12 ($r = 0.184$, $p = 0.045$), and mental health component SF-12 ($r = 0.268$, $p = 0.003$) were positively correlated to FACIT-OST, as expected. The Greek validated COST-FACIT-v2 is a reliable tool in providing rapid assessment of cancer patients' level of financial distress.

Keywords

COST · Financial toxicity · Financial distress · Cancer patients

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E. C. Fradelos (✉) · K. Tsaras · D. Papagiannis · I. V. Papathanasiou · M. Saridi
Department of Nursing, University of Thessaly, Larissa, Greece

P. M. Prapa
Sotiria Chest Diseases Hospital of Athens, Athens, Greece

M. Chatzi
Department of Infections, University Hospital of Larissa, Larissa, Greece

B. Guillen
FACIT Organization, Ponte Vedra, FL, USA

K. Souliotis
Department of Social and Education Policy, University of Peloponnese, Corinth, Greece

Health Policy Institute, Athens, Greece

P. Vlamos (ed.), *GeNeDis 2022*, Advances in Experimental Medicine and Biology 1425,
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18.1 Introduction

Cancer is climbing the ladder to become the leading cause of death across the globe [1] and ranks as an important barrier to increasing life expectancy in every country of the world [2]. Additionally, its overall incidence is increasing due to the control of communicable diseases, an increase in life expectancy, population explosion, and the adoption of lifestyles known to increase cancer risk [1]. According to estimations by the World Health Organization (WHO) in 2019, cancer is the first or second leading cause of death in people younger than 70 years of age in 70 out of 183 countries, and the third or fourth cause of death in 23 more countries [2].

Ferlay et al. (2021) estimated that there were 19.3 million new cancer cases and 10.0 million cancer deaths in 2020 worldwide. There is about a 20% risk of getting cancer in a lifetime (before the age of 75), and a 10% risk of dying from cancer; one in five persons will get cancer during their lifetime and one out of 10 will die from it. Female breast cancer has now become the most commonly diagnosed cancer worldwide (with 2.26 million new cases estimated in 2020) followed closely by lung cancer. The most common cause of cancer death remains by far lung cancer, followed by liver and stomach cancer [3].

Cancer significantly worsens the physical, mental, and social functioning of the affected patients and affects patients' quality of life (QoL) negatively [4]. Moreover, cancer imposes a substantial economic burden on society, health and social care systems, patients, and their families [5]. Various studies have reported different cancer cost estimates depending on the cancer site, types of data, study population, study period, and study methodology [6]. Moreover, since cancer is a heterogeneous condition, the economic burden is expected to depend on multiple factors such as cancer site, patient's age and sex, or insurance coverage arrangements in place in each context [7].

In the United States, cancer patients are expected to pay approximately four times more ($16.346) than non-cancer ones [6]. Recent studies in European Union countries estimated €55.3 billion (approximately 44% of total costs) for the economic burden of lung, breast, colorectal, and prostate cancers. In Spain specifically, the total economic burden of cancer was calculated at €9016 million. These costs are likely to increase, as more people require treatments, which become increasingly expensive [8]. Those rising costs of cancer care have been associated with higher out-of-pocket expenses, medical debt, and even bankruptcy [7], and recognition of financial hardship among cancer survivors is growing [9].

It has been shown that survivors of cancer are more likely to report higher out-of-pocket medical costs, work-related productivity loss, depletion of assets, and medical debt (including bankruptcy) than those without a cancer history. Furthermore, the adverse financial impact of cancer is often shared by family caregivers, with 25% of caregivers reporting high levels of financial strain from decreasing financial assets, increasing out-of-pocket costs, and productivity loss in their jobs [10]. Survivors may be vulnerable to material financial hardship (henceforth financial stress), which appears particularly common in survivors with low income or financial stress before diagnosis and has been associated with poor psychological well-being [9], poor quality of life among cancer survivors [9, 11], changes in receiving medical care, or even declaring bankruptcy [12], and it may reduce cancer survival [13].

Even though researchers have developed and tested a plethora of measures on the physical and emotional burden of cancer patients and their caregivers, there's a scarcity of knowledge on existing measures meant to estimate the financial burden of cancer. For instance, according to Lee and Cagle (2021), based on a review of the literature, there are no systematic reviews exploring measures of financial burden, financial stress, or financial strain, and no studies comparing whether available measures are well-validated and appropriate for families coping with serious or life-threatening illness [14]. It has also been suggested that identifying at-risk patient groups earlier in their cancer journey allows care providers to intervene and optimize patient outcomes [15].

18.2 Objectives

The aim of this study was to investigate the psychometric properties of the Greek version of FACIT-COST as well as to assess the levels of financial distress of patients suffering from lung cancer in relation to their quality of life and lung cancer symptom burden.

18.3 Methods

A cross-sectional quantitative analysis was conducted. The information was gathered using a self-assessment tool.

18.3.1 Study Sample

One-hundred twenty lung cancer patients who were receiving chemotherapy in an Athens general hospital day clinic participated in the trial. The following were the inclusion requirements: (a) Greek speakers, (b) individuals who are at least 18 years old, (c) patients diagnosed with lung cancer of any kind (d) receiving chemotherapy or another form of treatment, as well as (e) satisfying levels of cooperation and (f) capacity. Data were gathered between February and March of 2021.

18.3.2 Instruments

The COST-FACIT-v2 is used to evaluate the financial toxicity of patients. On a five-point scale, 0 meant "not at all," 1 meant "a little bit," 2 meant "somewhat," 3 meant "quite a bit," and 4 meant "very much." A lower score indicated greater financial toxicity. The financial toxicity score was computed by adding up the 11 items (items 2, 3, 4, 5, 8, 9, and 10 were reverse-scored), multiplying by 11, and dividing by the number of items answered [16].

18.3.3 The 12-Item Health Survey (SF-12)

For use in large-scale studies, the 12-item Health Survey (SF-12) was created as a quicker alternative to the SF-36, especially where total physical and mental health, rather than the conventional eight-scale profile, are the outcomes of interest. The physical and mental component summary scores (PCS-12 and MCS-12) are computed using all 12 items. The reliability and validity of this survey, which has been translated into Greek, were determined using a sample of 1007 people in the greater Athens area [17].

Functional Assessment of Cancer Therapy—Lung Symptom Index Questionnaire—7 items—version 4 (FACIT—FACT-LCS).

The Lung Cancer Symptom Index (LCS) consists of seven questions about the symptoms that lung cancer patients most frequently experience, particularly in the advanced stages: dyspnea, thinking, loss of appetite, weight loss, chest tightness, and coughing. The choices were "not at all," "a little bit," "somewhat," "quite a bit," or "very much." The subscale's final score, which reflected less symptom burden and improved quality of life, increased with each patient's score, from lowest to highest [18].

18.3.4 Content and Face Validation

The translated Greek version was provided by the FACIT Measurement System. To assess the items' applicability to the scale and cultural context, ten Greek lung cancer patients were invited to participate in a convenience sample in a 1-day clinical setting. On a four-point scale, each item was assessed (1 = not relevant, 2 = slightly relevant, 3 = relevant, and 4 = very relevant). By asking the patients to comment on the item's appropriateness, interpretability, and time required to complete the scale, the face validity of the scale was assessed.

18.4 Statistical Analyses

SPSS 25.0 (IBM Corporation, Armonk, NY, USA) was used to calculate descriptive statistics, variance analyses, first-order correlations, and regression. Qualitative data were reported as absolute and relative frequencies, whereas quantitative variables were provided as means (±SD). The factorial structure of FACIT-COST was investigated using exploratory factor analysis. In order to determine the correlation between continuous variables, we also ran Pearson's correlation coefficient. p-Values with a significance level of 0.05 were used in all statistical analyses, which were performed using IBM SPSS Statistics 25.

18.5 Results

The majority of the participants were male (68.3%), married or cohabitated (81.3%), and had been diagnosed with microcell cancer (90%). In regard to the FACIT-COST mean, it was found to be 18.8. This value is below 22, which is the median of the theoretical range; thus, we can say that Greek cancer patients are experiencing financial distress. The mean score in both mental and physical scale of SF-12 is below 50, and we can say that Greek cancer patients are experiencing low QoL levels. Finally, in regard to the Lung Symptom Index Questionnaire, the mean score was 19.7, and this value states that patients are experiencing burden from lung cancer symptoms (Table 18.1).

18.6 Construct Validity of the Greek Version of FACIT-COST

Factor Analysis was applied to explore construct validity of the questionnaire. In particular, exploratory factor analysis was applied, which shows if the correlation between items can be explained by a smaller number of factors. To extract the factors, principal components analysis with axes rotation with Varimax rotation method was applied. All items had significant loadings and could be included in the factors respectively (Table 18.2). High value of KMO index (KMO = 0.747) and the statistical significance of Bartlett's Test of Sphericity ($\chi 2(55) = 402.864$, $p < 0.001$) suggest that there is a sampling adequacy, and by applying factor analysis, will give satisfactory results. The factor analysis resulted in one factor with Eigenvalue >1 (Kaiser criterion) that interpreted 35% of the total variance.

18.7 Convergent Validity

Convergent validity was investigated in comparison to SF-12 and FACT-Lung Symptom Index, suitable measures to evaluate the convergent validity of FACIT-COST. FACT-L ($r = 0.365$, $p < 0.001$), physical component SF-12 ($r = 0.184$, $p = 0.045$), and mental health component SF-12 ($r = 0.268$, $p = 0.003$) were positively correlated to FACIT-COST, as expected (Table 18.3).

18.8 Reliability of FACIT-COST

The reliability of FACIT-COST questionnaire was tested for the characteristics of stability and internal consistency. In order to examine the reliability of the FACIT-COST, the test-retest method was used. From the total of 120 patients, 25 of them completed the questionnaire for a second time (retest) after a 3 weeks period, a period of time sufficient to ensure that there is no remembrance of previous answers. For the statistical control in the repeatability of measurements between test and retest, the Pearson's correlation coefficient was estimated, and paired t-test for the difference between the two administrations of the questionnaire. None statistically significant difference was observed, and there was a strong correlation between the two measurements. For testing the internal consistency of the FACIT-COST, Cronbach's alpha coefficient was used. Internal reliability coefficient for the total score of the FACIT-COST 12 questionnaire was 0.817, which showed that the scale has very good internal consistency.

Table 18.1 Demographic characteristics

		n (%)
Gender	Male	82 (68.3)
	Female	38 (31.7)
Age: mean ± SD		64.1 ± 9
Marital status	Married/cohabitation	98 (81.3)
	Unmarried/divorced/widowed	22 (18.7)
Educational status	Mandatory/secondary	84 (70)
	Higher education	36 (30)
Working	Yes	57 (47.6)
	No	63 (52.4)
Area of residence	Urban	98 (82)
	Semi-urban	13 (11)
	Rural	9 (7)
Type of cancer	Micro	12 (10)
	Non-micro	108 (90)
Duration in months: mean ± SD		1.14 ± 0.9
Type of therapy	Chemotherapy	51 (42.6)
	Combination	44 (36.4)
	Anoso	25 (21)
Comorbidities	No	63 (52.5)
	Yes	57 (47.5)
Laboratory values	Ht	40.3 ± 28.2
	Hb	16.8 ± 12.3
	WBC	6558 ± 2534
Financial distress	FACIT-COST	18.8 ± 8.9
	FACIT-LCS	19.7 ± 4.2
Performance status	0	53 (43.8)
	1	55 (46)
	2	12 (10)
Quality of life: mean ± SD	Physical health	39.3 ± 9.5
	Mental health	42.11 ± 10.3

Table 18.2 Construct validity and internal consistency measures

	Factor loading	Uniqueness
cost1	0.315	0.901
cost2	0.339	0.885
cost3	0.772	0.405
cost4	0.441	0.806
cost5	0.546	0.701
cost6	0.614	0.623
cost7	0.669	0.553
cost8	0.681	0.536
cost9	0.446	0.801
cost10	0.589	0.654
cost11	0.480	0.769
Variance explained 33.2%	Cronbach $a = 0.817$	

KMO = 0.747, Bartlett's test = X^2 (55) 402.864, $p < 0.001$

18.9 Discussion

The aim of our study was to assess the validity and reliability of the Greek version of The Functional Assessment of Chronic Illness Therapy-COST Questionnaire.

An exploratory factor analysis was carried out and resulted, as expected, in one factor solution. Assessment of Cronbach's a coefficient produced adequate results supporting the internal consistency of the FACIT-COST. Additionally, convergent was demonstrated in comparison to SF-12 and FACT-L. Furthermore, administration of the instrument after a 3-week period provided evidence of high test-retest reliability. Overall, this study provided evidence for the psychometric properties and the one factor structure of the

Table 18.3 Convergent validity of FACIT-COST

Variable		FACT-L	Physical component SF-12	Mental health component SF-12
FACIT-COST	Pearson's *r*	0.365	0.184	0.268
	p-value	<0.001	0.045	0.003

instrument and is in line with other similar research [16, 19, 20].

According to our results, the total score of FACIT-COST was found to be 18.8. This mean value is suggesting that Greek lung cancer patients are experiencing financial distress. This result is inline with other studies [19, 20], indicating that financial distress is indeed a major additional problem that cancer patients face. According to the annual cancer report [21], there is an increased annual out-of-pocket money cost, especially among cancer patients aged 65 years and older, and it is even higher for patients diagnosed with later-stage disease, indicating that the patient economic burden associated with cancer care is substantial in the United States not only at a national but also at a patient level. Furthermore, a study contacted among 251 lung cancer in Canada resulted in higher score in Cost scale than our study. Yet, the score of cost indicated that Canadian lung cancer patients were also experiencing financial distress. The authors also highlighted that financial burden should be routinely assessed, and appropriate resources for support should be offered [22].

In this study, it was observed that there was a positive correlation of FACIT-COST, FACT-L, and physical and mental health components of SF-12, meaning that financial well-being is associated with good HRQoL. This outcome is consistent with research on lung cancer patients as well as cancer patients in general. In a cross-sectional study in China, in which 227 lung cancer patients participated, it was observed that costs exceeding total annual household income and perceived financial difficulty are associated with poorer HRQOL in lung cancer patients. In addition, that study highlighted that those subjective indicators of financial burden have a stronger effect on quality of life than objective indicators [23]. Moreover, a large-scale observational study (contacted in North Carolina where 1000 cancer survivors participated) found that high financial burden was associated with lower household income, younger age, and poorer quality of life [24]. Thus, we can assume that financial burden is prevalent among cancer survivors and is related to patients' health-related quality of life. Policymakers and healthcare professionals should focus on interventions and policies that improve patient education and engagement in regard to financial burden.

This study is not without limitations. The small sample size and the cross-sectional study design are mentioned. Among the strengths of the study are: the novelty of the subject especially in Greek healthcare settings, and the fact that a viable and trustworthy instrument that can be used with the Greek population was produced by this study.

18.10 Conclusions

The Greek validated FACIT-COST v2 is a reliable tool in providing rapid assessment of cancer patients' level of financial distress. Its good reliability and validity suggest comparability of findings from other countries and cultural backgrounds.

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19

The Impact of Changes in Mental Health Legislation on Psychiatry Trainee Stress in Victoria, Australia

Rhoda Lai, Kevin Teoh and Christos Plakiotis

Abstract

In Victoria, Australia, the introduction of a new state Mental Health Act (MHA) in 2014 resulted in changes to the workload and type of work undertaken by trainee psychiatrists. In addition to long working hours, workload intensity is most often cited by trainees as a factor that leads to fatigue, with trainees often taking work home or doing overtime in order to fulfill work responsibilities and satisfy training requirements. This administrative burden is compounded by the high emotional burden associated with the practice of psychiatry, including patient suicides, aggression, and threats. This study aimed to explore the impact of these legislative changes on psychiatry trainees' stress and well-being, using a qualitative research methodology involving semi-structured interviews. Despite reporting that the length and number of reports they were preparing under the new MHA had increased, as had the amount of time spent at Tribunal hearings, psychiatry trainees were understanding of the necessity of MHA changes in improving patient rights. The trainees did not express a desire for the MHA changes to be reversed, but rather recognition by their workplaces that changes are also needed at a ground level—such as an increase in staff numbers—to accommodate for these. While mental health legislative changes are designed to improve the system and better protect patient rights, measures must also be taken to ensure that any policy-level changes are adequately adjusted for in hospital staffing levels.

Keywords

Psychiatry trainees · Well-being · Workplace stress · Administrative burden · Mental health legislation

19.1 Introduction

Fatigue is a common experience among trainee doctors who are navigating the difficulties of balancing work and study demands [8, 16]. Trainee

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R. Lai
Monash Ageing Research Centre (MONARC), Monash University, Melbourne, VIC, Australia

K. Teoh
Department of Organizational Psychology, University of London, Birkbeck, UK

C. Plakiotis (✉)
Monash Ageing Research Centre (MONARC), Monash University, Melbourne, VIC, Australia

Aged Persons Mental Health Service, Monash Health, Melbourne, VIC, Australia

Department of Psychiatry, School of Clinical Sciences at Monash Health, Monash University, Melbourne, VIC, Australia
e-mail: Chris.Plakiotis@monash.edu

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doctors in Australia work an average of 47.3 h per week, far beyond the 38 h that the Australian Medical Association considers full time [3, 21]. In addition to long working hours, workload intensity is most often cited by trainees as a factor that leads to fatigue, with trainees often taking work home or doing overtime in order to fulfill work responsibilities and satisfy training requirements, as well as meet perceived expectations that they take up additional career and educational opportunities [2, 14, 17]. For psychiatry trainees, this workload burden is also compounded by a high emotional burden associated with the nature of their work, including patient suicides, aggression, and threats [17].

In Victoria, Australia, the introduction of a new state Mental Health Act (MHA) over the last few years has resulted in changes to the workload and type of work that trainees undertake. These changes were introduced in 2014, but research on how they have affected the well-being of psychiatry trainees is limited. The new Victorian MHA has discernible benefits for patients, being designed to better protect their rights [18]. This has come at the cost, however, of clinicians being required to write longer, more detailed reports on their patients and attend more frequent Mental Health Tribunal (MHT) hearings. It can be expected that this has increased trainees' workloads. As mentioned earlier, this is problematic as workload intensity leads to trainee fatigue and overtime work, regardless of rules and regulations around working hours [14].

The aim of this study was to explore how these legislative changes have been affecting psychiatry trainees' stress and well-being. A qualitative research method was chosen in order to uncover themes and issues that arose for trainees organically, as there was little prior research on trainees' experiences of these changes to base outcomes on.

19.2 Methods

19.2.1 Participants and Procedures

This study was conducted at a large metropolitan health service in Victoria, Australia. All psychiatry trainees at the health service were invited to participate through group email advertisements and talks by the research team at meetings. They expressed interest in participating by contacting a research assistant who did not have a direct relationship to their training or clinical work.

Participants were asked questions regarding the new Victorian MHA within broader individual semi-structured interviews with the research assistant centered on factors contributing to their stress and well-being. See Table 19.1 for questions that were specifically related to the MHA. If participants brought up issues or comments relating to the MHA in the broader interview, these were also included in the analysis for this paper. Interviews were audio-recorded then transcribed by the research assistant, with identifying information removed before data were analyzed. This project received ethical approval from the health service's Human Research Ethics Committee.

19.2.2 Data Analysis

Template analysis was used to analyze interview transcripts using NVivo 11 software (QSR International). This method was chosen as the interview schedule was informed by both literature and the senior author's experience [9–11]. Analysis was undertaken by author CP under supervision as part of a Master degree project.

Table 19.1 Semi-structured interview guideline questions on the MHA

Mental health tribunal
Were you working in psychiatry prior to the change in the Mental Health Act (MHA) in 2014?
Has the change to a new MHA in 2014 impacted on your workload as a registrar?
Do you find the volume of work needed to prepare for Mental Health Tribunal (MHT) hearings excessive or the process of presenting at MHT hearings stressful? Is this more so than under the previous MHA (if applicable)?
Do you think there is a role for aspects of your job being redesigned (by your employer or yourself) so that you can better meet the demands of preparing patients for MHT hearings?

In the first phase of data analysis, coding of all themes that emerged in the first six transcripts was undertaken with the objective of characterizing the data in as much detail as possible. Hierarchical clustering was initially avoided in the initial template developed. Coding of the remaining 11 transcripts was then conducted before the initial template was reviewed and revised to reflect the additional insights gained through coding of all of the transcripts.

In the Results section of this chapter, we have presented all themes related to the MHA and its impact on the RANZCP Fellowship program as they appeared in the wider template. Data unrelated to the above topics have not been presented. The final template consisted of the overarching themes "sources of stress" and "sources of well-being" [13]. Data on the MHA contributed to the subtheme of "workload" (a source of stress), but within this, trainees also expressed feelings of understanding about the MHA changes. In this chapter, the two sides have been presented as their own themes.

Table 19.2 Participant demographics

Characteristic	Number (total *n* = 17)	Percentage (%)
Gender		
Male	8	47.1
Female	9	52.9
Year of psychiatry training		
Year 1	5	29.4
Year 2	2	11.8
Year 3	2	11.8
Year 4	1	5.9
Year 5	3	17.6
Year 6 or more	4	23.5
Completion of RANZCP Fellowship training hurdles[a]		
None completed	7	41.2
Some completed	8	47.0
All completed	2	11.8
Family situation		
Trainees with partner	13	76.5
Trainees without partner	4	23.5
Trainees with children	7	41.2
Trainees without children	10	58.8
Prior non-medical qualifications or employment		
Yes	7	41.2
No	10	58.8
Prior training in another specialty		
Yes	2	11.8
None (or partial specialist training)	15	88.2

[a] Including multiple choice question exam, essay style exam, objective structured clinical exam, psychotherapy written case, and scholarly project

19.3 Results

19.3.1 Participants

Seventeen psychiatry trainees were included in this study (see Table 19.2 for participant characteristics). The average age was 36 (this ranged between 25 and 57). Participants had graduated with their medical degrees between 3 and 32 years ago. Ten had experience of working under the previous (2008) Victorian MHA.

19.3.2 Impact on Workload

Whether or not they had experience working under both the current and previous MHAs, the majority of the trainees agreed that the current MHA contributed to a large amount of their workload. Specific aspects of the MHA requirements that contributed to their overall workload were report length and the frequency of MHT hearings.

> I believe there's much more frequent Mental Health Tribunals, it's much harder to keep people on the Act, the report is a lot longer as well, and it's a lot more frequent…So more frequent Tribunals, which is a lot more stressful as well—it's like going to court, pretty much, every few weeks. [Participant 12]

Trainees reported having to prepare reports for up to four MHT hearings in a week. There was a pervasive feeling that the time spent preparing reports was detracting from other aspects of their work and training.

> …there was a concern in some of the literature that the clinical act becomes a bit poorer because people are spending too much time writing reports. And at times I think that is true…But that's a fact, it really has increased our workload. Less seeing patients, less learning new psychiatry, more time spent poring over medical histories. [Participant 2]

Some expectations around the implementation of the MHA, particularly having to meet with the patient and discuss the contents of their MHT report in detail ahead of their hearing, were also brought up as being difficult to achieve. The perception was that they would be challenged about not meeting these expectations was stated to be a source of stress.

> …I have heard from colleagues in the community that there's often been trouble with getting the patient in and giving them their report or finding the patient in the community and giving it to them. I have heard of people being verbally reprimanded by the tribunal for not being able to do that. [Participant 1]

19.3.3 Positive Aspects of the MHA

Despite the implications for their workload, trainees generally emphasized that they were not antagonistic toward the requirements of the new MHA, indicating that they understood there was a good reason for this vigor in safeguarding the rights of vulnerable mental health patients. Presenting at the hearings themselves was generally not identified as a source of stress.

> It sounds really odd, but I actually don't mind the presenting, because I think it's an important part of the patient's management to have the opportunity to at least have their voice heard… [Participant 13]

Rather, they were concerned that current medical staffing levels were insufficient in efficiently meeting MHA requirements, and that this again was often at the expense of direct patient contact time. This implies that the increased workload could be, but had not been, accounted for by increasing staffing levels.

> …unfortunately there hasn't been increased staff since the new Act. They probably need more staff, like one doing more admin work, one doing more clinical work. [Participant 12]

19.4 Discussion

The changes that have recently occurred in the MHA in Victoria have had significant impacts on Victorian psychiatry trainees' levels of stress [12]. This study interviewed 17 psychiatry trainees, with a good spread of gender, age, and level of training and experience, and found that though they understood the reasons behind the changes, there is a need for the workplace to adjust to allow for the greater amount of time they are devoting to MHA-related tasks. The difficulties encountered by psychiatry trainees in Victoria in implementing the new MHA 2014 may be understood as being part of a greater problem of doctor burnout stemming from excessive administrative burden at work [1, 15].

Trainees reported that the length and number of reports they were preparing, as well as the amount of time spent at Tribunal hearings, had increased under the new MHA. It must be acknowledged that since the present research was conducted, the format of Mental Health Tribunal reports for compulsory Treatment Orders has been substantially simplified and their length significantly reduced (with word limits being specified in some areas). These changes are clearly aimed at generating reports that are better understood by patients themselves (to whom they are addressed), rather than being optimized to convey complicated information to MHT members as was previously the case. It is hoped that these changes are of benefit both to patients and to the doctors involved in report preparation. The complex and lengthy format of Electroconvulsive Treatment Reports, however, remains unchanged.

In 2011, it appeared that Australian junior doctors' (including registrars') excessive working hours had been steadily declining, a promising step in the right direction [6]. However, trainees in the current study remarked that while the new MHA had increased their workload, the level of staffing had not changed, indicating that the trend of decreasing working hours may not be continuing. Evans and Young [5] also reported that Australian psychiatrists, particularly in the public sector, attributed poor work-life balance partly to the high administrative burden of their workload. Importantly, their study data were collected from the end of 2014, when the effects of the new MHA may have been beginning to come to light [5].

However, the trainees' feelings of understanding about the necessity of the changes to the MHA were prominent in the interviews, despite the added pressures on their workloads. The trainees did not express a desire for the MHA changes to be reversed, but rather recognition by their workplaces that changes are also needed at a ground level to accommodate for these. Several of the trainees suggested that more staff are required to cope with workload increases. Trainees have been shown to exhibit a strong sense of responsibility toward their patients and colleagues, choosing to work longer hours in order to avoid burdening others with extra work and make sure their patients are handed over and cared for properly [14]. With this in mind, it is important to continually monitor trainees' workload levels to mitigate their risk of stress and burnout [8].

The concerns raised in this paper regarding the impact of mental health legislative reform on the welfare of medical staff involved in its subsequent implementation are not unique, nor are they new, although they are, perhaps, infrequently acknowledged. Jabbar et al. [7] undertook a national survey of the psychiatrist workforce in Ireland (all 735 individuals with the MRCPsych qualification on the Irish College of Psychiatrists' membership list), to ascertain their responses to the implementation of the Mental Health Act 2001. Of the 317 respondents (representing 43% of the total sample to whom questionnaires were sent), 45 (14.2%) were senior registrars and 64 (20.2%) were registrars. Greater workloads were reported by 69.1% of respondents; less time with consumers by 26.8%; and more legalistic and conflictual relationships with consumers by 40.7%. Close to one-third (27.4%) of respondents considered implementation of the Mental Health Act to be unfeasible. The adversarial nature of mental health tribunals, disruption of routine clinical activities, and negative impact on therapeutic relationships were among the areas emphasized in the feedback received [4].

More recently, the following key reforms to the Mental Health Act in the United Kingdom were proposed in a Government White Paper [23]:

Mental Health Tribunal—Decreased time intervals between hearings;
Statutory Care and Treatment Plans and Advance Choice Documents—Newly required under the Act;
Second Opinion Appointed Doctors—Earlier involvement in patient management;
Nominated Person—Introduction of this new role;
Independent Mental Health Advocates—Expansion of existing role;
Community Treatment Orders—Increased evidence needed to justify their use.

While broadly welcoming these proposed reforms, which promise to update mental health law, address racial inequalities, and bolster mental health crisis management, The Royal College of Psychiatrists [22] raised concerns that they will significantly impact on psychiatrists' workload and work practices. An independent assessment of the workforce implications of this proposed reform by the College's Strategy Unit pointed to a significant increase in the number of psychiatrists needed for reform delivery in the proposed year of implementation (an additional 333 Full-Time Equivalent psychiatrists by 2023/24, at a cost of £40 m per year) and 10 years later (a further 161 Full-Time Equivalent psychiatrists by 2033/34, at a cost of £60 m per year at current prices). Informed by this analysis, the College concluded that the existing workforce cannot absorb these Mental Health Act changes and made the following recommendations to the UK government:

- A cumulative investment of £82 m (at current prices) in the psychiatric workforce by 2024/25 at the 2021 Spending Review
- Compulsory reporting of current and future workforce projections every two years by the Secretary of State for Health and Social Care via an amendment to the Health and Care Bill
- Enabling key NHS commitments to be delivered and increased mental health service demands to be met via a long-term workforce plan

A key limitation of the present study was that trainees were recruited from one health service in Victoria, limiting the generalizability of these findings to trainees in the rest of the state and country. However, this study highlights how policy-level changes can have real impacts on everyday stress levels of those working in the industry. The lessons provided by this study are now even more pertinent as we look upon the dawn of a new era in mental health legislation and service provision in Victoria. The Royal Commission into Victoria's Mental Health System [20] recommended that the Mental Health Act 2014 be repealed by the Victorian Government and a new Mental Health and Wellbeing Act enacted to better promote good mental health and well-being, reset relevant legislative foundations, support the delivery of more responsive services, establish new positions and service structures recommended by the Royal Commission, and place people with lived experience of mental illness, their families and carers at the center of service design and delivery. A new Mental Health and Wellbeing Bill was thus introduced by the Victorian Government to the Victorian Parliament in June 2022 [19]. While the changes ushered in by each revision or replacement of mental health legislation are designed to improve the system and better protect patient rights, measures must also be taken to ensure that any policy-level changes are adequately adjusted for in hospital staffing levels so as to mitigate the administrative burden entailed in implementing these changes.

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20

Mindfulness and Academic Performance of College and University Students: A Systematic Review

Ioanna Tzelepi, Flora Bacopoulou,
George P. Chrousos, Lida Sotiropoulou,
Dimitrios Vlachakis, and Christina Darviri

Abstract

Higher education's expectations place demands on students' attainment, leading them to experience stress and anxiety, which negatively affect their academic improvement and life satisfaction. The aim of this systematic review was to investigate (a) if mindfulness as an inner ability is related to academic attainment, through dependent variables, including compassion, engagement, stress or anxiety state, depression, self-efficacy, mindfulness's facets (non-reactivity, acting with awareness) and (b) if mindfulness-based interventions positively affect the academic performance of college and university students. The systematic review was conducted in accordance with the PRISMA statement. PubMed, Web of Science, and Cochrane Library Wiley were screened to identify studies published relevant to the topic. In total, 568 papers were retrieved in the initial search. Five papers met the eligibility criteria and were included in the systematic review: a randomized controlled trial, a non-randomized controlled trial, a quasi-experimental study, a quantitative exploratory pilot study, and a longitudinal randomized controlled study. Most interventional studies revealed a non-significant direct effect of practicing mindfulness technique on academic attainment. Further research, especially randomized controlled trials are necessary to clarify the effect of mindfulness on academic performance of college and university students.

Keywords

Mindfulness · Mindfulness-based interventions · Academic performance · College students · University students · Higher education · Grade point average (GPA) · Academic grades · Academic settings · FMMQ · MAAS

I. Tzelepi · L. Sotiropoulou · C. Darviri
School of Medicine, National and Kapodistrian University of Athens, Athens, Greece
e-mail: cdarviri@med.uoa.gr

F. Bacopoulou (✉)
Center for Adolescent Medicine and UNESCO Chair in Adolescent Health Care, First Department of Pediatrics, School of Medicine, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece
e-mail: fbacopoulou@med.uoa.gr

G. P. Chrousos
University Research Institute of Maternal and Child Health & Precision Medicine, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece

D. Vlachakis
Laboratory of Genetics, Department of Biotechnology, School of Applied Biology and Biotechnology, Agricultural University of Athens, Athens, Greece
e-mail: dimvl@aua.gr

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20.1 Introduction

Perceived educational environment influences students' outcome, such as academic performance, behaviors, well-being, and socio-emotional adjustment [1]. Higher educational expectations place demands on students' attainment, leading them to experience anxiety and stress, which negatively influence their well-being and academic success [2]. First year students are likely to be vulnerable, as they enter university at a demanding age, attempting to search and find their financial and social footing with a need for reorganization of their own lives [3]. Negative perceptions in regard to academic workload may have an unfavorable impact on students in health education programs due to Dundee Ready Education Environment Measure (DREEM) [4]. Nevertheless, a certain increment in the prediction of academic performance is supplied by the consciousness quotient [5].

One possible way to address this phenomenon is mindfulness, which is a contemplative practice that traces its origins back to eastern Philosophy, particularly Buddhism and the Noble Eightfold Path [6, 7]. In addition, it is a broad concept that can be defined as the ability to purposefully regulate all the attention and concentration on a specific target without focusing on a particular detail, yet remaining accepting this experience [8], such as the sensation of breathing, or one's present moment thoughts or emotions, while maintaining a non-judgmental attitude and awareness [9, 10]. All in all, mindfulness is linked to non-judgmental and intentional awareness of moment-to-moment experience and nurtures insight, concentration, and physiologic relaxation [11].

Numerous surveys have been already conducted to estimate the effectiveness of mindfulness on anxiety symptoms, perceived stress, resilience to stress, perceived educational environment of university or college students. In a randomized controlled trial, graduate students, who participated in a brief mindfulness practice in a classroom, self-reported decreased anxiety and stress based on heart rate and systolic blood pressure [12]. Moreover, in another randomized controlled trial, through an audio-guided mindfulness meditation program on medical students, for 30 days, perceived stress was significantly decreased from T1 to T3 (F [2,142] = 3.98, $p < .05$) and general well-being was significantly increased from T1 to T2 for the intervention group and the increase was sustained through T3 (F [2,144] = 3.36, $p < .05$) [13]. Furthermore, in a pragmatic randomized controlled trial, after the completion of eight weekly sessions of the mindfulness course, mindful participants reported fewer problems affecting their studier as well as university experiences than supported as usual participants. Particularly, the effect of the mindfulness in participants, who had examinations or assessments during the examination period (n = 267) was on average 0·19 CORE–OM (Clinical Outcomes in Routine Evaluation Outcome Measure) score points better than the case of those with no known assessments (p = .043) [14]. In a longitudinal study on 231 medical students, greater satisfaction with the perceived learning environment was associated with higher mindfulness scores based on students' mindfulness aptitude. Acting with awareness was the most powerful predictor of mindfulness and accepting without judgment was a significant inverse predictor of perceived educational environment due to DREEM–C scores [15].

Research has demonstrated that perceived learning environment by university or college students is a crucial factor in students' academic performance in regard of learning approaches [16] and well-being. Few interventional studies have been conducted to specifically investigate how mindfulness technique is beneficial for the academic performance of university or college students. Therefore, the aim of the present systematic review was to investigate if practicing mindfulness technique affects the academic attainment of college and university students.

20.2 Methods

20.2.1 Data Sources

The PubMed, Cochrane Library Wiley, Web of Science databases were screened to identify studies published relevant studies to the topic. Search terms used were the following: ("mindfulness" OR "mindfulness-based intervention*") AND ("academic performance" OR "academic score" OR "academic achievement" OR "academic success" AND "academic attainment" OR "academic record") OR ("college students" OR "university students").

20.2.2 Study Selection

Inclusion criteria were as follows: (a) studies that included solely adult participants, (b) studies' participants had to be college or university students, (c) studies that implemented not solely mindfulness, but also mindfulness-based programs, (d) studies with subjects not taking any psychotropic medication, studies had to use validated instruments for the evaluation on mindfulness effect, (f) studies regardless of their intervention's duration g) studies had to collect GPA or grades of given, programmed test/task, during the intervention.

Exclusion criteria were the following: (a) self-reported questionnaires or interviews of academic performance's evaluation instead of collecting grade point average, (b) very small sample.

Any relevant study indexed in the PubMed, Cochrane Library Wiley, and Web of Science electronic databases were initially selected and searched until September 10, 2022. All authors participated in the study selection process. Both the trial evaluation and process of data extraction were carried out by the first author and cross-checked by the second one. Any disagreement was resolved through discussion or with the help of the third author. Data were extracted from each study and summarized in text and table format, and then were used to create a descriptive synthesis of the findings.

20.3 Results

The systematic review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. The initial search retrieved 568 papers. Fifty-four duplicates were removed and identified abstracts were stored, using EndNote reference management software (Fig. 20.1).

Five papers met the eligibility criteria and were included in the systematic review: a randomized controlled trial, a non-randomized controlled trial, a quasi-experimental study, a quantitative exploratory pilot study, and a longitudinal randomized controlled study. The characteristics of the included studies are presented in Table 20.1.

Most of the interventional studies showed that mindfulness doesn't affect academic attainment permanently and strictly directly [17–21].

The trial of Sampl et al. analyzed the effects of a 10-week mindfulness-based self-leadership training (MBSLT) (once a week for 2 h) on mindfulness, academic achievement, academic self-efficacy, test anxiety, self-leadership and strain. The MBSLT revealed greater academic performance. More specifically, in the intervention group individuals (mean age = 20.90, $SD = 2.40$) had average study semester $M = 2.67$ ($SD = 1.49$) and participants of the control group (mean age = 22.83, $SD = 3.65$) had average study semester $M = 4.34$ ($SD = 2.63$). After the intervention, participants of the control group took $M = 3.80$ ($SD = 2.00$) on the exams, compared to students in the intervention group who took $M = 4.49$ ($SD = 1.52$) on the exams. After conducting t-tests and a mixed ANOVA test, the intervention group had better grades than the control group [$t(70.942) = -2.85$, $p = .006$, $d = .63$] [17].

On the contrary, the quantitative exploratory pilot study of Prado et al. over the course of a semester reported contradictive results. Positive changes in the relationship between mindfulness and academic improvement were found in a group of 93 students from the first semester, based on the scores' FFMQ test and MAAS test; however, there was no significant positive

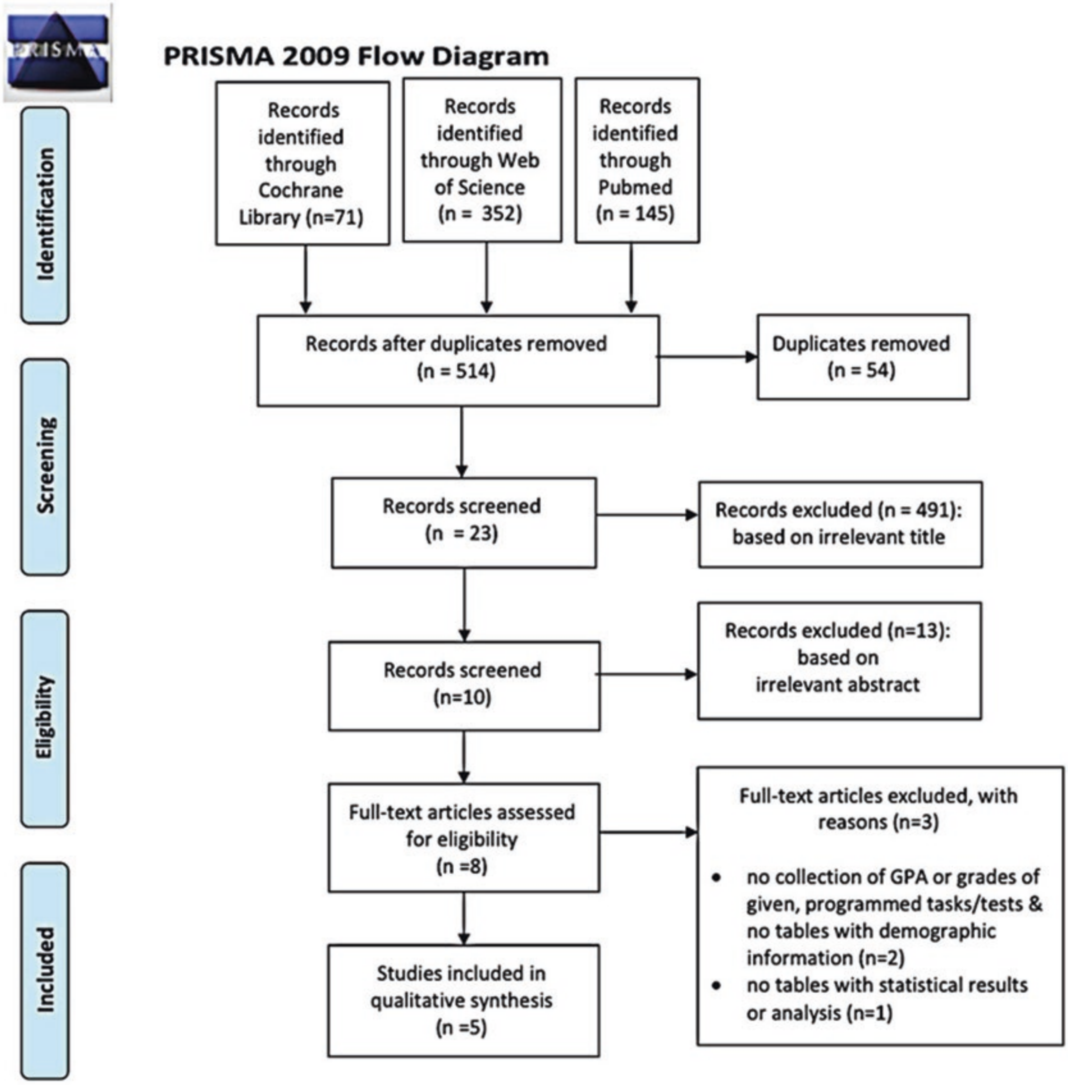

Fig. 20.1 Flowchart of study selection

improvement. Moreover, a group of 40 participants from the second semester revealed a higher percentage of negative academic changes. Lastly, significant associations of FFMQ and MAAS with academic performance were not found in each group [18].

The intervention of Lampe et Müller-Hilke applied the mindfulness-based stress reduction, developed by Kabat-Zinn, to examine the academic achievement of 143 medical students. They dedicated 6 two-hour courses to the intervention group (41 students). After the end of the intervention, the intervention group showed significantly higher scores in the anatomy 2 test than the control cohort as indicated by a p-value of .0014. These results lasted for at least six months beyond completion of the intervention, because beneficial effects were of short term and no longer traceable at follow-up assessments, when the physiology and biochemistry tests took place. Positive effects on academic attainment were temporary and only detectable at the period of completion of the intervention [19].

Table 20.1 Summary of extracted data

First author (year)	Type	Country	Participants	Scientific domain	Measurement tools	Main findings
Bellinger et al. (2015)	Quasi experimental	Unknown	112 Undergraduate students	Psychology Department	MAAS[*1], TMS-T[*2], STAI[*3], 24 problems of modular arithmetic, post-experiment questionnaires	No significant direct effect on academic performance, but only significant indirect effect through the mediator, state anxiety
Sampl et al. (2017)	Longitudinal randomized controlled trial	Austria	109 Bachelor students	University of Innsbruck	MAAS[*1], PSQ-20[*4], PAF[*5], GPA[*6]	Better academic grades
Prado et al. (2018)	Quantitative exploratory pilot study	Ecuador	133 University students from first and second semester	Polytechnic University, Faculty of Social Sciences and Humanitie in Ecuador (ESPOL)	MAAS[*1], FFMQ[*7], academic averages	No significant influence on academic performance
Firth et al. (2019)	Randomized controlled trial	Norway	92 Undergraduate students	Norwegian university college	MAAS[*1], PANAS[*8], PSS[*9], SWLS[*10], GSES[*11], VAS[*12], TENS/EMS[*13] machine, Cognitive Psychology academic examination	No significant direct impact on academic attainment
Lamp et al. (2021)	Non-randomized controlled trial	German	143 Medical students	Rostock University Medical Center	MAAS[*1], PSS[*9]-10, results from biology, chemistry, anatomy, physiology, biochemistry	Short-term significant academic improvement, traceable after the completion of the intervention

[*1] Mindful Attention Awareness Scale
[*2] Toronto Mindfulness Scale-Trait
[*3] State-Trait Anxiety Inventory
[*4] Self-Leadership Questionnaire-Deutsch
[*5] Revised Test Anxiety-German Prüfungsangstfragebogen
[*6] Grade Point Average
[*7] Five Facet Mindfulness Questionnaire
[*8] Positive and Negative Affect Schedule
[*9] Perceived Stress Scale
[*10] Satisfaction with Life Scale
[*11] Generalized Self-efficiency Scale
[*12] Visual Analogue Scale
[*13] Transcutaneous Electrical Nerve Stimulation

In addition, Bellinger et al., in a quasi-experimental study, conducted two separate studies and discovered how mindfulness and anxiety impact undergraduate students' subsequent academic performance. In the first study, participants were exposed to 15-min audio recordings of mindful breathing (*n* = 41) or progressive muscle relaxation (*n* = 38) in laboratory settings. The intervention group was tested to high-pressure situations (i.e., exams and quizzes), because the aim was to examine the mechanisms, by which mindfulness indirectly benefits tasks of math accuracy. Two main results were found. Firstly, mindfulness had indirect significant benefits on high-demand math performance (specifically accuracy) through the mediator of state anxiety (*b* = .06, 95% CI [.010, .140]). Secondly, mindfulness technique had no significant direct effect on math accuracy, showing that mindfulness did not affect exam scores of high-demand tasks independent of its influence on state anxiety (*b* = .14, *t* (107) = 1.51, *p* = .135). Lastly, the second study conducted in classroom is irrelevant, because mindfulness was considered as an endogenous trait of undergraduate engineering students [20].

Furthermore, the evidence of non-efficient mindfulness is in accordance with the study of Firth et al., which examined the indirect interplay between mindfulness and academic attainment through the role of self-efficacy as an agent of mindfulness, which may impact on academic performance and stress coping of undergraduate students (*n* = 92, mean age = 22.01, *SD* = 4.84), who were randomized into three different groups (sham/placebo; listening to music, control, mindfulness). After a 4-week intervention of 4-min mindfulness breathing followed by post-test reporting, they conducted repeated measures ANOVAs and found an insignificant (*p* = .620) difference between performance on the academic examination in the groups (*F* = 0.48). Paired sample t-tests were performed to test any differences among groups. In the short-mindfulness-based intervention, mindfulness significantly (*p* = .023) decreased self-efficacy (*t* = 2.45, *df* = 21, Cohen's *d* = .60). On the contrary, there was an increase in self-efficacy in predicting grades (*F* = 5.05, *p* = .028, *β* = 2.77, *t* = 2.25). Consequently, mindfulness did not affect academic performance since this technique could not improve self-efficacy, but significantly reduced the latter [21].

20.4 Discussion

In summarizing the evidence, one has to keep in mind that the reviewed studies were indexed in the PubMed, Cochrane Library Wiley, and Web of Science databases. Consequently, there is the possibility that studies have been missed. The different design of included studies [17–21] and the heterogeneity in statistical elaboration methods limit this study's generalizability. The observed results indicate potential associations, that should also be taken into consideration for further investigation in randomized controlled trials.

In the interventional study of Prado et al., significant associations between FFMQ, MAAS, and academic averages were not reported in each case, because in one group there was a higher percentage of students with adverse changes in their scores' tests (FFMQ, MAAS), and although there were more individuals (70%) with progress in their academic averages, 65% of students scored negative results on FFMQ-test (*β* = −.0537, *p* = .104) and MAAS-test (*β* = −.002, *p* = .612) [18]. In accordance with this, it has been reported that the relationship of scores' FFMQ to both practice and findings is inconsistent, on the grounds that the association between observing and non-judging was found to be more complex [22]. It is argued that research on mindfulness with multidimensional instruments like the FFMQ and MAAS could produce new and exciting information by focusing on patterns of scores on their scales [22, 23].

Furthermore, in the quasi-experimental study of Bellinger et al., to control for possible speed-accuracy trade-offs in participants' problem-solving performance in laboratory, they included low-demand or high-demand problem reaction times as covariates in all analyses for low-demand or high-demand accuracy, respectively.

Researchers controlled gender, because it did not interact with mindfulness to predict any of the dependent measures (bs = −.004 to −.06, ps = .415–.949). Its design may be not as strong as a true experiment, but participants in one study listened to one of two 15-min audio recordings [mindful breathing (n = 41) or progressive muscle relaxation (n = 38)]. These recordings did not impact any dependent variables, including state mindfulness, ratings of pressure, state anxiety, modular arithmetic performance [20].

Moreover, in the randomized controlled trial of Sampl et al., results were limited, as effects could not be detected whether they originated from mindfulness, self-leadership, or the combination of both. On one hand, it was suggested that mindfulness might enhance the effects of self-leadership (MBSLT). However, the mechanisms on how both constructs interact and their additive effects remain only theoretical. As the most significant factor in reducing stress, test anxiety, and improving self-efficacy or grades was impossible to be determined, it was proposed for further studies to examine the holistic effects of the MBSLT compared to an isolated mindfulness and self-leadership intervention and a control group using similar outcomes [17].

Furthermore, in the same randomized controlled trial of Sampl et al., university students, who joined voluntarily, were probably specifically attracted to stress prevention and achievement-related tasks, the generalizability to the average student population may be limited. A high level of ecological validity was ensured, as students with a subjectively perceived need could take part in the training and the training was conducted during the semester in a real-world situation. The randomized design was constructed to be easily incorporated into an average student's life and prevented the possibility that bias might be introduced by differences in starting values between groups. The random allocation to either a control group or an intervention helped the scientists to compare the impact of the intervention to those of a waiting list group, which multiplied the expressiveness of findings [17].

The limitations of the study of Lampe et al. were related to its design and its transient beneficial effects on academic success. More precisely, the choice of conducting a randomized controlled trial instead of a non-randomized one may have rendered intervention and control cohorts comparable for mindfulness. In addition, this study had a small sample size (N = 41) in the intervention cohort group. Lastly, the impact of mindfulness on academic performance was dependent on age or subject specialization [19].

In the trial of Firth et al., the findings of mindfulness's effect on self-efficacy were contrary to the intervention's hypothesis and expectation [21], as it is observed that mindfulness can reduce anxiety and depression [24], concurrently, there are findings indicate that mindfulness may also arise several problematic risk factors [25–27]. Mindfulness techniques can provoke short-term improvements [28], as it was observed by the research team of Firth et al. [21]. In this study, it was found that mindfulness had a positive effect on anxiety but not on depression. The researchers hypothesized that participants who received the mindfulness intervention would have significantly lower depression scores than those who received the placebo control condition. However, they did not find any differences between groups in terms of depression scores. In fact, they found a significant increase in depressive symptoms among those who received the mindfulness intervention compared with those in the control group [21].

20.5 Conclusions

The included studies despite their limitations and inherent differences revealed that there is no significant, direct, long-term effect of mindfulness-based interventions on academic attainment.

Huppert and Johnson have stated that the impact of mindfulness mediation intervention on academic performance is worthy of investigation [29]. Despite the implications and limitations, there is a complicated relationship between endogenous mindfulness as an aptitude and academic achievement, and the effect of this technique on academic improvement needs further investigation. Specific programs of this meditation technique, such as mindfulness-based stress reduction can decrease the academic evaluation anxiety [30–32], improve college students' self-confidence [30], life satisfaction [33], and concentration [29].

Future research is needed by conducting more randomized controlled trials in university or college settings, and utilizing, apart from GPA, other indicators such as cognitive tasks, to assess students' academic attainment.

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Investigating Mobbing Syndrome's Incidence in the Working Environment of a Public and a Private Greek Hospital

21

Panagiotis Theodorou, Charitomeni Matzoula,
Psomiadi Maria-Elissavet, Platis Charalampos,
and Bellali Thalia

Abstract

To investigate the phenomenon of moral harassment (mobbing) as well as the effect of demographic and occupational characteristics of healthcare professionals working in a public provincial general hospital and a private hospital in Athens a cross-sectional survey was designed. The study was conducted from November to December 2021 through the application of the Leymann Inventory of Psychological Terror (LIPT) a widely recognized research tool for the quantitative investigation of ethical harassment in the workplace. 264 fully completed questionnaires were collected out of the 300 that were distributed in both hospitals (response rates: 92% for the public hospital and 83.3% for the private). It was observed that private hospital's employees were morally harassed to a greater extent and for a longer time than the employees of a public hospital. The levels of moral harassment were quite high, indicating the necessity of thorough audit by the management in both hospitals.

Keywords

Mobbing syndrome · Moral harassment · Workplace bullying · Health professionals · Psychosocial risks

21.1 Background

The quality of one's working environment determines his well-being among other factors. A workplace where justice, respect, freedom of expression and protection of workers' rights rule, an atmosphere of security and tranquility is automatically created. However, this is not always the case, as workplaces can be characterized by dysfunction, oppression, insults, or even bullying [29]. Moral harassment, or as it is commonly known "mobbing," has multiple manifestations as it pertains verbal psychological violence, intimidation, insults to ones' personality and dignity, and declarations of threats in repetitive patterns that consequently lead the recipient of such behaviors not only in resigning his work [27, 40, 44].

P. Theodorou
School of Social Sciences, Postgraduate Course – Health Care Management, Hellenic Open University, Patra, Greece

C. Matzoula
Limnos General Hospital – Health Center, Myrina, Greece

P. Maria-Elissavet (✉)
Directory of Operational Preparedness for Public Health Emergencies, Ministry of Health, Athens, Greece

P. Charalampos
Greek DRG Institute SA, Athens, Greece

B. Thalia
Department of Nursing, International Hellenic University, Thessaloniki, Greece

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The systematic analysis of workplace harassment began with the German psychologist and researcher in the field of occupational psychology, Heinz Leymann, in 1980 [36], who used the term mobbing to explain all those hostile behaviors that may seem spontaneous, but if frequently repeated over a period of time lead to the manifestation of a series of negative effects [12]. The effects of mobbing are depended to individuals' physical and psychological well-being [46, 54], to the employment agency that prevents him from improving his performance [25, 51, 52], but also to society in general; increased insurance expenditure for victims' physical and mental rehabilitation ([17, 23]; European Agency for Safety and Health at Work [15]) early retirement or unemployment [8, 42]. Consequences have been recorded for those witnessing such incidents as well [41] while the significant decrease in victims' quality of life has been well-documented [21, 30, 53].

This phenomenon is observed across several labor sectors with varying incidence. For the healthcare sector, several of its characteristics favor mobbing's emergence; particularly, the heavy workload and responsibilities, conflicts between roles, organizational complexity, difficulties with work-life balance deteriorated by the shortages in resources and low pay [5, 6, 33]. Mobbing's effects lie in wait in both public and private healthcare sector. System's complexity along with the certainty of permanence facilitate the long-term imposition of pressure toward the psychological and moral harassment victims within the public sector, with devastating consequences on their personalities. In the private sector, employer's position of power aggravates the pressing circumstances the employee performs under, oftentimes leading him in resignation [20].

The purpose of this study was to record the frequency of mobbing syndrome-moral harassment/psychological violence, in the employees of Lemnos Health Center-General Hospital and of a private hospital located in Athens. Also, to investigate the influence posed by the study participants' demographic characteristics.

21.2 Materials and Methods

21.2.1 Study Population

To serve the study purpose a cross-sectional study was designed, and convenience sampling was applied. The study was carried out from November to December 2021 through the application of a dedicated questionnaire in two different hospitals; General Hospital-Health Center of Lemnos, a public one, and a private located in Athens. The survey was conducted following the approval of Lemnos' General Hospital Scientific Council and the private hospital's Administrative Board. The sample consisted by the entirety of the hospitals' human resources—medical, nursing, and administrative personnel, under any working relation, without any exclusion criteria. 150 questionnaires were distributed to Lemnos' General Hospital from which 138 were completed (response rate, 92%) whereas from the 150 questionnaires distributed at the private hospital 125 (response rate, 83.3%).

21.2.2 Research Tool

The research tool, an anonymous, structured, self-completed, closed-ended questionnaire, complied fully with the standing ethical regulations, consisted of two distinct parts: one for collecting participants' demographic and occupational characteristics and another adopting the Leymann Inventory of Psychological Terror (LIPT). LIPT assesses employees' exposure to moral and psychological harassment during the 12 months prior to the study via 45 items. It is an acknowledged research tool for the quantitative investigation of workplace moral harassment developed in the early 1990s [34]. LIPT has been previously translated and weighted for the Greek population [55].

Each of its items concern a specific type of psychological violence, to which the respondent is asked to recall any acts of intimidation to which he was exposed to or witnessed [9, 34]. These items correspond to 45 harassing behaviors grouped into five categories depending to their implications: (a) attacks concerning employee's social relations within the work (e.g., criticism, indifference, verbal attacks, exclusion from communication), (b) attacks aiming in discrediting and isolating the employee, (c) assignment of uninteresting, humiliating, inferior or superior tasks, and avoidance of assignment, (d) personal attacks that include spreading gossip and rumors and may stress employee's lineage and beliefs aiming in mockery, (e) physical threats, violence, and sexual harassment. According to Leymann, those who admit exposure to at least one of these 45 behaviors, in the previous 12 months, weekly or more, and for six months or more, are defined as bullying victims [35].

21.2.3 Statistical Analysis

Descriptive statistics were applied for all variables while the Kolmogorov–Smirnov test was deployed for normality testing. χ^2-test (Chi-square test) and Mann–Whitney hypothesis testing were applied as well to investigate the relations between variables. If more than two independent variables presented with statistically significant relations at the level of 0.2 ($p < 0.2$) in the bivariate analysis, multiple logistic linear regression with backward deletion of the variables was applied as well. In this case, odds ratio, the corresponding 95% confidence intervals and p values are reported. The bilateral level of statistical significance was set at 0.05. Data analysis was conducted d out with IBM's Statistical Package for Social Sciences (SPSS) 21.0.

21.3 Results

Table 21.1 describes participants' demographics and occupational characteristics.

Data analysis resulted in several statistically significant differences between the public and the private hospital concerning mobbing's frequency. More specifically, the percentage of employees who receive contemptuous glances and/or contemptuous gestures was greater in the public hos-

Table 21.1 Sample's demographics

Characteristics	N	%
Sex		
Male	77	29.3
Female	186	70.7
Age (in years)		
20–29	26	9.9
30–39	82	31.2
40–49	82	31.2
>49	73	27.8
Marital status		
Single	92	35.0
Married	144	54.8
Divorced	25	9.5
Widowed	2	0.8
Number of children		
0	85	32.3
1	59	22.4
2	105	39.9
3	12	4.6
>3	2	0.8
Monthly income (€)		
<1000	87	33.1
1000–1500	125	47.5
>1500	51	19.4
Specialization		
Medical doctors	63	24.0
Nurses	128	48.7
Technologists/radiologists	8	3.0
Laboratory technicians	14	5.3
Administrative employees	50	19.0
Sector		
Surgical	48	18.3
Pathology	40	15.2
Outpatient/ER	43	16.3
COVID-19	12	4.6
Laboratories	32	12.2
Closed wards	40	15.2
Administration	48	18.3
Educational level		
High school graduate	87	33.1
Technological institute graduate	86	32.7
University graduate	50	19.0
MSc holder	36	13.7
PhD holder	4	1.5
Years of service		
0–4	36	13.7
5–9	35	13.3
10–14	61	23.2
15–19	30	11.4
20–24	32	12.2

(continued)

Table 21.1 (continued)

Characteristics	N	%
>24	69	26,2
Working relation		
Indefinite term	227	86.3
Fixed-term	36	13.7
Hospital		
Public	138	52.5
Private	125	47.5

pital (5.8% versus 0.8%, $p = 0.04$) as well as percentage of employees who do not address them (8% versus 1.6%, $p = 0.02$). In addition, the percentage of those who speak badly behind their colleagues' backs was higher in the public hospital (16.7% versus 8%, $p = 0.03$) while the percentage of employees who judge their colleagues' work unfairly and detrimental was higher for the private hospital (29.6% versus 15.9%, $p = 0.01$). Also, the percentage of employees who force their colleagues to perform tasks that affect their health negatively was higher for the public hospital (5.1% versus 0%, $p = 0.01$) as was the percentage of those who despite their poor health, force their peers to perform hazardous tasks (7.2% versus 0.8%, $p = 0.01$).

Regarding mobbing's frequency depending for which entity employees work, no statistically significant relation was identified as 37.7% of the public entity's employees and 38.4% of the private reported having not suffered any harassing condition in the 12 months prior to the study ($p = 0.1$). However, a statistically significant relation between the length of time the employee had undergone harassment and the hospital he worked was observed ($p = 0.01$). Thus, private hospital's employees reported having suffered mobbing for a longer period of time ($p = 0.01$) and to a greater extent ($p = 0.02$) from the public hospital's ones as Table 21.2 portrays. Mobbing most frequently came from the supervisors to employees (55.2%), from same rank colleagues (37.4%), and from subordinates (4.9%). While those working for the public hospital received reportedly mobbing at a higher rate than their colleagues ($p = 0.03$), the private hospital employees reported receiving mobbing at a higher rate than their superiors ($p = 0.02$).

Table 21.3 depicts with whom the employees shared the harassment they experience; more frequently they appeared to share their problems with their colleagues (65%) supervisors (39.9%), and the least with their relatives and family members (6.7%).

Furthermore, the employees of the private hospital admitted having suffered psychological violence to a greater extent than the employees of the public one ($p < 0.001$) whereas the public hospital's employees reported that their colleagues had suffered greater psychological violence than the colleagues of the private hospital's employees ($p < 0.001$). The most frequent causes of such violence were bad workplace atmosphere (45.8%), hospital's poor organizational aspects (14.3%), heavy competition among individuals (14.3%), administrative problems/work placement (13.8%) and jealousy (9.4%). It was noted that bad workplace atmosphere was acknowledged more as an issue by the private hospital's employees ($p < 0.001$) whereas administrative problems/work placement by the public hospital's ones ($p < 0.001$).

Mobbing and psychological violence were found to be related statistically with five independent variables respectively at the level of 0.20 ($p < 0.20$). The multivariate analysis resulted in that those working in closed wards had suffered mobbing to a greater extent than their peers in the laboratory and administrative sectors (odds ratio = 2.58, 95% CI = 1.22 to 5.49, $p = 0.01$), while private hospital's employees had undergone more psychological violence (odds ratio = 23.3, 95% CI = 8.1–66.6, $p < 0.001$). As the psychological violence that was reported concerning the participants' colleagues, it as well was presented with statistically significant relations with five independent variables at the level of 0.20 ($p < 0.20$). It was found that the colleagues of the public hospital's employees had suffered more psychological violence than the colleagues of employees in the private one (odds ratio = 26.8, 95% CI = 9.2 to 77.6, $p < 0.001$) while doctors reported having more peers undergoing psychological violence than the technologists/administrative personnel (odds ratio = 3.2, 95% CI = 1.3–8.2, $p = 0.01$).

Table 21.2 Mobbing frequency regarding hospital entity

	Public hospital		Private hospital		Total		
	N	%	N	%	N	%	p^{α} value
How often have you faced one or more of the situations below in the past 12 months?							0.1^{α}
Daily	8	5.8	7	5.6	15	5.7	
Almost daily	25	18.1	32	25.6	57	21.7	
At least once per week	18	13	23	18.4	41	15.6	
At least once a month	10	7.2	11	8.8	21	8	
Rarely	25	18.1	4	3.2	29	11	
Never	52	37.7	48	38.4	100	38	
Length of time the employee undergoes mobbing (months)[b]	70.4	66	79.5	52.7	64.7	60	0.01^{γ}
Do you still face today such situations?							0.02^{δ}
Yes, I still deal with them today.	66	76.7	71	92.2	137	84	
No, I have dealt with them in the past at this job.	14	16.3	5	6.5	19	11.7	
No, I have with them in the past in a previous job.	6	7	1	1.3	7	4.3	
Colleague against employee							0.03^{δ}
No	47	54,7	55	71.4	102	62.6	
Yes	39	45.3	22	28.6	61	37.4	
Supervisor against employee							0.02^{δ}
No	46	53.5	27	35.1	73	44.8	
Yes	40	46.5	50	64.9	90	55.2	
Subordinate against employee							0.2^{δ}
No	80	93	75	97.4	155	95.1	
Yes	6	7	2	2.6	8	4.9	
Number of people against the employee[β]	8.2	8.3	0.7	0.5	4.7	7.1	$<0.001^{\gamma}$
Man against the employee							0.001^{δ}
No	75	87.2	77	100	152	93.3	
Yes	11	12.8	0	0	11	6.7	
Woman against the employee							0.6^{δ}
No	77	89.5	67	87	144	88.3	
Yes	9	10.5	10	13	19	11.7	

(continued)

Table 21.2 (continued)

	Public hospital		Private hospital		Total		p^{α} value
	N	%	N	%	N	%	
Man and woman against the employee							<0.001$^{\delta}$
No	26	30.2	65	84.4	91	55.8	
Yes	60	69.8	12	15.6	72	44.2	

$^{\alpha}$Chi-square goodness of fit, $^{\beta}$ mean, standard deviation, $^{\gamma}$Mann–Whitney control, $^{\delta}$ Chi-square test

Table 21.3 People employees share their mobbing issues with more frequently

	N	%
Shared with:		
Colleague	106	65
Supervisor	65	39.9
Head of personnel/human resources management	19	11.7
Staff representative/trade unionist	4	2.5
Inspector of labor, commissioner of administration	1	0.6
Lawyer	5	3.1
Staff physician	2	1.2
Another medical doctor	0	0
Social worker	0	0
Nurse	2	1.2
Friends or acquaintances outside workplace	11	6.7
Family members/relatives	11	6.7
Other person	5	3.1
No, I didn't have anyone I could turn to, but I wish I had	3	1.8
No, I didn't have anyone I could turn to, nor did I need it.	2	1.2

21.4 Discussion

According to our findings, women appear to suffer from harassing behaviors less frequently than men (61.35% versus 63.6%), a finding rather anticipates as sex has been associated with moral harassment [3, 32], even though several studies support a greater risk for women [13, 49]. However, said risk is influenced by the gender ratio in a working group, socially constructed roles that oftentimes identify a profession through sex, gender expectations including distinct professions for men and women [47]. For example, being a woman in a male-dominated profession, such as armed forces that is interwoven with male sex, power, and social status, has been found to significantly increase this [7, 50]. Being a man in a profession mainly attributed to females, e.g., nursing, has also been identified as a risk factor for harassing behaviors [18].

Despite the literature supporting that the youngest and least experienced healthcare professionals are oftentimes the ones undergoing moral harassment by their superiors or those with more years of experience [1, 5, 20, 39], in our study it was observed that as years of age and experience increased so did the scoring in the scale. It is a rather rare finding as in a recent corresponding study among doctors between 25 and 27 years old that hadn't had completed their residency yet, mobbing was reported by more than half the participants and sexual harassment by 15–19% of them [37].

In our study mobbing was found to affect all services, medical, nursing, and administrative at the rate of 66.7%, 64.8%, and 52.8%, respectively. Several studies note a higher prevalence of mobbing among the nursing personnel rather than other healthcare professionals [16, 22, 28]. Exposure rates up to 72.3% to some form of aggression were reported by Australian nurses, midwives, and other members of the hospital care staff [24] while a cross-sectional study conducted in three South Korean tertiary hospitals showed that over 70% of the nursing personnel had experienced at least one form of verbal abuse [10].

Furthermore, 44.1% of the public hospital and 58.4% of the private hospital employees admitted having encountered mobbing behaviors at least once per month during the 12 months prior to our survey. Also, a statistically significant relation between the lengths of time spent by the employee at the hospital where he/she works was identified, as the private hospital employees appeared experiencing mobbing expressions for longer (6.6 years) than those working in the public hospital (5.8 years). These findings are consisted with Zacharioudou et al.'s [55] and Karatza et al.'s [28]. Zachariadou et al. [55] conducted a similar survey among healthcare professionals working in a cyprian primary healthcare center (PHC) and Nicosia General Hospital (NGH). They found a corresponding psychological harassment rate as 45.6% of the participants reported having been exposed to at least one mobbing behavior in the 12 months prior to the study while the average harassment duration was 4.7 ± 6.1 years for those working in the GNL and 2.4 ± 4.2 years for those working in the PHC. Karatza et al. [28] estimated that psychological harassment for the 6 months prior to their study among the healthcare professionals five public hospitals in Attica was around 30.2%.

As observed in our study, public hospital employees were mobbed more than their colleagues while private hospital ones were mobbed more than their superiors. Findings from analogous surveys highlight a pervasive harassment on the part of managers towards their subordinates or among colleagues, in both, the public and private sectors, suggesting that mobbing may be indicative of broader institutional failures within organizations [14, 26, 43]. In a study by Awai et al. [4] conducted in a public Malaysian hospital the prevalence of mobbing in the 6 months prior to the study was 11.2%, where the most frequently reported perpetrators were women (44.4%), department heads (14%) and peers (12.4%). Similarly, in a study by Chatziioannidis et al. [11] conducted in Greece, the perpetrators were mainly women, aged between 45 and 64 years of age, managers, and senior colleagues when in a survey carried out in a Jordan public hospital nurses appeared to undergoing mobbing from doctors (23%), colleagues (19%) and their superiors (11%) [2]. Korkmaz et al. [31] however supported that harassing behaviors were mainly expressed by department heads (50.6%) and people holding senior positions (33.4%) generally though a study among healthcare professionals from Turkish public and private entities.

In the study of Ganz et al. [19], which involved nurses working in intensive care units from five Israeli medical centers, no participant admitted being harassed daily whereas 29% admitted being mobbed. Chatziioannidis et al. [11] estimated mobbing incidence at 53.1% for physicians and 53.6% for nurses in the personnel of 20 neonatal intensive care units in 17 distinct Greek hospitals. In addition, in a study conducted in two Spanish public hospitals it was observed that most of the intensive care units' nursing personnel were mobbing victims and witnesses that posed a negative impact on their job satisfaction and performance, requiring staffs' continuous rotation [48]. Additionally in our study, employees working in closed wards were harassed more (73.1%) than their colleagues in open ones (64.1%) or in the laboratory/administrative sector (51.2%).

All healthcare professionals working in the private hospital admitted having suffered harassing behaviors during the 12 months prior to our study whereas 56.5% of the public hospital's personnel did so. Interestingly though, 0.8% of the private hospital's and 60.1% of the public's employees admitted witnessing mobbing incidents at the same time, with physicians mainly reporting it. In Zachariadou et al.'s [55] study 43.4% of all respondents reported witnessing bullying in the 12 months prior to the survey, a finding that as well highlights how mobbing witnesses experience these incidents as well as their decisions to intervene [38], that formulate a problem separate from mobbing itself. Finally, the most frequent identified causes of psychological violence were mainly bad workplace atmosphere (45.8%), hospital's poor organizational aspects (14.3%), heavy competition among individuals (14.3%), administrative problems/work placement (13.8%), and jealousy (9.4%). Regarding mobbing causes according to Chatziioannidis et al. [11] personality traits (50.5%), management (32.2%) as well as workplace culture/atmosphere (10.7%) were recognized as most important.

21.4.1 Limitations

The main limitations of our study concern the time of its conduction as it coincided with the fourth COVID-19 pandemic wave and the study sample. Thus, during this period, access to the two hospitals was limited leading, in combination with participants' heavy workload, to reduced participation. Another limitation could be considered the fact that the research was partly restricted to a general provincial hospital located is a rather closed community, hence, participants' hesitation to provide truthful answers, as in this way they could potentially avoid any conflicts with their colleagues; even if they were mobbing victims and witnessed they could have preferred distancing themselves despite the confidentiality assurances. Notwithstanding, private hospital's employees either due to fear of disclosure or excessive workload, provided answers that following their analysis no mobbing incidents were recognized. Lastly, the notion of mobbing was unknown to most participants with further clarifications and behavior definitions required as many did not know that behaviors including excessive workload, or the assignment of excessive and novel tasks are to be considered as moral harassment expressions.

21.5 Conclusions

Our findings could be useful to hospital administrations to primarily establish the degree of moral harassment the employees are under, including their roles' conflict and ambiguity, as well as to explore bullies' and victims' personality traits while organization's leadership is adapting accordingly. As employees' physical and mental well-being protection ought to be responsibility of hospitals administrations, a stable, peaceful, and safe working environment is to be guaranteed as the prerequisite for employees' adequate performance. Managers' and executives' continuing education and appropriate training could also contribute in preventing moral harassment through managing human resources, crises, and conflicts in the workplace most suitably.

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22

How Does Meditation Affect the Default Mode Network: A Systematic Review

Dimitrios Zagkas, Flora Bacopoulou,
Dimitrios Vlachakis, George P. Chrousos,
and Christina Darviri

Abstract

This article provides a systematic review of studies evaluating the effect of meditation on the Default Mode Network (DMN). The review was conducted according to PRISMA guidelines. A literature search of PubMed, Scopus, and Embase was conducted up to June 2020. Search terms included default mode network or DMN and meditation.

A total of 306 articles were identified, of which 16 controlled trials with a total of 853 experienced (in Mindfulness, Samatha, Raja Yoga, Transcendental Meditation, Vipassana, Insight meditation Theravada tradition) and non-experienced mediators were finally included in this systematic review. The results showed that meditative interventions affect the operation of DMN and there are differences in functional connectivity between networks. Further research should be undertaken to establish meditation as an effective intervention strategy for well-being.

Keywords

Default mode network · DMN · Meditation · Mindfulness · Functional connectivity

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D. Zagkas
School of Medicine, National and Kapodistrian University of Athens, Athens, Greece
e-mail: dimzagk@med.uoa.gr

F. Bacopoulou (✉)
Center for Adolescent Medicine and UNESCO Chair in Adolescent Health Care, First Department of Pediatrics, School of Medicine, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece
e-mail: fbacopoulou@med.uoa.g

D. Vlachakis
Laboratory of Genetics, Department of Biotechnology, School of Applied Biology and Biotechnology, Agricultural University of Athens, Athens, Greece
e-mail: dimvl@aua.gr

G. P. Chrousos
University Research Institute of Maternal and Child Health & Precision Medicine, Athens, Greece

UNESCO Chair in Adolescent Health Care, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece

C. Darviri
School of Medicine, National and Kapodistrian University of Athens, Athens, Greece

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22.1 Introduction

In the last two decades, meditation has been made available to the general population. It has been used in a variety of circumstances, including increasing physical and mental health [1], lowering the negative feelings brought on by stress, and regulating emotions. Meditation has been used in the acute and remission phases of treatment for severe schizophrenia, as well as a supplemental and alternative treatment for depression, posttraumatic stress disorder (PTSD), and attention-deficit hyperactivity disorder (ADHD) [1]. There have been reports that it lessens withdrawal symptoms and emotional anguish [1].

As it encompasses a sizable number of other techniques, meditation is thought of as an umbrella word. Two factors—activation and the degree of bodily orientation—are used to categorize meditation approaches [2]. Conscious observation, body-centered meditation, visual concentration, meditation, emotion-focused meditation, mantra meditation, and motion meditation are the seven primary pillars that arise from these [2]. The psychological capacity to remain in the context of one’s experiences while maintaining a non-judgmental or accepted attitude, so fostering a pleasant, welcoming opening and curiosity, is known as mindfulness [3].

The origins of meditation come from Buddhist psychology and Eastern traditions, where it is noted that several methods may be used to enhance attention [3–5]. The instruction incorporates meditation practices including active or standing meditation (i.e., yoga or tai chi).

The aforementioned strategies have been shown to be effective at stabilizing attention and expanding a person’s concentration range. Practitioners are frequently instructed to breathe while employing “anchor” to focus their attention on the current moment [6]. The practitioner only tries to observe his experience from the current moment without evaluating or altering it as the mind “moves away,” while the focus gradually returns to the present [6]. Many individuals practice meditation to deal with everyday stresses and stress-related illnesses, as well as to improve overall health. A larger, alternative strategy that incorporates food and/or therapeutic practices (such ayurveda or yoga) as well as meditation methods is used [6]. Uncertainty exists about the differences between meditation approaches and how much these differences impact the consequences of psychosocial stress [7, 8]. According to prior research, “mindfulness“and “mantra” meditation approaches have a minor-to-moderate impact on easing physical and mental symptoms (such as anxiety, despair, and stress) (e.g., pain) [9–20].

Raichle et al. (2001) [21] made the discovery of the Default Mode Network (DMN) [21]. They contended that the brain is always engaged with external stimuli or tasks, keeping it from engaging in its own processes even when it is supposed to be at “rest” [21]. The medial prefrontal, precuneus, inferior parietal, and posterior cingulate cortices work together to create the Default Mode Network (DMN) [22].

Over 90% of the brain’s energy is used for DMN support [23]. Additionally, it is asserted that DMN continues to function when you sleep and even when you’re under mild anesthesia. The medial prefrontal cortex, posterior cingulate cortex, and inferior parietal lobule are three interrelated brain areas that make up the default function network, often known as the default network. The precuneus, hippocampal formation, and lateral temporal cortex are other structures that may be seen as being a member of the network [24].

As previously established, the DMN is made up of a collection of brain regions that seem to be less active when performing particular tasks that call for concentration and attention but more active when a person is awake and not performing any activities [24]. A person can dream, remember past events, imagine the future, study their surroundings, consider other people’s motives, and possess other capacities that have been linked to the functioning of the DMN when awake [24].

Recent studies have linked mental illnesses including depression, anxiety, and schizophrenia to default network activity. The fact that therapeutic methods like meditation, which have just lately gained popularity in western medicine, are expected to affect network activity by default raises the possibility that this is one of the ways in which they function to enhance well-being [24].

22.2 Methods

22.2.1 Search Strategy of Literature

This systematic review was conducted and reported according to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines [25]. A detailed literature search was performed in three databases (PubMed, Scopus and Embase). We searched from the first date available (2007) up to June 2020 using the following keywords: ("default mode network" OR DMN) AND meditation.

22.2.2 Selection Criteria

The following selection criteria were applied: (1) research studies investigating a sample of experienced mediators and uninformed controls; (2) controlled trials; (3) publications in English language; and (4) studies offering adequate results concerning the impact of meditation on DMN.

The following studies were excluded: those without full-text access; those published in languages other than English; those examining the effects of meditation in DMN in experienced or non-experienced participants only; those with different designs (e.g., case series, observational studies, cross-sectional studies); and, finally, conference papers, meeting abstracts, letters to the editor, commentaries, reviews, and studies with fewer than 25 participants. Figure 22.1 provides a summary of the research inclusion and exclusion process (PRISMA flowchart).

22.2.3 Data Extraction and Quality Assessment

The titles of the articles were the basis for the initial screening. The remaining articles' entire texts and abstracts were then reviewed for potential inclusion in accordance with the aforementioned criteria. Using the Cochrane Collaboration's Tool, we retrieved data based on the characteristics of the included studies (e.g., first author name, publication year, intervention kinds, and sample size), and we evaluated the risk of bias in individual studies in the following areas: Sequence creation, allocation concealment, participant, staff, and outcome assessor blindness, inadequate outcome data, selective result reporting, and other biases are all included in the evaluation.

22.3 Results

22.3.1 Study Selection

Three-hundred six entries in total were found throughout PubMed (86), Scopus (114), and Embase (106). After duplicate research were eliminated, just 140 studies remained. Following an assessment of the 140 articles' titles and abstracts, 58 papers were eliminated for a variety of reasons. Systematic reviews and meta-analyses (n = 3), non-clinical studies (n = 16), not in English (n = 1), number of participants 25 (n = 22), only experienced or non-experienced (n = 22), randomized clinical trials (n = 1), and other reasons (n = 1) led to the deletion of 66 records. Finally, this review included 16 studies [22–38]. The flowchart of study selection is shown in Fig. 22.1.

22.3.2 Quality Assessment

The risk of bias for individual studies is shown in Table 22.1.

The characteristics of the 16 clinical trials that were published between 2011 and 2020 in English are shown in Table 22.2.

The investigations comprised a total of 853 experienced and inexperienced mediators. Population characteristics included age, years of meditation, and group sample size. Each included study had a sample size of more than 25 individuals, a mean age range of 28 to 60 years, and an

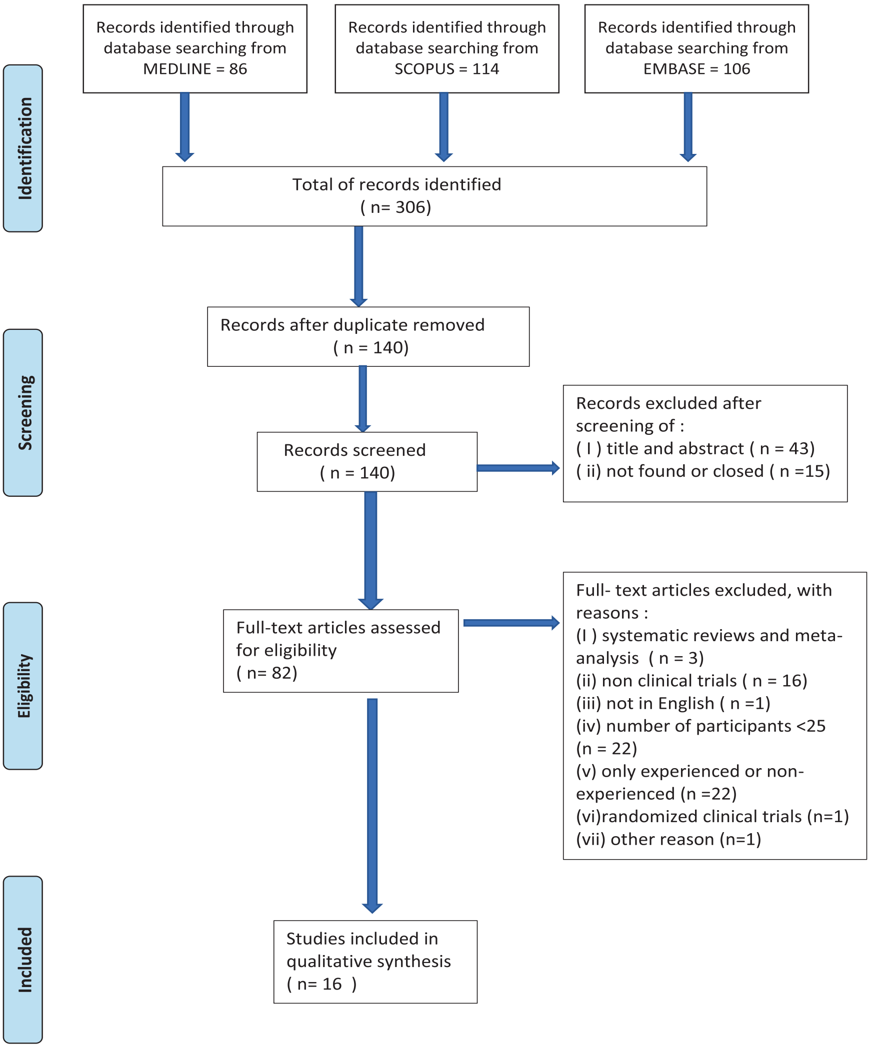

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Fig. 22.1 PRISMA flowchart

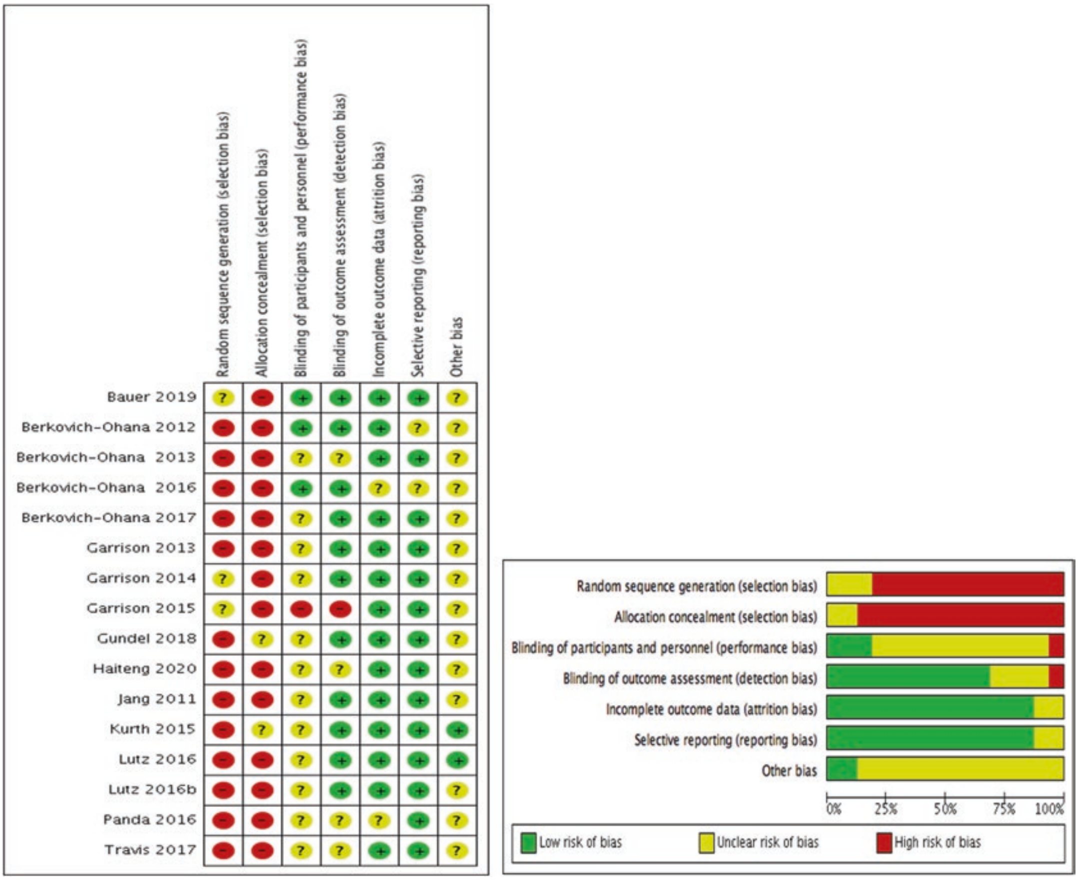
average number of years of meditative practice of 1 to 25.

Sixty Tibetan Buddhist male monks from Jiaqu Temple in Tibet were recruited for the study by Haiteng Jiang et al. (2020), as were 25 other male volunteers from the same neighborhood. Samatha and Vipassana meditation techniques were used to instruct the monks. The participants were instructed to unwind but not to close their eyes and meditate for 10 min. The monks were told to start meditating in the same way, daily for 30 min, following an auditory signal. There are three different ways to meditate: utilizing an object, repeating a mantra, and "Watching" your breath. According to the study's findings, theta band connection to the frontal temporal region was negatively connected with meditation experience [26].

Sixteen experienced meditators and 17 inexperienced HC meditators participated in Bauer, S. et al. (2019)'s study

The experiment was set up as follows: All participants had a 5-minute standby time with their eyes open (rsBase) to gather BOLD fMRI data

Table 22.1 Risk of bias



	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Bauer 2019	?	−	+	+	+	+	?
Berkovich-Ohana 2012	−	−	+	+	+	?	?
Berkovich-Ohana 2013	−	−	?	?	+	+	?
Berkovich-Ohana 2016	−	−	+	+	?	?	?
Berkovich-Ohana 2017	−	−	?	+	+	+	?
Garrison 2013	−	−	?	+	+	+	?
Garrison 2014	?	−	?	+	+	+	?
Garrison 2015	?	−	−	−	+	+	?
Gundel 2018	−	?	?	+	+	+	?
Haiteng 2020	−	−	?	?	+	+	?
Jang 2011	−	−	?	+	+	+	?
Kurth 2015	−	?	?	+	+	+	+
Lutz 2016	−	−	?	+	+	+	+
Lutz 2016b	−	−	?	+	+	+	?
Panda 2016	−	−	?	?	?	+	?
Travis 2017	−	−	?	?	+	+	?

[27]. In addition, the experienced meditators were scanned 20 min after the rsBase scan while conducting Vipassana (Med) meditation with their eyes open [27]. A second 5-minute period of rest (rsPost) was administered to the group of seasoned meditators [27]. A notable decrease in frontal brain activity within the DMN and a negative association between the DMN and the central executive network were characteristics of the meditation [27].

Two groups of healthy individuals were included in the study by Gundel F. et al. (2018): one with 14 participants who had experience with meditation and one with 16 participants who had no such experience. They arranged themselves into meditation groups and practiced walking meditation in accordance with the Zen Buddhist tradition [28]. The surveys were completed initially by half of the participants before beginning the 17-minute concentration activity, and the questionnaires were finished by the other half. Three practice sessions and four fundamental blocks totaling 2 min each were incorporated in mindfulness [28]. Every 12 s for the course of the trial, a new beat was added to the tone of a meditation bowl. The participants were awake and were given instructions to relax during the basic times without any particular emphasis on tone. They were instructed to concentrate on the tone during meditation sessions. The temporo-parietal DMN was shown to be more connected to the salience network and to have less activity in the anterior DMN in those with the highest scores on the mindfulness scale [28].

Thirty-six people who practiced mindfulness meditation were separated into three groups, along with 12 controls, by Berkovich-Ohana A et al. (2017). The Alternate Uses (AU) assignment was used to assess creativity.

Table 22.2 Characteristics of included studies

Reference	Study details	Study design	Population	Intervention	Comparison	Outcome	Summary of findings
1	Jiang H *et al. (2020), USA*	Clinical trial	N = 85, 60 Tibetan Buddhist male monks, 25 male volunteers from the same area	Subjects were asked to be in a relaxed and non meditative resting state with eyes closed for 10 min. Following an auditory cue, the monk subjects were instructed to start meditating in a similar manner to their daily practice for 30 min. All monks meditated via a 7-point posture of Vairocana, in which the shape of the body was similar to the form of an Egyptian pyramid. To enter the meditation state, there are 3 meditation techniques: using an object, reciting a mantra, and "watching" the breath	Health Volunteers	Analysis revealed that theta band connectivity in a temporal-frontal network negatively correlated with meditation experience	A relationship between the neural response to heartbeats in the DMN and the reorganization of large-scale network dynamics at different frequencies in response to meditation
2	Bauer C C C *et al. (2019), USA*	Clinical trial	N = 33, 16 EMs (Vipassana meditation experience) and 17 meditation naive HCs (health controls)	5-min, eyes-open resting-state period (rsBase), Vipassana meditation (Med), 5- min eyes-open restingstate period (rsPost)	Health controls	Meditation trait was characterized by a significant reduction in activity and FC within DMN and increased anticorrelations between DMN and CEN	The gradual reconfiguration in DMN and CEN suggest a neural mechanism by which the CEN negatively regulates the DMN and is probably responsible for the long-term trait changes seen in meditators and reported psychological wellbeing

3	Gundel F. *et al., (2018), Netherlands*	Clinical trial	N = 30, Meditation experts (14 participants), control group (16 participants)	Meditating on an auditory stimulus	Control group	Reduced activity in the anterior DMN and a stronger connection to the temporo-parietal DMN with the salience network in people with high scores on a mindfulness scale	New “default mode” being active during meditation as well as in the resting state. Longterm practitioners reporting that in the end there is no formal meditation time anymore, but everyday life becomes meditative and that there is a qualitative shift from the quality of the “I” to the “Non- Self”
4	Berkovich-Ohana A *et al., (2017) Israel*	Clinical trial	N = 48, 36 mindfulness meditation practitioners divided in three groups and 12 controls	Creativity was measured with the Alternate Uses (AU) task. EEG was then recorded during resting state (2.5 min eyes open and then 2.5 min eyes closed) measure temporal and spatial perception, and attentional skills, as well as a meditation/relaxation session of 15 min	Control group	Fluency and Flexibility (1) were higher in the two longterm mindfulness groups (>1000 h) compared to shortterm mindfulness practitioners and control participants and (2) negatively correlated with gamma inter-hemispheric functional connectivity (frontal-midline and posteriormidline connections). In addition, (3) Fluency was significantly correlated with mindfulness expertise	The results show that long-term mindfulness meditators exhibit higher divergent thinking scores in correlation with their expertise and demonstrate a negative divergent thinking—restingstate DMN activity relationship, thus largely support a negative DMNcreativity connection
5	Travis F *et al., (2017) USA*	Clinical trial	N = 87 participants both freshman and senior recordings and had been practicing Transcendental Meditation from one month to 5 years	(1)five minutes eyesclosed rest not begin their TM practice,” (2) a 4-min choice reaction-time task, and (3) a five-minute Transcendental Meditation session	Intervention eyesclosed rest	The eLORETA comparison of eyes-closed rest/task and TM practice/task identified similar areas of activation: theta and alpha activation during rest and TM in the posterior cingulate and precuneus, part of the default mode network	Not seem accurate to include TM practice with meditations in the catgory of Focused Attention, which are characterized by gamma EEG and DMN deactivation

(continued)

Table 22.2 (continued)

Reference	Study details	Study design	Population	Intervention	Comparison	Outcome	Summary of findings
6	Berkovich-Ohana A *et al., (2016) Israel*	Clinical trial	N = 36, 18 Mindfulness meditators (MM, age 42.3 ± 9.9 years, 6 female), 18 meditationnaive control participants (age 42.5±10.4 years, 5 female)	Resting state of meditators and naive	Meditators – Naive meditators	Functional connectivity within the DMN and the Visual networks were higher in the control group than in the meditators; 2) an increase for the functional connectivity between the DMN and the Visual networks in the meditators compared to controls; and 3) A significant negative correlation was found between DMN functional connectivity and meditation expertise	Functional connectivity both within and between networks reduces during meditation, compared to the resting-state
7	Lutz J *et al., (2016a), USA*	Clinical trial	N = 44, 22 midto-long-term mindfulness meditators (LTM), 22 matched meditation-naive participants (MNP)	Stimuli consisted of 52 negative and positive personality-descriptive adjectives from the groups: appearance, social aspects, transient condition, talents, and dispositions and neutral words	Meditation-naive participants (MNP)	Differences in DMPFC activation and affective ratings point towards increased awareness, potentially mindful regulation of SC and SP in LTM, while decreased connectivity to other regions of the default mode network could reflect a decreased self-focus in this group	Results illustrate differences in selfrelated emotional processes in meditators and offer clinically relevant insights into mechanisms of mindful emotion regulation when facing self-criticism and self-praise
8	Lutz J *et al., (2016b), USA*	Clinical trial	N = 40, Experienced mindfulness meditators (LTM, n = 21, average 4652 practice-hours) and matched meditation-naive participants (MNP, n = 19)	Conditions were 12 sections of cognitive self-reflection (THINK) or mindful self-awareness (FEEL), displayed in pseudo-randomised order, and interspersed with blocks of REST. 12 trials per condition in a single run. Total scan time was 12 min 20 s	Matched meditation-naive participants	Confirmation of hypothesis that down-regulation of cognitive self-referential CMS regions associated with the default mode network and mindwandering during mindful selfawareness	Neural patterns of mindful selfawareness emerge already in MNP but more pronounced in LTM. Specifically, meditation training might reduce selfreference and verbalization during mindful awareness

9	Panda R *et al., (2016), India*	Clinical trial	N = 40, 20 expert meditators, 20 Health Controls	Lie awake, with their eyes closed in a relaxed state within the MRI gantry. They were advised to refrain from any cognitive, language or motor tasks during the acquisition. Ear plugs were given to reduce scanner induced noise.	Twenty Health Controls	Using fMRI, we identified key reductions in the posterior cingulate hub of the DMN, along with increases in right frontal and left temporal areas, in experienced meditators during rest and during meditation, in comparison to healthy controls (HCs)	In particular, we found that the alteration in the duration of the DMN microstate when meditators entered the meditative state correlated negatively with their years of meditation experience. This reflected a trait effect of meditation, highlighting its role in producing durable changes in temporal dynamics of the DMN
10	Garrison K A *et al., (2015), USA*	Clinical trial	N = 56, 20 experienced meditators () and 26 nonmeditators (controls)	Three standard mindfulness meditation practice: 1) Concentration 2) Loving kindness 3)Choiceless awareness	Nonmediators practice	Meditation is associated with reduced activations in the default mode network, relative to an active task, for meditators as compared to controls	The suppression of default mode processing may represent a central neural process in long-term meditation, and they suggest that meditation leads to relatively reduced default mode processing beyond that observed during another active cognitive task.
11	Kurth F *et al., (2015), USA*	Clinical trial	N = 100, 50 meditators and 50 control subjects, matched for sex (28 men, 22 women) and for age	All subjects (i.e. meditators and controls) were scanned at the same site, using the same scanner and image acquisition protocol	Differences in Control subjects	The group difference within the precuneus, as well as the positive correlations with meditation years in the pregenual cingulate cortex, suggests an adaptation of the default mode network in meditators	Positive correlation between meditation practice years and asymmetry near the posterior intraparietal sulcus may suggest that meditation is accompanied by changes in attention processing

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Table 22.2 (continued)

Reference	Study details	Study design	Population	Intervention	Comparison	Outcome	Summary of findings
12	Garrison K A *et al., (2014), USA*	Clinical trial	N = 46, 20 experienced meditators, 26 novices	Three standard mindfulness meditation practices: loving kindness, concentration, and choiceless awareness (Gunaratana 2002; Brewer et al. 2011). This analysis is focused only on the loving kindness meditation condition	Loving kindness meditation condition	Meditators showed greater functional connectivity during loving kindness between the PCC /PCu and the left inferior frontal gyrus, whereas novices showed greater functional connectivity during loving kindness between the PCC /PCu and other cortical midline regions of the default mode network, the bilateral posterior insula lobe, and the bilateral parahippocampus/hippocampus	Loving kindness meditation involves a present-centered, selfless focus for meditators as compared to novices.

13	Garrison K A *et al., (2013), USA*	Clinical trial	Experiment 1A 22 meditators and 22 nonmeditators Experiment 1B 9 meditators and 11 nonmeditators Experiment 2 10 meditator	Experiment 1A included six 3.5- minute runs. Each run consisted of a 30- second active baseline task designed to elicit self-referential processing, followed by a 3-minute focused attention task. For the active baseline task, individuals viewed adjectives and mentally decided whether or not the words described them Experiment 1B was comprised of the same 30-second active baseline task as in Experiment 1A, followed by an additional real-time feedback task Experiment 2 protocol was designed to allow participants to discover how the feedback graph corresponded to their own subjective experience of focused attention in real-time	Non mediators, differences in mediators	Real-time feedback during a focused attention task from the posterior cingulate cortex, a hub of the default mode network shown to be activated during mind-wandering and deactivated during meditation. In a first experiment, both meditators and non-meditators reported significant correspondence between the feedback graph and their subjective experience of focused attention and mindwandering. When instructed to volitionally decrease the feedback graph, meditators, but not non-meditators, showed significant deactivation of the posterior cingulate cortex	These findings support the feasibility of using rt-fMRI to link objective measures of brain activity with reports of ongoing subjective experience in cognitive neuroscience research, and demonstrate the generalization of expertise in introspective awareness to novel contexts.

(continued)

Table 22.2 (continued)

Reference	Study details	Study design	Population	Intervention	Comparison	Outcome	Summary of findings
14	Berkovich-Ohana A *et al., (2013)*	Clinical trial	N = 48, 36 Mindfulness Meditation (MM) practitioners (3 groups) and 12 healthy controls who had no prior meditation experience	EEG was recorded for 5 min during resting state (RS), a TP task, and a meditation (MED) session of 15 min, all conditions eyes-closed (additional tasks were excluded from this report).	Differences between practitioners and healthy controls	Results show that: (i) DMN activity was identified as reduced overall interhemispheric gamma MPC during the transition from resting state to a time production task and (ii) Minduced a state increase in alpha MPC as well as a trait decrease in EEG-FC.	This report emphasizes the possibility of studying the DMN using EEG-FC as well as the importance of studying meditation in relation to it
15	Berkovich-Ohana A *et al., (2012) Netherlands*	Clinical trial	N = 48, 36 Mindfulness Meditation (MM) practitioners (3 groups) and 12 healthy controls who had no prior meditation experience	Three eyes-closed conditions the initial resting state (RS), the time production task (TP) and the meditation (MED)	Differences between practitioners and healthy controls	MM practitioners exhibited a trait lower frontal gamma activity, related to narrative self-reference and DMN activity, as well as producing longer durations, these being negatively correlated with frontal gamma activity	MM practitioners exhibit lower trait frontal gamma activity, as well as a state and trait increases in posterior gamma power, irrespective of practice proficiency
16	Jang *et al., (2011), Ireland*	Clinical trial	N = 68, 35 meditation practitioners, 33 healthy controls without meditation experience	All subjects received 4.68-min resting state functional scanning runs.	Healthy controls	Meditation practitioners demonstrated greater functional connectivity within the DMN in the medial prefrontal cortex area than did controls	Results suggest that the long-term practice of meditation may be associated with functional changes in regions related to internalized attention even when meditation is not being practiced

Then, while in a relaxed condition, EEG was recorded for 2.5 min with the eyes open and 2.5 min with the eyes closed to assess temporal and spatial perception, attentional abilities, and a 15-minute meditation/relaxation session [29]. In comparison to short-term mindfulness practitioners and control individuals, the two long-term mindfulness groups (>1000 h) showed better levels of fluency and flexibility, and there was a negative link in gamma inter-hemispheric functional connectivity (frontal-midline and posterior-midline connections). Finally, there was a strong correlation between fluency and mindfulness expertise [29].

Eighty-seven individuals, including freshmen and senior records, who had been practicing transcendental meditation for 1 month to 5 years were evaluated in the study by Travis F. and Parim N., (2017) [30]. They completed three tasks: a 4-minute choice reaction-time task, a 5-minute transcendental meditation session, and a 5-minute eyes-closed relaxation without TM practice. The eLORETA comparison of eyes-closed rest/task and TM practice/task (theta and alpha activation during rest and TM) revealed that the posterior cingulate and precuneus, parts of the default mode network, were engaged [30].

Eighteen mindfulness practitioners and 18 control individuals who had never meditated before were recruited by Berkovich-Ohana A et al. in 2016 [31]. Between meditators and naive people, an examination was conducted while they were sleeping. In addition, after being exposed to factor 3, the mediators' functional connectivity between the DMN and optical networks increased in comparison to that of the control group, which was lower in the meditators than in the control group [31]. Between DMN functional connectivity and experience with meditation, a substantial inverse relationship was discovered [31].

Lutz J. et al. (2016a) gathered 22 mid-to-long-term mindfulness practitioners (LTM) and 22 matched meditation-naive individuals (MNP) [32]. The stimuli were 52 personality-descriptive adjectives, both positive and negative, from the following categories: appearance, social features, temporary state, abilities, dispositions, and neutral terms [32]. They discovered that variations in DMPFC activity and emotional evaluations hint to heightened awareness, maybe conscious modulation of SC and SP in LTM, but changes in connection to other areas of the default mode network may indicate a reduction in self-focus in this group [32].

In the same time frame, Lutz J. et al. (2016b) performed a second study with 40 seasoned practitioners of mindfulness meditation and matched non-meditators. The intervention was divided into 12 blocks of rest (REST), each separated by a piece of cognitive self-reflection (THINK) or mindful self-awareness (FEEL). The downregulation of cognitive self-referential CMS areas linked to the default mode network and mind-wandering during mindful self-awareness was seen by the researchers to be consistent with the hypothesis [33].

Trials were done by Panda R. et al. (2016) with the involvement of 20 professional Raja Yoga meditators and 20 healthy controls. The test involved lying comfortably and awake inside the MRI gantry with the eyes closed [34]. They were told not to do any muscular, verbal, or cognitive activities during them. To lessen the loudness, earplugs were used. When comparing experienced meditators to healthy controls during both rest and meditation, they discovered substantial decreases in the posterior cingulate hub of the DMN that coexisted with elevations in the right frontal and left temporal regions using fMRI [34].

In the study by Garrison, et al. (2015), which comprised 26 non-meditators (controls) and 20 experienced meditators, the intervention consisted of three traditional mindfulness meditation practices: (1) Mindfulness; (2) Loving compassion; and (3) Awareness without choice. They came to the conclusion that meditation is linked to lower DMN activations in meditators as compared to controls when doing an active activity [35].

Fifty meditators and 50 control participants participated in the trial that Kurth et al. (2015) conducted. Using the same scanner and image collection methodology, the individuals were scanned at the same location [34]. Their research revealed differences in the precuneus as well as the pregenual cingulate cortex's favorable connections with years of meditative practice. These results suggested that the default mode network in meditators had been modified [36].

Garrison et al. (2014) performed trials using the identical intervention as mentioned above with the involvement of 26 novices and 20 experienced meditators. The findings were that experienced meditators displayed greater functional connectivity during practicing loving kindness between the PCC/PCu and the left inferior frontal gyrus, whereas newcomers displayed greater functional connectivity during practicing loving kindness between the PCC/PCu and other cortical midline regions of the default mode network, the bilateral posterior insula lobe, and the bilateral parahippocampus/hippocampus [37].

Seventy-four people took part in the experiments that Garrison et al. (2013) performed. The identical intervention in the first two phases was used in three tests, with the exception of time. They observed that during mind-wandering and meditation, a hub of the default mode network was active and deactivated [38]. There is a strong correlation between the feedback graph and the meditators' and naïve participants' subjective experiences of concentrated concentration and mind-wandering. Additionally, after the feedback graph's decline, they observed a considerable deactivation of the posterior cingulate cortex [38].

In the experiments conducted by Berkovich-Ohana et al., 36 mindfulness meditation (MM) practitioners (three groups) and 12 healthy naive controls participated (2013). The participants underwent a 15-minute meditation session (MED), a 5-minute TP task, and a 5-minute EEG recording session while in the resting state (RS) [39]. They demonstrated that I DMN activity was detected as decreased total inter-hemispheric gamma MPC during the change from resting to a time-production task and (ii) MM generated a state increase in alpha MPC as well as a trait drop in EEG-FC [39].

Thirty-six mindfulness meditation (MM) practitioners were divided into three groups, along with 12 healthy naïve controls, for an experiment performed by Berkovich- Ohana et al. in 2012. Three eyes-closed conditions made up the intervention in this trial: the initial resting state (RS), the time production task (TP), and the meditation (MED) [40]. They hypothesized that lower frontal gamma activity, which is linked to narrative self-reference and DMN activity and is more prolonged and negatively associated in experienced practitioners [40] was a feature.

Finally, Jang et al. (2011) conducted an intervention with all participants having undergone 4.68-min resting state functional scanning runs, with the help of 35 meditation practitioners and 33 healthy naive controls. In comparison to controls, experienced meditators showed higher functional connectivity within the DMN in the medial prefrontal cortical region [41].

22.4 Discussion

The primary purpose of this systematic study was to determine how meditation affected the default mode network. Results from this review's analysis indicated that meditation therapies may have an impact on how DMN functions [26–41].

Large-scale rearrangement of the network dynamics at various frequencies has been seen in response to meditation and has been linked to the neuronal response to the heartbeat and the DMN [26]. Additionally, the ongoing remodeling of DMN and CEN suggests the existence of a neuronal mechanism wherein CEN negatively controls DMN is likely in charge of the long-term feature changes seen in meditators, and is linked to psychological well-being [27].

According to long-term practitioners, life eventually becomes contemplative and there is a qualitative change from the character of the "I" to the "Non- Self," even if there is no longer any formal time set out for meditation. Therefore, both during meditation and when we are resting, a new "default mode" is activated [28].

Additionally, long-term meditators score more divergently than they do in practice because they exhibit a negative divergent mind-activity connection of the DMN at rest, which is generally indicative of a negative DMN creative link [29].

Additionally, compared to the person's resting state, the functional connectivity both within and across the networks diminishes during meditation [31]. Long-term meditation has also been shown to inhibit default mode processing, and it has been hypothesized that this suppression is in addition to that shown during other active cognitive activities [35].

Years of experience with meditation were shown to be inversely connected with the shift in DMN microstate length when meditators reached the meditative state. It is a typical outcome of meditation, highlighting its contribution to the ongoing alterations in the DMN‘s temporal dynamics [34].

The analysis indicated variations in self-related emotional processes in meditators and provide clinically applicable insights into mindful emotion regulation mechanisms when faced with self-criticism and self-praise [32]. Meditation practice may also lessen self-reference and verbalization during mindful awareness

For experienced meditators as opposed to beginners, the meditation of loving kindness requires a present-centered, selfless attention [37].

We may infer that meditation alters attention processing based on the positive link between years of meditation practice and asymmetry around the posterior intraparietal sulcus [36]. Even when meditation is not being performed, long-term meditation practice may be linked to functional alterations in areas connected to internalized attention [41].

Regardless of level of skill, those who practice mindfulness meditation show reduced trait frontal gamma activity as well as a state and trait rise in posterior gamma power [40].

The group of meditations employed for focused attention, which are characterized by gamma EEG and DMN inactivation, should not include TM practice [30].

There are several limitations that must be recognized. First, consider the sample size and number of included research. Additionally, we only included clinical studies. Additionally, the sample's heterogeneity, the many meditation techniques utilized, and the various research methods make it challenging to generalize the findings. It's likely that the inclusion criteria we mentioned above prevented us from finding papers with lower bias. We highly advise using consistent measurements in future studies to help with data consolidation. Finally, due to the bias of the included papers, there may be possible publication bias in our results.

22.5 Conclusion

In conclusion, the study findings demonstrate that meditation has an impact on the DMN. Additional clinical studies and randomized clinical trials are needed to support meditation as a successful intervention method for health promotion.

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23

Job Satisfaction of Nurses Versus Other Mental Health Professionals Working in Psychosocial Rehabilitation Services

Loukia Karvouni, Theodoula Adamakidou,
Marianna Mantzorou, Alexandra Mantoudi,
Dimitrios Christopoulos, Georgia Fasoi,
and Afroditi Zartaloudi

Abstract

Introduction: The objectives of Psychiatric Reform were, on the one hand, psychiatric hospitals' shutting down and, on the other hand, the creation of Psychosocial Rehabilitation facilities, in order to provide appropriate care to individuals suffering from mental health problems in community. Therefore, mental health professionals' job satisfaction constitutes one of the fundamental factors leading either to success or failure of each reforming effort. Purpose: The aim of this study was to investigate the level of professional satisfaction of nurses working in Psychosocial Rehabilitation facilities compared to other mental health professionals. Methodology: Three hundred and sixty-seven mental health professionals, working in the field of psychosocial rehabilitation completed (a) a sociodemographic questionnaire, and (b) Spector's Job Satisfaction Survey (JSS). Results: Moderate levels of total professional satisfaction were observed. Low satisfaction rates were recorded in "Pay," "Promotion," and "Fringe Benefits" subscale. High satisfaction rates were recorded in "Supervision," "Cooperation between colleagues," and "Nature of work," while moderate satisfaction rates were reported in "Contingent rewards," "Operating procedures," and "Communication" within facilities. It is noteworthy that nurses were statistically significant less satisfied with the "Contingent rewards" ($p = 0.028$), the "Nature of work" ($p = 0.001$), and the "Communication" ($p = 0.019$), while they were statistically significant more satisfied with "Supervision" ($p = 0.007$) compared to the other specialties of mental health professionals. Conclusions: The results can be used by those with administrative and scientific responsibilities in the field of mental health in order to recognize professionals' difficulties and solve their problems in psychosocial rehabilitation facilities. These interventions could improve their levels of job satisfaction, in order to achieve optimal therapeutic results for mentally ill and improve the quality of the services provided.

L. Karvouni · T. Adamakidou · M. Mantzorou ·
A. Mantoudi · D. Christopoulos · G. Fasoi ·
A. Zartaloudi (✉)
Department of Nursing, University of West Attica,
Athens, Greece
e-mail: azarta@uniwa.gr

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Keywords

Nurses · Job satisfaction · Psychosocial rehabilitation · Mental health professionals

23.1 Introduction

The objectives of psychiatric reform were, on the one hand, psychiatric hospitals' shutting down and, on the other hand, the creation of psychosocial rehabilitation facilities, in order to provide appropriate care to individuals suffering from mental health problems in community. Therefore, the job satisfaction of mental health professionals involved comprises one of the fundamental factors having a significant impact on every reforming effort. Because of the increased demands of their role, mental health professionals working in community facilities face increasingly stressful working conditions. Mental health professionals of outpatient community facilities experience higher levels of stress, which have several negative consequences on their mental and physical health, professional performance, job attitudes, job satisfaction, and tendency to leave their job [1, 2]. Job satisfaction is a cornerstone of any organization's successful operation. Improved working conditions, fair rewards, and continuing education are thought to contribute to increasing mental health professionals' satisfaction and quality health services. Lack of job satisfaction significantly undermines the quality-of-service delivery in community facilities [3].

The purpose of this study was to investigate the level of professional satisfaction of nurses compared to other mental health professionals working in psychosocial rehabilitation facilities.

23.2 Material and Methods

The sample of the study consisted of 367 mental health professionals (220 mental health nurses and 147 other mental health specialists) working in the psychosocial rehabilitation facilities (psychiatric accommodation facilities, hostels, boarding homes, community mental health centers, sheltered apartments, etc.) of the public sector and, more specifically, of the largest psychiatric hospital of Athens, the capital city of Greece. This was a cross-sectional descriptive study. The sampling method applied was that of convenience sampling. A total of 430 questionnaires were distributed and 367 were completed (response rate 85.3%). Data collection took place from February to June 2020.

The inclusion criteria were: (i) ability to understand the questions of the research tools, (ii) ability to read and sign the consent form, (iii) ability to speak, read, and write in Greek. Exclusion criteria from the study were (i) employees who did not wish to participate, (ii) inadequate language skills. Our study sample consisted of psychiatrists (10.5%), nurses (24.6%), assistant nurses (31.3%), psychologists (10.3%), social workers (9.9%), and occupational therapists (7.6%). The reason that all the specialties working in psychosocial rehabilitation facilities participated in the study is that the nature of their work requires intense interaction of all specialties and to some extent presupposes the overlap of their roles in order to provide appropriate and adequate mental health care.

23.2.1 Ethics

Before collecting data, approval was obtained by the Scientific Council of the Hospital (Code number: 38141-16/12/2019). All subjects had been informed about the purpose of the study, the confidentiality of their responses, the anonymity of the data, the voluntary nature of their participation, their right to refuse or discontinue participation in the study and that the data would be used only for research purposes, according to the ethical standards of the Declaration of Helsinki (1989) of the World Medical Association. All participants participated only after they had given their written consent. The research complied with the General Regulation for the Protection of Personal Data (GDPR).

23.2.2 Measurement Tools

Socio-Demographic Characteristics Questionnaire: The participants were given a questionnaire on the socio-demographic characteristics of employees (gender, age, level of education, family status, job position, specialty, work experience, etc.).

Job Satisfaction Survey (JSS) questionnaire of Spector (1985): The Job Satisfaction Survey (JSS) questionnaire of Spector [4] was used to measure nurses' job satisfaction. The JSS consists of 36 questions and has been translated in Greek language and validated in the Greek population by Tsounis and Sarafis [5]. The questionnaire is divided into nine subscales including Pay, Promotion, Supervision, Fringe Benefits, Contingent Rewards (performance-based rewards), Operating Procedures (required rules and procedures), Coworkers, Nature of Work, and Communication. Participants respond on a six-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = agree, 5 = slightly agree, 6 = strongly agree). Scores on each of nine subscales, based on 4 items each, can range from 4 to 24; while scores for total job satisfaction, based on the sum of all 36 items, can range from 36 to 216. A higher score indicates more satisfaction. The scores on the negatively worded items must be reversed before summing with the positively worded. For the 4-item subscales with a range from 4 to 24, scores of 4 to 12 are indicative of dissatisfaction, 16 to 24 are indicative of satisfaction, and between 12 and 16 are indicative of ambivalence. For the 36-item total where possible scores range from 36 to 216, the ranges are 36 to 108 for dissatisfaction, 144 to 216 for satisfaction, and between 108 and 144 for ambivalent.

23.2.3 Statistical Analysis

All statistical analyses were performed with the IBM Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA), version 21.0. Socio-demographic data were analyzed using descriptive statistics. Frequencies and percentages were calculated for the categorical variables, while continuous variables were expressed as means and standard deviations. Frequencies and percentages were calculated on the characteristics of the participants and the subscales of job satisfaction. To investigate the association between two categorical variables, the χ^2 test (chi-squared test) was used. Comparison between two groups was performed with the use of Student's t test or Mann–Whitney U test according to variable distribution. T-test was performed between two variables that followed a normal distribution, whereas a Mann–Whitney U test was performed if two continuous variables did not follow a normal distribution. Statistical significance was set up at 0.05. A p-value ≤ 0.05 was considered to be statistically significant. Internal consistency for the questionnaire was evaluated with Cronbach's alpha indexes. A threshold of 0.6 or higher were indicative of acceptable internal consistency of the items.

23.3 Results

The majority of our study population (79.6% of non-nursing staff and 90% of nursing staff participants) were female. Aged 46.4 ± 7.5 years and 46.3 ± 6.8 years, respectively. The characteristics of patients are shown in Table 23.1. The majority of non-nursing staff were married (57.1%) had a university level education (64.6%) and didn't have an administrative position (78.2%). The majority of nursing staff were married (65%), high school graduates (37.3%), and didn't have an administrative position (75%). Regarding the specialties of staff, 10.5% of the sample were psychiatrists, 24.6% mental health nurses, 31.3% assistant nurses, 10.3% psychologists, 9.9% social workers, and 7.6% occupational therapists. The 25.2% of our non-nursing sample worked in hostels, 21.8% in nursing homes, and 36.7% in community mental health centers. The 44.1% of our nursing sample worked in hostels, 41.8% in nursing homes, and 6.8% in community mental health centers. The median number of years

Table 23.1 Socio-demographic characteristics of the participants ($n = 367$)

Characteristics	Non-nursing staff *N* (%)	Nursing staff *N* (%)	*p*-value
Gender			
Male	30 (20.4%)	22 (10.0%)	**0.005**[a]
Female	117 (79.6%)	198 (90.0%)	
Age (in years)[b]	46.4 (7.5)	46.3 (6.8)	0.887[c]
Family status			
Unmarried	46 (31.3%)	27 (12.3%)	**<0.001**[a]
Married	84 (57.1%)	143 (65.0%)	
Divorced/separated	14 (9.5%)	43 (19.5%)	
Widowed	3 (2.0%)	7 (3.2%)	
Number of children			
None	58 (39.5%)	42 (19.1%)	**<0.001**[d]
1	39 (26.5%)	50 (22.7%)	
2	42 (28.6%)	103 (46.8%)	
3	7 (4.8%)	18 (8.2%)	
4	1 (0.7%)	5 (2.3%)	
5 and more	0 (0.0%)	2 (0.9%)	
Education			
Primary school graduate	0 (0.0%)	6 (2.7%)	**<0.001**[d]
Secondary school	2 (1.4%)	8 (3.6%)	
High school	6 (4.1%)	82 (37.3%)	
Post-secondary education	0 (0.0%)	26 (11.8%)	
University education	95 (64.6%)	43 (19.5%)	
Master's degree	40 (27.2%)	22 (10.0%)	
Ph.D. degree	3 (2.0%)	0 (0.0%)	
Psychiatric specialty	1 (0.7%)	33 (15.0%)	
Job position			
Director	4 (2.7%)	0 (0.0%)	**<0.001**[a]
Head nurse	5 (3.4%)	42 (19.1%)	
Scientific responsible	12 (8.2%)	10 (4.5%)	
Attending doctor	11 (7.5%)	0 (0.0%)	
Head of a nursing section	0 (0.0%)	3 (1.4%)	
None	115 (78.2%)	165 (75.0%)	
Psychosocial rehabilitation facility of job position			
Community mental health center	54 (36.7%)	15 (6.8%)	**<0.001**[a]
Psychiatric accommodation facility	37 (25.2%)	97 (44.1%)	
Boarding home	32 (21.8%)	92 (41.8%)	
Other	24 (16.3%)	16 (7.3%)	
Number of years working in their current facility[e]	10.0 (12.0)	8.5 (10.0)	0.263[f]
Total years of service[e]	20.0 (10.0)	20.0 (8.0)	**0.124**[f]

Values are expressed as *n* (%) unless otherwise stated

[a] x^2 test

[b] Mean (standard deviation)

[c] *t*-test

[d] x^2 trend test

[e] Median (Interquartile range)

[f] Mann–Whitney U test

working in their current facility was 10 years (IR = 12.0) and 8.5 years (IR = 10.0) for non-nursing and nursing staff, respectively. The median number of total years of service was 20 years (IR = 10.0) and 20 years (IR = 8.0) for non-nursing staff and nursing staff, respectively.

Table 23.2 presents the score of the nine subscales of the JSS questionnaire. Nurses exhibited moderate level of total professional satisfaction (121.6 ± 16.1). Non-nursing health professionals also exhibited moderate level of total professional satisfaction (124.6 ± 19.3). As far as non-nursing staff is concerned, greater satisfaction was found with supervision and less with pay (18.9 ± 3.9 and 9.2 ± 3.0, respectively). Also, great satisfaction was found with nature of work (18.3 ± 2.9) and coworkers (17.9 ± 3.1) and less with communication (15.6 ± 3.4), contingent rewards (12.9 ± 3.8), operating conditions (12.6 ± 3.3), promotion (10.3 ± 3.4), and fringe benefits (9.8 ± 3.3). As far as nursing staff is concerned, greater satisfaction was found with supervision and less with pay (20.0 ± 3.5 and 8.4 ± 2.8, respectively). Also, great satisfaction was found with nature of work (17.0 ± 3.2) and coworkers (17.9 ± 3.1) and less with communication (14.7 ± 3.5), contingent rewards (11.8 ± 3.4), operating conditions (11.9 ± 3.2), promotion (10.2 ± 3.3), and fringe benefits (9.2 ± 2.9).

The majority of the total sample exhibited high job satisfaction level regarding supervision (86.7% of our participants), coworkers (79.0%) and nature of work (73.8%) and low job satisfaction level regarding pay (80.9%), promotion (66.5%), and fringe benefits (74.1%). The majority of our participants exhibited moderate (42.2%) to low (40.9%) level of job satisfaction regarding the contingent rewards. Additionally, the majority of our participants exhibited moderate (43.1%) to low (39.0%) level of job satisfaction regarding the operating procedures. Finally, the majority of our participants exhibited moderate (40.1%) to high (43.6%) level of job satisfaction regarding communication. Greater percentage of nursing staff reported high job satisfaction level with "Supervision" ($p = 0.007$) and low job satisfaction level with the "Contingent rewards" ($p = 0.028$) compared to the other mental health professionals. Greater percentage of nursing staff reported moderate-to-low job satisfaction with the "Nature of work" ($p = 0.001$) and low job satisfaction with the "Communication" ($p = 0.019$) compared to the other mental health professionals (Table 23.3).

The Cronbach's alpha of the total Job Satisfaction Survey (JSS) questionnaire was found to be 0.86, indicating very high reliability. In particular, the Cronbach's alpha was 0.66 for "Pay" subscale, 0.67 for "Promotion" subscale, 0.85 for "Supervision" subscale, 0.54 for "Fringe benefits" subscale, 0.71 for "Contingent rewards" subscale, 0.54 for "Operating Procedures" subscale, 0.70 for "Coworkers" subscale, 0.69 for "Nature of work" subscale, 0.66 for "Communication" subscale, which indicates an acceptable internal consistency of the subscales (with the exception of the "Fringe benefits" and the "Operating Procedures" subscale).

Table 23.2 Mean ± SD of values of subscales of job satisfaction scale

Subscales	Non-nursing staff	Nursing staff
Pay	9.2 ± 3.0	8.4 ± 2.8
Promotion	10.3 ± 3.4	10.2 ± 3.3
Supervision	18.9 ± 3.9	20.0 ± 3.5
Fringe benefits	9.8 ± 3.3	9.2 ± 2.9
Contingent rewards	12.9 ± 3.8	11.8 ± 3.4
Operating procedures	12.6 ± 3.3	11.9 ± 3.2
Coworkers	17.9 ± 3.1	17.9 ± 3.1
Nature of work	18.3 ± 2.9	17.0 ± 3.2
Communication	15.6 ± 3.4	14.7 ± 3.5
Total satisfaction	124.6 ± 19.3	121.6 ± 16.1

Table 23.3 Absolute and relative (%) frequencies of subscales of job satisfaction survey

	Job satisfaction			
Subscales	Low	Moderate	High	*p*-value
Pay	**297 (80.9)**	**65 (17.7)**	**5 (1.4)**	0.110
Non-nursing staff	114 (38.4%)	29 (44.6%)	4 (80.0%)	
Nursing staff	183 (61.6%)	36 (55.4%)	1 (20.0%)	
Promotion	**244 (66.5)**	**105 (28.6)**	**16 (4.9)**	0.923
Non-nursing staff	99 (40.6%)	39 (37.1%)	9 (50.0%)	
Nursing staff	145 (59.4%)	66 (62.9%)	9 (50.0%)	
Supervision	**14 (3.8)**	**35 (9.5)**	**318 (86.7)**	**0.007**
Non-nursing staff	8 (57.1%)	21 (60.0%)	118 (37.1%)	
Nursing staff	6 (42.9%)	14 (40.0%)	200 (62.9%)	
Fringe benefits	**272 (74.1)**	**83 (22.6)**	**12 (3.3)**	0.062
Non-nursing staff	102 (37.5%)	38 (45.8%)	7 (58.3%)	
Nursing staff	170 (62.5%)	45 (54.2%)	5 (41.7%)	
Contingent rewards	**152 (40.9)**	**155 (42.2)**	**60 (16.9)**	**0.028**
Non-nursing staff	59 (38.8%)	51 (32.9%)	37 (61.7%)	
Nursing staff	93 (61.2%)	104 (67.1%)	23 (38.3%)	
Operating procedures	**143 (39.0)**	**158 (43.1)**	**66 (17.9)**	0.179
Non-nursing staff	60 (42.0%)	67 (42.4%)	20 (30.3%)	
Nursing staff	83 (58.0%)	91 (57.6%)	46 (69.7%)	
Coworkers	**11 (3.0)**	**66 (18.0)**	**290 (79.0)**	0.871
Non-nursing staff	3 (27.3%)	30 (45.5%)	114 (39.3%)	
Nursing staff	8 (72.7%)	36 (54.5%)	176 (60.7%)	
Nature of work	**11 (3.0)**	**85 (23.2)**	**271 (73.8)**	**0.001**
Non-nursing staff	3 (27.3%)	20 (23.5%)	124 (45.8%)	
Nursing staff	8 (72.7%)	65 (76.5%)	147 (54.2%)	
Communication	**60 (16.3)**	**147 (40.1)**	**160 (43.6)**	**0.019**
Non-nursing staff	16 (26.7%)	59 (40.1%)	72 (45.0%)	
Nursing staff	44 (73.3%)	88 (59.9%)	88 (55.0%)	
Total satisfaction	**65 (17.7)**	**261 (71.1)**	**41 (11.2)**	0.187
Non-nursing staff	26 (40.0%)	98 (37.5%)	23 (56.1%)	
Nursing staff	39 (60.0%)	163 (62.5%)	18 (43.9%)	

Values are expressed as absolute frequency *N* and relative frequency (%)

23.4 Discussion

Our study participants showed a moderate level of total professional satisfaction, based on the overall score of the scale. This finding is consistent with the findings of other studies [6, 7]. A comparative study, conducted by Pelechas & Antoniadis [8], showed that neither doctors nor nurses were satisfied with their work, as work satisfaction levels were found to be low to moderate. A recent survey by Vangeli [9], carried out on a sample of 115 doctors and nurses, showed that medical staff were moderately satisfied with their job. Most studies conducted in Greece have concluded that nurses were not satisfied with their work [10, 11].

A low level of professional satisfaction regarding salary earnings, promotion opportunities, and fringe benefits (insurance coverage, paid leaves, pension prospects) was reported by the participants in the this study. These results are consistent with the surveys of Kremeti [12], Pappa [13] and Tsoukala [14]. According to the survey of Tsouni and Sarafi [15], which studied the professional satisfaction of health care providers in the field of drug addiction, the majority of participants were dissatisfied with salary (77%), promotion opportunities (69.9%), and additional benefits (60.3%). In a research study by Niarchakou [16], 68.8% were dissatisfied with their salary. The corresponding percentage in our study was 81.5%. This result was to be expected as salaries and pensions of public sector health professionals have been reduced or frozen in Greece, in the context of the economic crisis [17]. It is noteworthy that nursing staff were statistically significant less satisfied with salary and fringe benefits (insurance coverage, paid leaves, pension prospects) compared to other specialties of mental health professionals. According to a research by Theodossiou & Pouliaka [11], there seems to be an economic differentiation between doctors and nurses in Greece.

The level of job satisfaction of participants with the contingent rewards (appreciation, recognition and rewards for good work) and the operating conditions (rules and procedures, bureaucracy, workload) was moderate to low. According to a survey by Nemmaniwar et al. [18], conducted in health professionals working in hospitals in India, recognition of employees' giving and reward for their positive efforts have increased the levels of professional satisfaction. Other research conducted in hospitals in Greece has resulted in similar results [19, 20]. It is worth noting that the nurses were statistically significant less satisfied in terms of contingent rewards compared to the other specialties of mental health professionals. It is noteworthy, that regarding nursing profession, there is a general trend towards reduced job satisfaction, because of the negative stereotypes that downgrade nursing professional status [21]. In a study by Lambrakis et al. [22], investigating the expectations and satisfaction of nursing staff working in a public general hospital, non-recognition of giving has emerged as one of the most important factors of professional dissatisfaction. Dissatisfaction, recorded by the participants of this study, with the operating conditions of the service (rules and procedures, bureaucracy, workload), is compatible with the findings of other studies [23, 24]. Since 2008, staff have gradually been decreased (early retirements, cuts, etc.). As a result, there has been an increase in the workload of the existing employees. Mental health professionals are less satisfied with responsibilities not directly related to their profession, such as bureaucratic and administrative work [25].

This study suggested a high level of professional satisfaction with supervision, cooperation between colleagues and the nature of work. This finding is confirmed in the survey of Niarchakou [16], Tsoukala [14], carried out in public general hospitals in Cyprus. Similarly, in the Tsouni and Sarafi survey [15] conducted in health professionals working in facilities of addiction treatment, the vast majority (85.8%) expressed high satisfaction with the nature of the work, the relationship with colleagues (80.8%), and the relationship with supervisors (77.8%). In our study, the particular percentages were 73.8%, 79.0%, and 86.7%, respectively.

The vast majority considered the content of their work to be extremely interesting. This finding is in line with the results of Kresteiniti [26] study. Crepia [27] concluded that the highest satisfaction levels have been noticed when employees considered that "their job was interesting" and that "patient's response motivated them in their workplace". Triantafyllou [28] considered that most mental health professionals in community facilities have consciously chosen to work with the mentally ill, were properly trained in psychosocial rehabilitation issues, believed that their interventions could be effective and as a result this kind of professionals could be more satisfied and less burdened. In addition, it is considered that community professionals have greater autonomy and more choices, so that they may not experience monotony in their work field. The positive effect of autonomy on job satisfaction was also highlighted in the Knudsen et al. [29] survey conducted in 823 community therapists in the USA.

The high level of professional satisfaction of our participants in terms of cooperation between colleagues is in line with the results of the Chiou-Fen Lin et al. [30] survey of mental health nurses, according to which there was a strong positive correlation between teamwork and job satisfaction, a finding also known from previous studies by Roche & Duffield [31] and Ward [32] among mental health professionals. In the survey of Dimitriadou et al. [33] and Kremeti [12], the majority have referred that they were pleased with cooperation with their colleagues. Satisfactory cooperation between colleagues could be attributed to the cooperative nature of work in community psychosocial rehabilitation facilities and, perhaps, to the great work experience of both nursing and non-nursing staff of our sample. Employees with greater work experience may have realized that it is worth maintaining good relations with patients and colleagues, because this, in addition to having positive effects to their mental health, is also important for the protection of their balance which may facilitate their smooth professional development. In general, the more experienced employees unlike the younger ones have realized that if work is by nature difficult, there is no need to waste additional energy on unimportant daily conflicts.

In this study, the majority of participants reported a high level of professional satisfaction in terms of supervision. Fairness, consistency, transparency and positive feedback, as well as clarity of supervisors' demands have a decisive impact on increasing the job satisfaction of mental health professionals [34]. A remarkable finding in this survey is that nurses were statistically significant more satisfied with supervision by their managers compared to the other specialties of mental health professionals. This finding is consistent with the conclusions of Kovner et al. [35] and Karanikola and Kleanthous [23]. Supervisors are of great importance to nurses as they are responsible for implementing a stable administrative framework and clinical supervision and promoting a trustful working environment and teamwork practices. Essentially, people with a relatively permanent low perception of their personal value need strong external feedback from supervisors and colleagues to think positively of their personal value.

However, in the present investigation, it was found that nurses were statistically significant less satisfied with the nature of the work compared to the other specialties of mental health professionals. Triantafyllou [28] also concluded that nurses in psychiatric facilities appeared to be less satisfied with the nature of their work than psychiatrists. It is possible that nurses had higher expectations about the therapeutic dimensions of their work and their degree of autonomy in relation to the reality they had experienced, resulting in greater dissatisfaction with the nature of the work. In Greek reality there is a difference between theoretical education and practice in nursing profession. Nurses are forced, due to the lack of staff, to carry out auxiliary work most of the time, which creates ambiguity of their role and conflicts. On the other hand, the profession of doctors, who are their closest coworkers, is characterized by a high level of independence in the context of planning and decision-making. Nurses' limited initiatives are attributed not only to doctors' interventions, but also to the prevailing social representations of their profession [36].

Finally, it should be noted that a moderate level of satisfaction of participants was reported, in this study, with regard to the level of communication within mental health facilities related to their goals and their employees' tasks. Additionally, it was found that the nursing staff were statistically significant less satisfied with communication compared to the other specialties of mental health professionals working in psychosocial rehabilitation facilities. This finding is consistent with the result of the Borou et al. [20] study, in which 44.4% of nurses were most interested in defining the goals of the department where they worked. This finding could partly explain the fact that nurses were less satisfied with the nature of their work compared to the other specialties of mental health professionals.

23.4.1 Limitations

This study was conducted in psychosocial rehabilitation facilities located in the Athens area. The results cannot be generalized. The second limitation is that this study has excluded mental health professionals working in private facilities. An additional limitation is the use of self-report questionnaires.

23.5 Conclusions

Job dissatisfaction may affect health professional' productivity and work performance. Lack of satisfaction in the workplace appears to lead to increased absenteeism, tardiness, complaints, and resignations. Employees' engagement and productivity are increased by enhancing job satisfaction. As a result, the quality of provided health care delivery is improved, and patients becomes more satisfied. Considering the results of this study, appropriate administrative and educational measures should be taken in the field of psychosocial rehabilitation services to solve the problems that reduce mental health professionals' job satisfaction.

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Depressive Symptoms and Anger Expression Among Survivors After Stroke

24

Anastasia Papadopoulou,
Panagiotis Papadopoulos,
Eirini Grammatopoulou, Anna Kavga,
Alexandra Koreli, Alexandra Mantoudi,
Angeliki Stamou, Georgia Gerogianni,
and Afroditi Zartaloudi

Abstract

Introduction: Stroke is a frequent cause of death and one of the most common causes of disability and depression in the countries of the Western world. Depression is associated with limited functionality, reduced self-care, and increased mortality in patients with stroke. Anger often occurs in these patients and may disrupt the course of their recovery. Aim: The investigation of the presence of depressive symptomatology, the expression of anger, and the degree of functioning/independence of patients after stroke. Method: One hundred and ten patients after stroke completed the Center for Epidemiological Studies-Depression (CES-D) scale, the State-Trait Anger Expression Inventory, and the Barthel Index. Results: Patients who lived alone had a higher depressive symptomatology score than patients who did not live alone ($p = 0.009$). An increase in the total depressive symptomatology score was related to an increase in the anger expression score ($p = 0.011$), increase in anger-in score ($p < 0.001$), increase in anger-out score ($p < 0.001$), and decrease in anger control score ($p = 0.001$). Females had lower anger-in scores compared to men ($p = 0.029$). Individuals with a history of previous stroke had higher anger-out scores compared to people without a history of previous stroke ($p = 0.025$). An increase in the patient's functional/independence score was associated with an increase in anger control score ($p = 0.015$). Conclusions: Early detection and management of depression and anger will facilitate patient's compliance to the rehabilitation program in order to achieve optimal therapeutic results and ensure a better quality of life.

Keywords

Stroke · Depression · Anger expression · Functionality

24.1 Introduction

Stroke is a particularly common problem, since after heart disease and cancer, it is the third leading cause of death in the countries of the Western world [1, 2]. Depression is the most frequent dis-

A. Papadopoulou · P. Papadopoulos · A. Kavga ·
A. Koreli · A. Mantoudi · A. Stamou · G. Gerogianni ·
A. Zartaloudi (✉)
Department of Nursing, University of West Attica,
Athens, Greece
e-mail: azarta@uniwa.gr

E. Grammatopoulou
Department of Physiotherapy, University of West
Attica, Athens, Greece

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order after stroke and is associated with excessive disability, limited functioning, reduced self-care, poor social and economic living conditions, cognitive impairment, and increased mortality [3, 4].

Additionally, anger occurs in 15–57.2% of patients after stroke [5], and it can arise due to the brain damage, the patient's personality, or because of the hospital environment [6]. There are three distinct forms of anger expression: (a) anger-in, which refers to individuals who suppress their anger and do not openly express it, (b) anger-out, which refers to individuals who verbally express their anger, and (c) controlled anger (anger-control), which refers to individuals who experience intense anger but maintain constant control over its expression [7]. The psychological condition of patients usually creates problems in terms of rehabilitation and in their relationship with their environment and family caregivers. However, depression and anger may not be perceived or may be underestimated by patients, making their recovery difficult [6].

The aim of this study was to investigate the presence of depressive symptomatology in patients after stroke, their expression of anger and the degree of their functioning/independence.

24.2 Methodology

24.2.1 Data Collection

The sample consisted of 110 patients after stroke with a mean age of 69.3 years (SD = 13.7), who came for their follow-up appointment to the neurological outpatient clinic of General Hospital of Argolis or came for rehabilitation treatment at the Physical Medicine and Rehabilitation Center of General Hospital of Argolis or were hospitalized in the pathological clinic of the Nursing Unit of Argos and Nafplion. Questionnaires were also given to patients who were either hospitalized or came for treatment and rehabilitation at the Mediterranean Rehabilitation Center in Loutraki. A total of 137 questionnaires were given to patients of the above units (response rate of 80.29%). Collection of the questionnaires took place between April and October 2020. Ethical rules were followed and the researchers obtained informed consent from all study participants after relevant approval and permission by the Scientific Council of the above nursing units. In addition, participants were informed about the purpose of the study, the confidentiality of responses and data, the assurance of anonymity of their identity, the voluntary nature of their participation, their right to refuse or discontinue participation in the study and that the data would be used only for research purposes, according to the ethical standards of the Declaration of Helsinki (1989) of the World Medical Association.

The inclusion criteria for participation in the study were all the patients to be adults, not to exhibit aphasia and to exhibit a satisfactory level of cooperation and perceptual ability, to have a good knowledge of Greek language, and to complete informed consent form.

Exclusion criteria were age <18 years old, patients with insufficient knowledge of the Greek language or serious cognitive or perceptual disorders, resulting in the inability to understand/cooperate and patients who did not wish to participate.

24.2.2 Instruments

Participants were administered a structured questionnaire about socio-demographic and clinical characteristics, the Center for Epidemiological Studies-Depression (CES-D) scale, the State—Trait Anger Expression Inventory, and the Barthel Index.

24.2.2.1 Center for Epidemiological Studies-Depression (CES-D) Scale

The CES-D is a 20-item self-report measure that includes questions that pertain to a wide range of depressive symptoms and was developed by the Center for Epidemiologic Studies [8]. Respondents are asked to rate the frequency of occurrence of each symptom in the last 4 weeks on a 4-point scale, which ranges from 0 = rarely or none of the time (less than 1 day) to 3 = most or all of the time (5–7 days). Sixteen items tap a variety of cognitive, affective, behavioral, and somatic symptoms associated with depression, four focus on positive moods, scored in reverse direction (i.e., a raw score of 0 = 3, 1 = 2, 2 = 1, and 3 = 0). Total scores are calculated by summing responses across the set of 20 individual items and can range from 0 to 60, with higher scores indicating greater depression. A score of 16 or greater typically is employed as a cutoff that indicates clinical depression [8]. The scale has been translated in Greek language and validated in the Greek population. Internal consistency for the questionnaire has been found satisfactory (Cronbach's alpha = 0.81) indicating high reliability [9].

24.2.2.2 State-Trait-Anger Expression Inventory

State-Trait-Anger Expression Inventory (STAXI) Scale [10] is comprised of 24 items and 3 subscales evaluating anger; assessing anger-in (items 3, 5, 6, 10, 13, 16, 17, 21), anger-out (items 2, 7, 9, 12, 14, 19, 22, 23), and anger control (items 1, 4, 8, 11, 15, 18, 20, 24). This tool is composed of three subscales of anger-in, anger-out, and anger-control, with eight questions for each subscale. Anger-in refers to the frequency with which anger that is experienced is held in or suppressed. Anger-out refers to the extent to which an individual expresses anger towards other people or objects in the environment. Anger control refers to the effective control or reduction of anger. Grading is based on a 4-point Likert scale (1 = almost never, 2 = sometimes, 3 = often, 4 = almost always). Higher scores indicate higher level of the particular anger expression in each subscale. The scale has been translated in Greek language and validated in the Greek population. Cronbach's alpha was 0.72 for anger-out, 0.66 for anger-in and 0.85 for anger-control [11].

24.2.2.3 Barthel Index

The Barthel Index (BI) was first developed by Mahoney and Barthel in 1965 [12] and later modified by Collin, Wade, Davies, and Horne in 1988 to investigate functionality and self-care abilities and could be completed by a health professional through direct observation and by patients themselves when they are able to complete it [13]. The BI is a widely used measure of functional disability. The index was developed for use in rehabilitation patients with stroke [14]. The Barthel Index (BI) measures the extent to which individuals can function independently and have mobility in their activities of daily living (ADL). BI consists of 10 common ADL activities including: feeding, bathing, grooming, dressing, bowel control, bladder control, toileting, chair transfer, ambulation, and stair climbing [12]. Items are rated in terms of whether individuals can perform activities independently, with some assistance, or are dependent (scored as 15, 10, 5, or 0). Items are weighted according to the level of nursing care required. The score is calculated by simply totaling the individual item scores. The index yields a total score out of 100—the higher the score, the greater the degree of functional independence [15]. A modified scoring system has been suggested by Shah, Vanclay, & Cooper [16], using a 5-level ordinal scale for each item to improve sensitivity to detecting change (1 = unable to perform task, 2 = attempts task but unsafe, 3 = moderate help required, 4 = minimal help required, 5 = fully independent). Shah et al. [16] note that a score of 0–20 suggests total dependence, 21–40 severe dependence, 41–60 moderate dependence, and 61–90 slight dependence and 91–100 no dependence. Cronbach's alpha was 0.98–0.97 indicating high reliability [16].

24.2.3 Statistical Analysis

Statistical analysis was performed using the SPSS 20.0 statistical program. Descriptive statistics (means, standard deviations and frequencies) were used in this study and inductive statistical analysis (Pearson's index, Spearman, t-test, analysis of variance, multiple linear regression) was performed for correlations between variables. A p-value ≤0.05 was considered to be statistically significant. Internal consistency for the questionnaire was evaluated with Cronbach's alpha indexes. Values ≥0.7 were indicative of good internal consistency of the items. For this research, Cronbach's alpha was 0.79 for CES-D, 0.80 for anger-in, 0.71 for anger-out, 0.86 for anger-control, and 0.92 for Barthel Index.

24.3 Results

The sample consists of 110 patients who had stroke (62.7% were male and 37.3% female) with an average age of 69.3 years (SD = 13.7). The majority of the participants were married (76.4%), had children (89.1%), had primary school education (55.5%), and were pensioners (60%). (Table 24.1).

Additionally, 76.4% of the sample had suffered an ischemic stroke and 23.6% hemorrhagic stroke, 29.1% had heart disease, 44.5% had hypertension, and 26.4% had diabetes mellitus. Additionally, 11.8% of the patients had a previous history of stroke. Moreover, 25.5% of the participants used to smoke, 20.0% consumed alcohol, 33.6% were taking antidepressant treatment 51.8% were not able to take care for themselves, and 5.6% of the participants had a body mass index (BMI) of 27.9 and were overweight.

The mean self-report score of depressive symptomatology was 22 (Table 24.2), when a score of 16 and above (>=16) is indicative of individuals at risk for depression (Table 24.3).

The higher the self-report score of depressive symptomatology, the more depressive symptoms the person experiences. In this study, 74.5% of participants were at risk for depression (score >= 16). The mean score on the anger-in subscale was 15, on the anger-out subscale 15.8 and on the anger control subscale 21.6.

The patient's mean functioning/independence score (BARTHEL INDEX, BI) was 69.7, indicating slight dependence (Table 24.4).

From the correlations between the scores of depressive symptomatology, anger expression, and degree of functioning/independence in patients with stroke (Table 24.5), it was found a positive statistically significant association between:

Depressive symptoms and anger expression ($r = 0.249$, $p = 0.009$).
Depressive symptomatology and the internalization of anger (anger-in) ($r = 0.364$, $p < 0.001$).
Depressive symptomatology and anger externalization (anger-out) ($r = 0.519$, $p < 0.001$).
Functionality/independence (BARTHEL scale) and anger control ($r = 0.372$, $p < 0.001$).

Additionally, it was found a negative statistically significant association between:

Depressive symptomatology and anger control ($r = -0.422$, $p < 0.001$).
Depressive symptomatology and functioning/independence (BARTHEL scale) ($r = -0.412$, $p < 0.001$).
Anger internalization and anger control ($r = -0.547$, $p < 0.001$).
Anger externalization and anger control ($r = -0.366$, $p < 0.001$).

According to the multivariate linear regression, the following results are presented (Table 24.6):

Patients who lived alone had a higher depressive symptomatology score (CES-D) than patients who did not live alone ($p = 0.009$).
An increase in the total depressive symptomatology score (CES-D) was related to an increase in the anger expression score (State-Trait Anger Expression Inventory) ($p = 0.011$), increase in anger-in score ($p < 0.001$), increase in anger-out score ($p < 0.001$), decrease in anger control score ($p = 0.001$).
Females had lower anger-in scores compared to males ($p = 0.029$).
Individuals with a history of previous stroke had higher anger-out scores compared to people without a history of previous stroke ($p = 0.025$).
An increase in the patient's functional/independence score (BARTHEL INDEX, BI) was associated with a reduction in depressive symptomatology score (CES-D) ($p < 0.001$) and an increase in anger control score ($p = 0.015$).

Table 24.1 Sociodemographic characteristics of the sample ($N = 110$)

		N	%
Gender	Male	69	**62.7**
	Female	41	37.3
Marital status	Single	7	6.4
	Married	84	**76.4**
	Divorced	2	1.8
	Widowed	17	15.5
Do you have children?	Yes	98	**89.1**
	No	12	10.9
Education	Illiterate	22	**20.0**
	Primary education	39	**35.5**
	Secondary education	14	12.7
	High school	16	14.5
	Technological education	2	1.8
	University education	11	10.0
	MSc	2	1.8
	PhD	1	0.9
	Other	3	2.7
Occupation	Freelancer	21	19.1
	Civil servant	19	17.3
	Employee in private sector	21	19.1
	Farmer	31	**28.2**
	Other	18	16.4
Are you currently working?	Full time	13	11.8
	Part time	2	1.8
	Unemployed	3	2.7
	Pensioner	66	**60.0**
	Household	3	2.7
	Disability pension	16	14.5
	Unemployed for health reasons	7	6.4

Table 24.2 Mean ± SD of depressive symptoms and ways of expressing anger

	Min	Max	Mean	SD
Depression CES-D	0	60	**22**	9.1
Anger-in	8	30	**15**	4.7
Anger-out	8	29	**15.8**	4.2
Anger control	8	32	**21.6**	5.4
Total anger expression score	24	74	**52.4**	6.4
Functionality (BARTHEL INDEX, BI)	0	100	**69.7**	29.2

Table 24.3 Percentage of people at risk for depression

Score of depressive symptomatology based on the scale (CES-D)	*N* (%)
<16	28 (25.5)
>=16	**82 (74.5)**

Women had a lower functioning/independence score (BARTHEL INDEX, BI) in comparison with men ($p = 0.001$).

People who needed help in order to take care of themselves had a lower functional/independence score (BARTHEL INDEX, BI) than people who could take care of themselves without external assistance ($p < 0.001$).

Table 24.4 Categorization based on patient's functional/independence score (BARTHEL INDEX, BI)

		N	%
Score assessing patients' functionality, self-care and independence (BARTHEL INDEX, BI)	Complete dependency—institutionalization (0–20)	8	7.3
	Severe disability—dependence on an assisting person (21–40)	14	12.7
	Moderate dependency—potential for maximum improvement (41–60)	13	11.8
	Slight dependency (61–90)	44	**40.0**
	No dependency (91–100)	31	**28.2**

24.4 Discussion

In this study, 74.5% of participants had depressive symptomatology (CES-D score $\geq$ 16), finding which is congruent with a similar study [17]. The occurrence of depressive symptoms is a recognized and frequent phenomenon among stroke patients [18] and has a negative effect on the outcome of stroke, since it seems to reduce patients' response to rehabilitation process and is associated with increased mortality [19].

This study also showed that patients who lived alone exhibited higher depressive symptoms. Living alone, changes in lifestyle or marital status, and social isolation were found to be significantly associated with depression in patients with stroke [20].

In this study, patients showed a higher mean total score on anger expression compared to the general population, a finding which is congruent with similar studies [21, 22]. In this study, a positive statistically significant association was observed between depressive symptoms and anger expression, since patients with more depressive symptoms expressed more anger and vice versa. These results are consisted with those of similar studies [21, 23]. People frequently express their anger with anger outbursts or anger suppression because they consider anger as an inappropriate emotion and they choose to push it away, which leads to depression and anxiety symptoms [24].

The findings of this study indicated that 20% of the sample showed heavy to complete dependence on basic parameters of self-care such as mobility, personal hygiene, feeding, incontinence and independent use of toilet. Strokes, apart from high mortality, cause severe social problems due to the disability and chronic incapacity of these patients [25]. In this study, patients who showed reduced score on the BARTHEL scale, which means low functioning, showed higher depressive symptoms. In a similar study, it was found that the degree of functioning and limitation in activities of daily living were related to the occurrence of depression after stroke [26–28].

The results of this study also indicated a positive statistically significant association between the degree of functioning and anger control. When people are less independent and functional, they control their anger less. This finding is consisted with those of Huang et al. [29]. According to Pascual-Leone et al. [30], conditions that cause low self-esteem, such as loss of functionality and the inability to self-care and engage in daily activities, may activate a sense of shame. Some people could react to the sense of shame with anger and self-punishing feelings.

This study also found that women had a statistically significant lower degree of functioning/independence compared to men. This finding is consistent with those of Kashihara et al. [31] and Kavga [32]. Factors that may play a role in women's function and recovery could be the difference in muscle strength and stroke severity between the two genders as well as the presence of post stroke depression in women. Females tend to be older and have more severe strokes [33–35]. Roth et al. [36] examined outcomes by gender 1 year after stroke and concluded that women had poorer rehabilitation outcomes than men.

This study also found that women had a lower anger-in score than men. This means that they did

Table 24.5 Correlations between depressive symptomatology score, anger expression, and degree of functioning/independence in stroke patients

	Depressive symptomatology score	
	Pearson coefficient	*p*-value
Anger expression score	0.249	**0.009**
Anger-in score	0.364	**<0.001**
Anger-out score	0.519	**<0.001**
Anger control score	−0.422	**<0.001**
Functionality/ independence score (BARTHEL scale)	−0.412	**<0.001**
	Functionality/ independence score (BARTHEL scale)	
	Pearson coefficient	*p*-value
Anger expression score	0.108	0.260
Anger-in score	−0.126	0.189
Anger-out score	−0.177	0.065
Anger control score	0.372	**<0.001**
	Anger-in score	
	Pearson coefficient	*p*-value
Anger-out score	0.414	**<0.001**
	Anger-in score	
	Pearson coefficient	*p*-value
Anger control score	−0.547	**<0.001**
	Anger-out score	
	Pearson coefficient	*p*-value
Anger control score	−0.366	**<0.001**

not suppress their anger, but expressed it. However, there have been studies which concluded that women tended to differ greatly in the expression of their anger, since men expressed their anger more often and more intensely [37] compared to women, who reported a greater tendency to suppress their anger, as they couldn't show anger directly due to internal and social barriers and the fact that they wouldn't be socially welcomed. The need for social approval may lead to suppression of anger [38]. However, the women of our study were less independent and functional compared to men and needed help from others to take care of themselves. As a result, they interacted more with their carers. Externalizing anger is a result of interacting with another individual [39]. Given the fact that women are usually the main caregivers for the other family members and the household, their inability to fulfill their daily family tasks and activities may lead to anger being expressed [40].

Findings of this study showed that people with a history of prior stroke had higher score in expressing anger than people without a history of prior stroke. This can be attributed to the fact that individuals with a prior history of stroke may be more likely to have experienced greater or permanent functional impairment, disability, dependence, as well as emotional burden, depression, and frustration, for a longer period of time. Thus, they may possibly express their anger to a greater extent compared to people without a history of previous stroke [21].

24.4.1 Limitation of the Study

The sample used in this study is a convenience sample since it comes from certain nursing and rehabilitation units in Greece. Thus, the findings cannot be generalized. Additionally, further investigation of depressive symptomatology, expression of anger, and the degree of functioning/independence in stroke patients can be achieved with more qualitative approaches.

24.5 Conclusions

Patients with stroke manifest depressive symptoms and anger in a large percentage, due to their impaired functionality. These patients may have deficit in self-care, increased dependence on others, and limited autonomy. In this study, patients with more depressive symptoms expressed more anger and vice versa. In addition, patients with low level of functioning and independence expressed their anger more frequently. Women had less post-stroke functioning and expressed their anger more frequently compared to men. Patients with a history of previous stroke expressed their anger more compared to patients without a previous stroke. The use of research

Table 24.6 Correlations between socio-demographic-clinical characteristics, and scores of depressive symptomatology, anger-in, anger-out, anger control, and functioning/independence in stroke patients (multivariable linear regression analysis)

Multivariate linear regression with total depressive symptomatology score as dependent variable (CES-D)			
	Coefficient *b*	95% confidence interval for *b*	*p*-value
Do you live alone?	−6.468	−11.291 έως −1.644	**0.009**
Do you take antidepressant treatment?	−4.866	−8.058 έως −1.674	**0.003**
Total anger expression score	0.361	0.124 έως 0.598	**0.003**
Functionality/independence score (BARTHEL INDEX, BI)	−0.117	−0.169 έως −0.066	**<0.001**
Multivariate linear regression with anger-in score as dependent variable (anger-in)			
	Coefficient *b*	95% confidence interval for *b*	*p*-value
Gender	−1.893	−3.592 έως −0.193	**0.029**
Depressive symptomatology score (CES-D)	0.204	0.113 έως 0.294	**<0.001**
Multivariate linear regression with anger-out score as dependent variable (anger-out)			
	Coefficient *b*	95% confidence intervalfor *b*	*p*-value
History of previous stroke	−2.415	−4.515 έως −0.314	**0.025**
Depressive symptomatology score (CES-D)	0.225	0.150 έως 0.300	**<0.001**
Multivariate linear regression with anger control score as dependent variable			
	Coefficient *b*	95% confidence interval for *b*	*p*-value
Depressive symptomatology score (CES-D)	−0.198	−0.309 έως −0.087	**0.001**
Patient functionality/independence score (BARTHEL INDEX, BI)	0.043	0.009 έως 0.078	**0.015**
Multivariate linear regression with the total anger expression score as the dependent variable			
	Coefficient *b*	95% confidence interval for *b*	*p*-value
Depressive symptomatology score (CES-D)	0.184	0.043 έως 0.324	**0.011**
Multivariate linear regression with patient functional/independence score as dependent variable (BARTHEL INDEX, BI)			
	Coefficient *b*	95% confidence interval for *b*	*p*-value
Gender	−11.904	−19.068 έως −4.740	**0.001**
Can you take care of yourself?	−20.502	−30.177 έως −10.827	**<0.001**
Anger control score	0.775	0.103 έως 1.448	**0.024**

data regarding the effects of stroke on patients' mental health can help health professionals to improve the psychological assessment of patients with stroke and ensure the adequate treatment of these symptoms during the rehabilitation stage.

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Correlation of Cancer Caregiver's Burden, Stress, and Their Quality of Life

Theodora Fellia, Pavlos Sarafis, Axilleas Bouletis, Vasileios Tzenetidis, Iokasti Papathanasiou, Theodora-Paisia Apostolidi, Niki Gkena, Athanasios Nikolentzos, Anna Patsopoulou, and Maria Malliarou

Abstract

Objective The purpose of this study is to examine the stress levels felt by family caregivers. The main objectives of this study are (a) the cross-examination of family caregiver's burden, (b) caregiver's stress levels and its impact on burden feeling, also (c) the effect of caregiving on caregiver's quality of life.

Methods A quantitative method was developed, with the use and collection of anonymous questionnaires. Participants consisted of 121 family caregivers of patients under Home Parenteral Nutrition (HPN), along with the oversight of the company "Ygeias Erga and co." Tools that have been used for the needs of this study are a questionnaire with basic demographics: The Zarit Burden Interview (ZBI), Quality of life questionnaire (CarGQoL), and **Kingston Caregiver Stress Scale (KCSS)** Data were analyzed with SPSS 22.

Results 65.3% of the participants were women with an average age of 50.7 years. 39.7% were patients' spouses and 26.4% were high school graduates. 31.7% of the participants suffered from a chronic disease, with 22.3% taking daily medication. 67.8% lived in the same house as the patient, 30.6% were taking care of the patient for 6–12 months, and 39.7% had no help from another person. 43.8% of patients were under HPN for 1–3 months. A negative correlation was found between all dimensions of the Zarit Burden Interview (ZBI) and Kingston Caregiver Stress Scale and cancer caregiver CarGQoL scale scoring. Participants, who had help from another person permanently, had a better quality of life from others with no help whatsoever. Higher stress levels were found to be correlated with worse quality of life.

T. Fellia · A. Nikolentzos
Hellenic Open University, Patras, Greece

P. Sarafis
University of Thessaly, Larissa, Greece

A. Bouletis
404 General Military Hospital, Larissa, Greece

V. Tzenetidis (✉) · I. Papathanasiou · T.-P. Apostolidi · A. Patsopoulou · M. Malliarou (✉)
Laboratory of Education and Research of Trauma Care and Patient Safety, Nursing Department, University of Thessaly, Larissa, Greece
e-mail: malliarou@uth.gr

N. Gkena
Nursing Department, University of Thessaly, Larissa, Greece

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Conclusions Burden increase was found to be related to stress increase. Younger participants and patients' female spouses had higher levels of stress. The present research also found that stress related to financial issues had an important role. Family caregiver support is found to be a matter of great importance, and healthcare professionals have to pay attention to their needs.

Keywords

Cancer · Caregiver burden · Quality of life · Parenteral nutrition

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All authors contributed equally to this chapter.

25.1 Introduction

Life-threatening illnesses, including cancer, not only cause great emotional distress and anxiety to the patient, but also to the patient's family [1]. In 2012, an estimated 14.1 million new cases of cancer occurred, while deaths due to cancer were estimated at 8.2 million. The incidence of cancer is estimated to exceed 400 men per 100,000 inhabitants and 300 women per 100,000 inhabitants, while their deaths were 200 and 100, respectively. The most common cancer in men in 87 countries is prostate cancer, while in Eastern Europe the most common cancer in men is lung cancer. For women, the most common cancers in North America, Europe, and Oceania are breast cancer, while the most common cancers in Latin America, the Caribbean, Africa, and most of Asia are breast and cervical cancers of the uterus [2].

It is a fact that after the diagnosis of cancer, the roles in the family and everyday life change drastically, creating the need for quick adjustment by all members and especially by the patient's main caregiver. Research has shown that caring spouses in particular experience the same level of stress (perhaps even more so) as patients. The burden on the relative may even impede adequate patient care. The burden of the informal caregiver is the objective and subjective results of the process of providing care to the patient and are related to physical, psychological, social, and financial difficulties [3].

It is generally accepted that the level of health is crucial to a good quality of life and is one of the most important indicators for assessing the quality of life. Three key indicators for assessing quality of life are physical condition, mental state, and social interaction. Individual factors that can be considered are life expectancy, living conditions, income, access to education and health, lifestyle (e.g., smoking, alcohol consumption, physical activity), etc. [4]. Significantly, the cost of treating cancer is passed on to patients and their families, resulting in them paying $ 5.6 billion in direct costs. Forty-nine percent of the costs are covered by private insurance, while only 43% by Medicare and Medicaid programs. According to research, people with a history of cancer are more likely to have financial difficulties than people who have not had cancer. The financial difficulties that a cancer patient or a former cancer patient (survivor) may experience, include difficulties in paying immediate expenses, house bills, reduced income, unemployment or lost working hours, or even skipping a doctor's appointment, or not taking medication. Due to insolvency [5, 6]. It is legitimate to further assess the burden of informal caregivers of cancer patients with severe disease. These caregivers experience an even greater burden, not only because of the more intense threat to life from the disease but also because of the chronicity that usually exists. Also, the informal caregivers of end-stage cancer patients undertake complex procedures for the care of the patient, a fact that makes their daily life more difficult. With regard to patient caregivers receiving parenteral care at home, their quality of life, there is room for further research, with the present work being an endeavor.

The aim of this study was to investigate the level of stress and quality of life of informal caregivers of cancer patients, which arise both from the stress of the disease itself and from the burdens of care.

25.2 Material and Method

Quantitative data collection was made, with anonymous questionnaires. The sample was consisted of the informal caregivers of the relatives of the patients who receive parenteral nutrition at home. The participants were the main caregiver in each home with a cancer patient receiving parenteral nutrition and the person who had undertaken the parenteral procedure. Unless the procedure was performed by a health professional, while in each home up to two participants. The questionnaire included some basic demographic data of the respondents, such as age and gender. The tools used were the Zarit Burden Interview. This questionnaire consists of 22 questions regarding the burden of the informal caregiver [7], the quality of life questionnaire: CarGQoL. The questionnaire includes 29 questions about caregiver's quality of life and daily life [8], Kingston Caregiver Stress Scale (KCSS). The questionnaire includes 10 questions about stress [9] and the quality-of-life questionnaire of a cancer patient **c**aregiver (CQOLC) with 35 statements.

25.3 Statistical Analysis

The analysis (quantitative and qualitative) as well as the processing of the questionnaire data was done with the statistical package of Social Science Analysis (SPSS). The level of statistical significance (*p*-value) was set at 5%. Mean values, standard deviations (SD), and median and interquartile range were used to describe the quantitative variables. Absolute (N) and relative (%) frequencies were used to describe the qualitative variables. Student's t-test was used to compare quantitative variables between two groups. Parametric dispersion analysis (ANOVA) was used to compare quantitative variables between more than two groups. To check the type I error, due to the multiple comparisons, the Bonferroni correction was used according to which the significance level is $0.05/k$ (k = number of comparisons). The Pearson or Spearman correlation coefficient (r) was used to control the relationship between two quantitative variables. The correlation is considered low when the correlation coefficient (r) ranges from 0.1 to 0.3, moderate when the correlation coefficient ranges from 0.31 to 0.5 and high when the coefficient is greater than 0.5. Linear regression analysis with the stepwise integration/subtraction method was used to find independent factors related to the scoring in the scale of Quality of Life, Burden and Stress of caregivers. Linear regression analysis where necessary was performed using logarithmic transformations. Significance levels were bilateral and the statistical significance was set at 0.05. The statistical program SPSS 22.0 was used for the analysis.

25.4 Results

Our sample consisted of 121 participants. 65.3% of the participants were women and the mean age was 50.7 years (SD = 16 years). 39.7% of the participants were the patient's spouses. 31.7% of the participants had a chronic illness and 22.3% were receiving daily medication. 67.8% of the participants lived in the same house as the patient, 30.6% had already taken care of him for half a year and 39.7% did not have help from someone else on a permanent basis, for the care of the patient. Finally, 43.8% of patients received parenteral at home for a period of 1 to 3 months. Participants who had help with patient care on a regular basis and from another person had a significantly higher score, that is, a better quality of life compared to those who did not have any help. There were no significant correlations regarding caregiver's quality of life, age, and duration of parenteral care. The following are the Spearman correlation coefficients of the dimensions of the Caregivers' Quality of Life Scale (CarGQoL), with the Kingston Caregiver Stress Scale (KCSS) (Table 25.1).

All dimensions of the Kingston Caregiver Stress Scale (KCSS), with some exceptions related to family factor, as well as the KCSS-total score were found to be negatively related to the quality-of-life scale; so the more anxiety-related feelings the participants had, the worse was their quality of life in all areas.

Table 25.1 Spearman correlation coefficients of the dimensions of the Caregivers' Quality of Life Scale (CarGQoL), with the Kingston Caregiver Stress Scale (KCSS)

		Care factor	Family factor	Financial factor	KCSS total
Psychological well-being	*r*	−0.65^{+}	−0.16	−0.37	−0.60^{+}
	p	**<0.001**	0.089	**<0.001**	**<0.001**
Burden	*r*	−0.61^{+}	−0.38	−0.33	−0.60^{+}
	p	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Relationship with healthcare	*r*	−0.31^{+}	−0.35	−0.39	−0.39^{+}
	p	**0.001**	**<0.001**	**<0.001**	**<0.001**
Administration and finances	*r*	−0.50^{+}	−0.31	−0.85	−0.60^{+}
	p	**<0.001**	**0.001**	**<0.001**	**<0.001**
Coping	*r*	−0.53^{+}	−0.36	−0.49	−0.55^{+}
	p	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Physical well being	*r*	−0.64^{+}	−0.23	−0.52	−0.62^{+}
	p	**<0.001**	**0.011**	**<0.001**	**<0.001**
Self-esteem	*r*	−0.32	−0.14	−0.37	−0.26
	p	**<0.001**	0.143	**<0.001**	**0.004**
Leisure time	*r*	−0.43	−0.11	−0.36	−0.39
	p	**<0.001**	0.221	**<0.001**	**<0.001**
Social support	*r*	−0.36	−0.37	−0.32	−0.41
	p	**<0.001**	**<0.001**	**0.001**	**<0.001**
Private life	*r*	−0.39	−0.06	−0.34	−0.35

$^{+}$Pearson

Table 25.2 Spearman correlation coefficients of the dimensions of the Caregivers Quality of Life Scale (CarGQoL), with the Zarit Burden Interview

		Personal strain	Role strain	Deprivation of relationships	Management of care
Psychological well being	*r*	−0.52^{+}	−0.33^{+}	−0.46^{+}	−0.64
	p	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Burden	*r*	−0.68^{+}	−0.65^{+}	−0.69^{+}	−0.18
	p	**<0.001**	**<0.001**	**<0.001**	**0.044**
Relationship with healthcare	*r*	−0.15^{+}	−0.16^{+}	−0.12^{+}	−0.37
	p	0.137	0.094	0.190	**<0.001**
Administration and finances	*r*	−0.67^{+}	−0.48^{+}	−0.39^{+}	−0.31
	p	**<0.001**	**<0.001**	**<0.001**	**0.001**
Coping	*r*	−0.37^{+}	−0.23^{+}	−0.38^{+}	−0.62
	p	**<0.001**	**0.015**	**<0.001**	**<0.001**
Physical well being	*r*	−0.68^{+}	−0.39^{+}	−0.46^{+}	−0.58
	p	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Self-esteem	*r*	−0.51	−0.19	−0.20	−0.22
	p	**<0.001**	**0.046**	**0.028**	**0.014**
Leisure time	*r*	−0.36	−0.27	−0.33	−0.16
	p	**<0.001**	**0.003**	**<0.001**	0.080
Social support	*r*	−0.35	−0.29	−0.34	−0.15
	p	**<0.001**	**0.002**	**<0.001**	0.093
Private life	*r*	−0.43	−0.28	−0.28	−0.13
	p	**<0.001**	**0.004**	**0.003**	0.171

$^{+}$Pearson

The following are the Spearman correlation coefficients of the dimensions of the Caregivers 'Quality of Life Scale (CarGQoL), with the Zarit Burden Interview (Table 25.2).

The dimensions "Personal strain," "Role strain," and "Deprivation of relationships" were found to be negatively related to all dimensions of quality of life with the exception of the dimension "Relationship with healthcare," while the dimension "Management of care" had a negative correlation with all except "leisure time," "Social support," and "Private life." The correlations found to be significant indicate that the more burden participants felt because of the care they provided, the worse their quality of life was in each area.

25.5 Discussion

In this study, an attempt was made to understand the degree of burden on the relatives of cancer patients who receive parenteral nutrition at home, as well as stress levels. The results showed a very significant burden on the informal caregivers, which in a large percentage of cases coexisted with intense stress, factors that seemed to affect all aspects of the life of the participants. The research did not reveal any link between the quality of life of caregivers and the duration of parenteral nutrition, as well as the duration of care provided. This finding is not in line with the research of Alptekin et al. in which there was a negative correlation between participants' quality of life and the duration of care provided for more than 18 months [10]. This differentiation may be due to the fact that cancer patients who receive parenteral care at home are usually already very serious [11] and therefore the burden on caregivers is already chronic and as a rule care has long since passed 18 months. According to the same research, old age, female gender, low educational level, health problems of caregivers themselves, as well as difficulties in continuing social activities were also factors that aggravate and worsen the quality of life of caregivers.

In the present survey, 60.3% had help on a regular basis from another person and greater social support, which was positively related to their quality of life and personal life. People who received help on a regular basis had less anxiety about patient care issues, and the greater the stress, the more participants questioned the effectiveness of their role as caregivers. From the research of van Ryn et al., caregivers who had significant social support and material resources were less likely to suffer from the detrimental effects of caregiving than other caregivers with limited resources and social support [12]. Unsar-Ozcetin, Dursun in their research on the quality of life, burden and resilience of informal caregivers, highlighted the value of social support and found that caregivers often neglect their social life due to the increased workload they have to cope, which further aggravates the situation and increases feelings of guilt [13].

Furthermore, a significant correlation was found between the educational level of the participants and their managerial ability, with the low educational level being associated with worse managerial ability, which was negatively affected by stress and feelings of chronic fatigue. Toptas Kilic's research on Oz shows a link between educational level and caring skills [14].

People with a higher level of education may have better communication skills, resulting in more effective management of the patient's needs.

Another important finding of Toptas Kilic's Oz study is that caregivers who cared for 1–6 h a day had higher quality-of-life scores than those who spent more hours. This agrees with the present study, as it concludes that people who live in the same house as the patient feel more stressed because they have less free time and this affects negatively their quality of life. Continuation of social activities is related to leisure time, which was less in people who lived in the same house as the patient, while in the present study, older caregivers had a worse quality of life and more stressful feelings of chronic fatigue. Semere et al. in their research on the quality of life and the burden of informal caregivers found mediocre scores on the burden of older participants and higher on the younger [15]. The findings of this study may be related to the increased other obligations (family and professional) that young people have in comparison with the older people.

Caregivers' health problems have been associated with a greater sense of burden, but research has shown that people who received daily medication were less likely to question their ability as caregivers.

The results of this study show a significant correlation between stress and quality of life of caregivers. The more feelings caregivers had about caregivers, the worse their quality of life. However, the more personal stressful feelings of chronic fatigue they had, the greater the increase in burden and the more significant the deterioration of their quality of life. From the research of Unsar et al found that the more feelings of caregivers' anxiety and depression, the greater the burden they had [3]. It has been found that mental strength is a factor that affects the quality of life and feelings of burden. Higher endurance is associated with less burden and better quality of life [13]. In this study, it was shown that the more feelings of stress and the more the participants questioned their abilities as caregivers, the less endurance they had.

25.6 Conclusions and Suggestions

The review of the literature showed the important effects that the diagnosis of cancer has on the patient himself and the rest of the family, but also on its coherence and structure. While cancer seems to have existed earlier than man himself and despite the rapid development of science and technology, its cure remains a challenge for the scientific community. However over the years new applications have greatly increased the survival expectancy for most cancers and have made it a chronic disease. The nutritional support of the cancer patient and especially the treatment of cachexia (with the help of parenteral nutrition at home), which can be a result of the disease and its complications, or even anti-cancer treatments, are among the very important improvements that have been made. in the treatment of cancer in recent years.

The chronicity of cancer, but also the frequency of its occurrence in developed countries, are factors of significant burden on health systems, with a large burden of caring for the cancer patient, to be proportional to the family environment. Quality of life is a multidimensional concept and includes elements both objectively and subjectively. Some objective factors that determine a person's quality of life are living conditions, working conditions (or unemployment), educational level, etc., while a subjective factor is the individual's perception of his quality of life. Informal caregivers of cancer patients are one of the busiest groups of caregivers, as they are faced with long-term complications and disease and are often called upon to undertake highly specialized care procedures, which consume most of their daily time. Stress, physical and emotional fatigue and depression that often coexist, are factors that worsen the quality of life of the caregiver. The resilience of the caregiver can affect the care provided and consequently the quality of life of the patient himself.

Both the research and the literature review showed that the burden on informal caregivers of cancer patients is very significant. Informal caregivers play a crucial role in the patient's quality of life, highlighting the need for support from health professionals. It is legitimate for their role to be recognized more and for more importance to be given to the special needs they may have.

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Changes in Smoking Habits in Greece During the Lockdown Measures Due to COVID-19

Ioannis C. Lampropoulos, Paraskevi Kirgou,
Dimitrios G. Raptis, Erasmia Rouka,
Ourania Kotsiou, Dimitrios Papagiannis,
Zoe Daniil, Konstantinos I. Gourgoulianis,
and Foteini Malli

Abstract

Introduction During lockdown, people are experiencing higher than usual levels of stress related to social isolation, employment, and finances that may result in lifestyle changes. Here, we aim to assess whether smoking habits changed during the lockdown measures due to coronavirus disease 2019 (COVID-19).

Methods For the purpose of the survey, an online questionnaire was distributed from the tenth of April to the second of May 2020, among a Greek population, by using an online platform.

Results Two hundred smokers/vapers participated in the present survey (62.5% women, 44% of 36–45 years, 29% of 16–55 years, 15.5% 26–35 years). The daily number of cigarettes smoked before the onset of the COVID-19 pandemic is 15.06 ± 9.84, while during the restrictive measures due to COVID-19, the daily number of cigarettes smoked is 14.52 ± 10.13 ($p > 0.05$). Vapers consumed an average of 0.54 ± 2.43 mL vapor per day before the COVID-19 pandemic and 0.61 ± 2.81 mL during lockdown. Males smoked more cigarettes per day before (16.31 ± 11.87) and during the lockdown (15.33 ± 12.17) versus females (14.30 ± 8.36) and 14.04 ± 8.70, respectively) ($p > 0.05$ for both genders). Before versus during the restrictive measures, subjects that were primary school graduates smoked more cigarettes per day (28.00 ± 9.09 and 27.50 ± 9.57, respectively), followed by subjects that were high school graduates (16.90 ± 9.33 and 15.97 ± 9.50, respectively), university graduates (14.17 ± 10.14 and 13.93 ± 10.66, respectively), postgraduates (12.96 ± 9.52 and 12.25 ± 9.90, respectively) and middle school graduates (12.89 ± 8.22 and 14.22 ± 7.93, respectively).The self-reported reason for the change in the mL vaporized and the cigarettes smoked are confinement at home (36.3%), stress about COVID-19 (34.09%), free time (20.45%), boredom (4.54%), stress about the work status (2.27%), and participation in online lucky games (2.27%).

I. C. Lampropoulos (✉) · D. G. Raptis · E. Rouka ·
O. Kotsiou · F. Malli (✉)
Respiratory Disorders Lab, Faculty of Nursing,
University of Thessaly, Larissa, Greece

P. Kirgou · Z. Daniil · K. I. Gourgoulianis
Department of Respiratory Medicine, Faculty of
Medicine, School of Health Sciences, University of
Thessaly, Larissa, Greece
e-mail: zdaniil@uth.gr; kgourg@uth.gr

D. Papagiannis
Public Health and Vaccines Lab, Faculty of Nursing,
University of Thessaly, Larissa, Greece

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Discussion We did not observe significant differences in the daily consumption of smoke/vaping during the lockdown measures. More studies are needed to assess the long-term effects of the pandemic in smoking habits.

Keywords

Smoking habits · COVID-19 · Lockdown · Greece

26.1 Background

The novel coronavirus disease 2019 (COVID-19), which is induced by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and detected in December 2019 in Wuhan city of China, has spread rapidly across the world. Declared as a pandemic in March 2020 [1–3], each country confirming a number of cases of COVID-19 first began to implement strict hygiene measures and then imposed restrictions and quarantine on population. In consequence, some 4 billion people were forced to stay quarantine themselves at home.

During lockdown, people are experiencing higher than usual levels of stress related to social isolation, employment, finances, caring responsibilities, and concerns about catching or becoming ill from the virus [4]. Many smokers mistakenly believe that smoking helps to relieve stress and report smoking as a means of coping with high levels of stress [5].

At the other hand, during the COVID-19 pandemic, tobacco use remains a public health priority [6], with the tobacco smoking consumption being among the leading causes of death worldwide [7]. Quitting smoking reduces the risk of chronic diseases and increases healthy life expectancy [8].

The aim of our study is whether the lockdown measures negatively affected smokers and vapers and thus resulted in increased cigarette, tobacco or e-cigarette consumption during the period of restrictive measures in Greece. In addition, correlations were sought with the demographic characteristics of the respondents in relation to whether the respondents smoked or smoked increased.

26.2 Methods

The survey was conducted from the tenth of April to the second of May 2020, among the Greek population, by using an online platform, accessible through any device with an Internet connection. The survey was disseminated through institutional and private social networks (Facebook and Linkendin) and institutional mailing lists. Although it is a statistical method whose population parameters cannot be controlled, it was adequate for our research objectives because it facilitated the widespread dissemination of the questionnaire during the coronavirus pandemic period where there are many territorial constraints.

The electronic questionnaire was designed to measure the habits of conventional or e-cigarette smokers before and after their period of confinement at home due to COVID-19. The questionnaire, included 9 demographic questions (gender, age group, marital status, number of children, education, permanent residence, monthly net income category, occupation category, post-employment measures), as well as 11 questions on smoking and vaping related to the daily smoking habits and their cost. The answers were collected by posting the questionnaire on social media. The reliability analysis of the questionnaire scale used for conventional smokers shows a high Cronbach's alpha value of 0.70 and for e-cigarette smokers equal to 0.76.

Data are expressed as mean ± SD unless otherwise indicated. Normal distribution was assessed by the Kolmogorov-Smirnov test. In the cases of normality, the *t*-test or analysis of variance (ANOVA) was used for the statistical comparison between groups. In the cases of non-normality, we used the Mann-Whitney U test, Kruskal-Wallis, Wilcoxon z, and the Friedman test, respectively. All the statistical analyses were performed at the statistical significance level of 5% corresponding to p value of 0.05. Data were analyzed with SPSS software, version 22 (Statistical Package for Social Sciences Inc., 2003. Chicago, USA).

26.3 Results

Two hundred smokers/vapers participated in the present survey during the period 10/04/2020–02/05/2020 when the questionnaire was posted on social networking pages. Of the respondents, 62.5% were women and 37.5% were men. The sociodemographic characteristics of the population is presented in Table 26.1.

The daily number of cigarettes smoked before the onset of the COVID-19 pandemic is 15.06 ± 9.84, while during the restrictive measures due to COVID-19, the daily number of cigarettes smoked is 14.52 ± 10.13 ($p > 0.05$). Vapers consumed an average of 0.54 ± 2.43 mL vapor per day before the COVID-19 pandemic and 0.61 ± 2.81 mL during lockdown.

The majority of respondents (57.5%) stated that they smoke a conventional cigarette, followed by those who use tobacco (34.5%) and an electronic cigarette (4%). The results show that 1% use tobacco in combination with electronic cigarette, while 3% smoke conventional cigarette in combination with electronic cigarette.

The majority of respondents seem to have smoked cigarettes and tobacco for more than 10 years and electronic cigarettes for 2–5 years (Fig. 26.1).

Gender is a parameter of differentiation in the number of cigarettes smoked by participants daily before and during the quarantine. Males smoked more cigarettes per day before (16.31 ± 11.87) and during the lockdown (15.33 ± 12.17) versus females (14.30 ± 8.36) and 14.04 ± 8.70, respectively) ($p > 0.05$ for both genders).

Regarding cigarettes per day per age group before the onset of the pandemic and after the restrictive measures, there was no statistically significant difference observed.

Table 26.1 The sociodemographic characteristics of the participants

Variable	N	%
Gender		
Male	75	37.5%
Female	125	62.5%
Age group		
>18 years	1	0.5%
18–25 years	4	2%
26–35 years	31	15.5%
36–45 years	88	44%
46–55 years	58	29%
56–65 years	16	8%
>65 years	2	1%
Marital status		
Unmarried	52	26%
Married	120	60%
Divorced	3	1.5%
Widower/widow	2	1%
Educational level		
Primary school	4	2%
Middle school	9	4.5%
High school	70	35%
University graduate	69	34.5%
Postgraduate doctoral studies	48	24%
Permanent residence		
Urban (>10,000 residents)	143	7.5%
Semi-urban (3000–10,000 residents)	28	14%
Rural (<3000 residents)	21	10.5%
Island	8	4%
Income		
0–149 euro	9	4.5%
150–299 euro	6	3%
300–499 euro	21	10.5%
499–699 euro	33	16.5%
700–999 euro	56	28%
1000–1499 euro	49	24.5%
>1500 euro	26	13%
Professional category		
Private employee	106	53%
Civil servant	33	16.5%
Freelance	31	15.5%
Farmer	6	3%
Unemployed	21	10.5%
Household—Retired	3	1.5%

The number of cigarettes smoked before and during the lockdown did not differ in terms of age group, marital status, number of children, or place of residency. However, we observed significant differences in terms of cigarettes per day according to the educational level both before ($p = 0.012$) and during ($p = 0.029$) the lockdown. Before versus during the restrictive measures, subjects that were primary school graduates smoked more cigarettes per day (28.00 ± 9.09

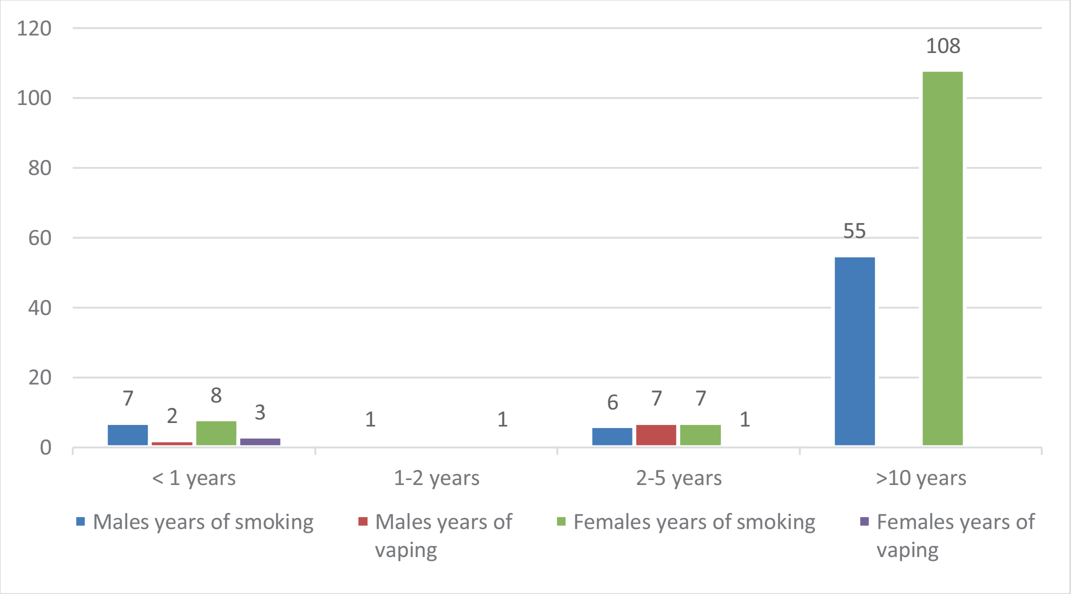


Fig. 26.1 Years of smoking and vaping in in the study population according to gender

and 27.50 ± 9.57, respectively), followed by subjects that were high school graduates (16.90 ± 9.33 and 15.97 ± 9.50, respectively), university graduates (14.17 ± 10.14 and 13.93 ± 10.66, respectively), postgraduates (12.96 ± 9.52 and 12.25 ± 9.90, respectively), and middle school graduates (12.89 ± 8.22 and 14.22 ± 7.93, respectively).

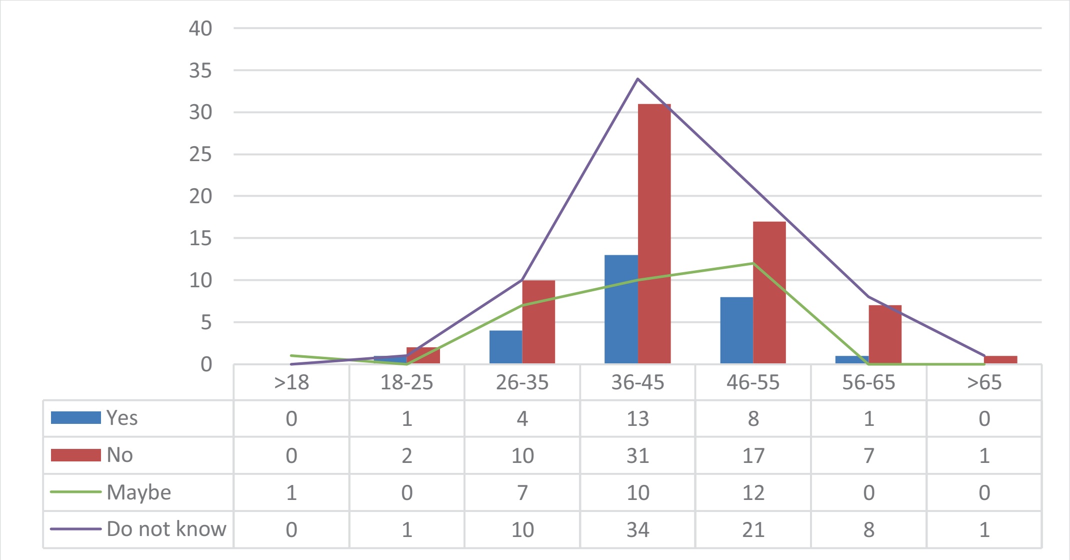
Respondents in all age groups appeared to be undecided on whether they believe they will reduce smoking after resumption of measures. In more detail, 34% the smokers/vapers reported that they do not consider reducing smoking after the restrictive measures, 13.5% reported that they think about reducing smoking after the lockdown, while the majority (37.5%) were undecisive. The rest (15%) reported that maybe they would reduce smoking after the restrictive measures but they were not sure yet (Fig. 26.2).

Participants that changed smoking during the quarantine were further asked to describe the reasons that led to the change. It seems that the reasons for the change in the mL vaporized and the cigarettes smoked are confinement at home (36.3%), stress about COVID-19 (34.09%), free time (20.45%), boredom (4.54%), stress about the work status (2.27%), and participation in online lucky games (2.27%) (Fig. 26.3).

26.4 Discussion

In the present study, we failed to observe any significant difference in the daily consumption of smoke/ vaping during the lockdown measures versus before the pandemic. We observed that daily cigarette consumption differed according to the educational level in both time points. Those who changed their smoking habits attributed the change mainly due to the obligatory confinement at home due to lockdown measures, stress related to COVID-19 and more free time.

We did not observe significant changes of smoking habits before and after the lockdown that occurred in Greece in May 2020. Di Renzo et al. studied an Italian population, and suggested that smoking is reduced significantly during the pandemic 3.3% of subjects decided to quit smoking during lockdown [9]. In addition, researchers reported that participants who smoked >10 cigarettes/day decreased by 10.5% during the pandemic. The relative decrease in smoking habits may be partially explained by the fact that smok-



	>18	18-25	26-35	36-45	46-55	56-65	>65
Yes	0	1	4	13	8	1	0
No	0	2	10	31	17	7	1
Maybe	1	0	7	10	12	0	0
Do not know	0	1	10	34	21	8	1

Fig. 26.2 Intention to reduce smoking or vaping after resumption of measures

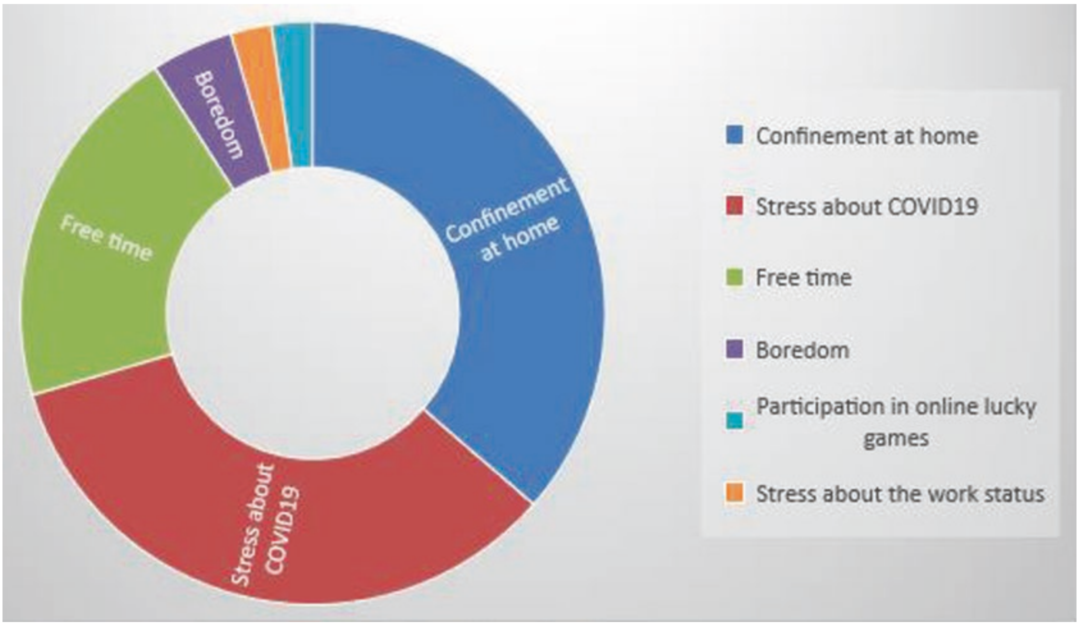


Fig. 26.3 Reported reasons for the differences in smoking and vaping before versus during the quarantine

ing has been considered a risk factor for COVID-19 related outcomes while studies have observed that smokers have greater odds for contracting COVID-19 [10]. Among current smokers before lockdown, 10.1% quit smoking and 13.5% decreased cigarette intake. In another study, a 13.2% of ex-smokers reported relapsing during lockdown while 32.7% of participants increased their daily cigarette intake [11]. Although national public health associations have suggested and advised smokers to quit smoking in order to reduce COVID-19 related adverse events

[10]. We failed to observe a significant difference of smoking habits during the lockdown. One possible reason for this may be that during the study period, Greece had not yet faced a significant COVID-19 wave in terms of both infections, hospitalizations and deaths [12].

Studies have proposed that the COVID-19 pandemic can influence the smoking habits in 3 different themes [13]. Some subjects may increase smoking as a coping mechanism to reduce COVID-19-related stress and boredom due to the obligatory confinement at home. Others consider that lockdown may aid in their try to quit smoking since it raises health concerns. Studies have shown that the fear of being infected with COVID-19, fear of death, anxiety when listening to the news about the pandemic and sense of powerlessness were related with increasing cigarette [11]. In our study, most of the subjects that changed their smoking habits during lockdown attributed it to the obligatory confinement at home, and the stress related to COVID-19.

We observed that educational level was associated with educational level, with subjects that attended only primary school smoking more cigarettes per day both before and during the quarantine. Subjects that were high school graduates, university graduates, and postgraduates followed in descending order of cigarettes per day consumption. Similar results have been reported by others that provide further support of a social inequality of smoking irrespectively of the pandemic [14]. The fact that subjects that have limited education level are less likely to be informed about the devastating health effects of smoking than subjects of higher educational levels my underline this finding [15].

The present study has several limitations. The questionnaire that assessed the research questions was distributed through social media and thus we cannot ensure compliance with the parameterization. However, this method was used in order to overcome geographical barriers that arose due to the restrictive measures. Another limitation of the present study is the fact that the changes were self-reported and were not subjectively confirmed. In addition, we did not examine for changes that may have occurred long-term. Future studies are needed in order to effectively address whether the changes reported remain after the restrictive measures.

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27

Assessment of Burden in Family Caregivers of Chronic Hemodialysis and Peritoneal Dialysis Patients During the Pandemic Period of COVID-19

Pantelis Stergiannis, Maria Christoforaki,
Charalampos Platis, Eleni Lahana,
Aikaterini Niki Oikonomou, and George Intas

Abstract

Introduction In Greece, patients undergoing hemodialysis (HD) usually go to dialysis centers two or three times a week for three/four hours per session BECAUSE the treatment for home is unavailable; therefore, caregivers should perform supportive transportation and care functions.

Purpose This study was designed to assess the burden and quality of life in caregivers of patients undergoing hemodialysis and peritoneal dialysis (PD) and to record their attitude toward Coronavirus Disease-2019 (COVID-19).

Methodology We studied caregivers of patients undergoing hemodialysis and peritoneal dialysis. A total of 80 caregivers took part (30 caregivers of patients of PD and 50 caregivers of patients of HD). The final form of the questionnaire was based on the Quality-of-Life Scale (SF-12) and the Zarit Scale, in order to record the scale of burden and the effect on them throughout the process. The Fear Due to COVID-19 Scale (FCV-19S) contributed to recording the caregivers' fear toward the pandemic of COVID-19.

Results Most of the caregivers were women with an average age of about 60 years and 6–10 were the patient's wife or partners. The prevalence of the moderate or severe burden of the patients was found at 18.7%, and the few or no burden at all at 33.8%. The prevalence of fear toward COVID-19 was at very high levels, reaching 82.5% in all caregivers.

Conclusions During the pandemic period of COVID-19, the role of the caregivers of the patients, both who follow the PD method and those who have joined the HD, is particularly important. Their quality of life has been partially affected in all dimensions.

P. Stergiannis (✉)
Faculty of Nursing, National and Kapodistrian University of Athens, Athens, Greece

M. Christoforaki
University General Hospital of Heraklion "PAGNI", Iraklio, Greece

C. Platis
Greek DRG Institute SA, Athens, Greece

E. Lahana
University of Thessaly, Volos, Greece
e-mail: elahana@uth.gr

A. N. Oikonomou
General Hospital of Arta, Arta, Greece

G. Intas
General Hospital of Nikaia "Agios Panteleimon", Nikaia, Greece

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Keywords

Caregiver burden · Chronic kidney disease · Dialysis · Peritoneal dialysis · Quality of life

27.1 Introduction

The term chronic kidney disease (CKD) includes any disorder that may affect the function of the kidney [8]. Its progression can be slow and its course can progress from 2 to 10 years, resulting in end-stage renal disease. A characteristic feature of kidney disease is its silent manifestation and development, since no particular symptoms are obvious in early stages of the disease. Signs that indicate kidney disease include swelling, especially in the lower extremities, intense feeling of fatigue, and macroscopic hematuria. Diseases such as diabetes, high blood pressure, long-term use of non-steroidal anti-inflammatory drugs, inflammatory diseases such as glomerulonephritis, and polycystic kidney disease can lead to similar conditions.

Hemodialysis (HD) as a way of treatment of acute renal failure is the ideal solution. In many cases, where patients suddenly develop symptoms of nausea and respiratory discomfort, the only solution for the health to be restored in just a few sessions is anuria with dialysis [10]. When patients use non-steroidal anti-inflammatory drugs, cardiovascular disorders or even bleeding occur in acute conditions.

Peritoneal dialysis (PD) is the process that, with the use of special solutions, achieves the removal of excess water and substances that are useless for the body, through the peritoneal cavity. In order to start PD therapy, it is necessary to place a peritoneal catheter in an appropriate way to ensure safe access to the peritoneal cavity. The procedure is performed in a specialized unit, mainly using Tenckhoff catheters [2].

In case of chronically ill patients, the presence of a caregiver, meaning a person who will provide any care needed to them throughout their recovery, is often considered necessary. These are mainly people who are not qualified to provide such services and hold the title of the informal caregiver (informal caregiver), most of whom are people of the patients' immediate family environment, usually spouses or patients' offspring. On the other hand, it is not unusual that the care of a patient or an elderly person is entrusted to an experienced health professional, providing any health service for a fee.

The purpose of this study was to investigate the impact of renal function replacement methods on patients' caregivers whose quality of life is to be differentiated and burdened. An effort will be made to review the effects on their health, both physically and mentally, as well as on their family and wider social environment.

27.2 Materials and Methods

This is a cross-sectional study. The study was performed on a total of 80 patient caregivers: 50 of them were patient caregivers of the Artificial Kidney Unit and 30 were patient caregivers of the Continuous Portable Peritoneal Dialysis Unit of the University Hospital of Heraklion, respectively, aged over 18 years, who have integrated in the substitutional process of their renal function for at least 6 months.

An essential tool in the data collection was a questionnaire, which initially included questions about the respondents' demographic content, and questions depicting their quality of life according to the SF-12 scale [7]. Furthermore, the questionnaire included questions to assess the degree of burden on caregivers of kidney patients with the main tool being the Zarit Scale ("The Zarit Burden Interview," 2007; "Open Journal Systems," 2015). The above scales are reliable, valid methods of approaching the research topic, weighted in the Greek population, and free to use [7]. Due to the COVID-19 pandemic, questions based on the F-CoV-19 Scale have been included to assess the scale of fear surrounding the pandemic [3, 11].

27.2.1 Statistical Analysis

Frequency distributions of descriptive and other patient care characteristics of the study were calculated. The form of the distributions of the scores of the Quality of Life, Health Charge, and Fear Due to COVID-19 Scale was checked using the Blom method (QQ plot), while their reliability coefficients were calculated using the Cronbach method. As a slight asymmetry was detected, the two components of Quality of Life were compared using the Student t method. Because of separation in two groups and smaller models due to their particular characteristics, a non-variable correlation was made with the non-parametric Spearman method between scales and characteristics of caregivers. The Student t and Mann-Whitney criteria were used on a case-by-case basis to compare the levels of the scales between the two groups of caregivers. An acceptable significance level was set to 0.05.

27.3 Results

Overall, 80 dialysis patients participated in the study (Table 27.1), 60% were women, and the average age of all was 60.5 years (±10.4) with 51.2% being 60+ years old. Also, 93.7% were married and 43.8% reported that up to 2 members were living in the same household. Their education background varied evenly in all levels, most of them graduating primary school (31.0%). In terms of their professional employment, the majority of the caregivers considered themselves as private employees (31.3%), with 46.3% declaring an average monthly income of less than 800 euros. Finally, 76.3% of them lived in an urban area.

In terms of their proximity to patients, the majority, or 70.0%, live in the same home as the patient, while only 7.5% in the same or a different neighborhood. Also, 58.8% of caregivers are patients' spouses/partners and 36.3% children; in day care, 66.3% report up to 5 h of care for the patient while the average length of care was estimated at 4.8 years ranging from half a year to 13 years (Table 27.2).

Table 27.1 Demographic data of the participants

		N	%
Sex	Men	32	40.0
	Women	48	60.0
Age	Middle age		60.5 (10.4)
	41–59	39	48.8
	60–79	41	51.2
Marital status	Married	75	93.7
	Unmarried, divorced, widowed	5	6.3
Family members living in the same house	To 2	35	43.8
	3	24	30.0
	4+	21	26.3
Education	Primary school	25	31.2
	Secondary school	20	25.0
	High school	18	22.5
	Higher education	17	21.3
Occupation	Household	15	18.7
	Freelancer	4	5.0
	Private employee	25	31.3
	State employee	13	16.3
	Farmer	5	6.3
	Retired	18	22.4
Monthly income, €	<800	37	46.3
	800+	43	53.7
Residential area	Rural	19	23.7
	Urban	61	76.3

The control in terms of characteristics shows a significant difference between the two groups only in terms of gender, giving a homogeneity between them, and consequently was directly compared to additional parameters. Specifically, the group of caregivers in PD has significantly more women than the HD group (93.3% vs. 40.0%, $p < 0.001$), while neither their average age differs (62.1 vs. 59.2 years, $p > 0.05$), nor the average length of care for their patients (4.4 vs. 5.1 years, $p > 0.05$). At the same time, this homogeneity shows that patients who have undergone, or are about to undergo, peritoneal dialysis, their caregivers have common characteristics, the most important being their proximity, family status, day care, or their relationship with the patient ($p > 0.05$) (Table 27.3).

Table 27.2 Characteristics of 80 caregivers related to their patients with HD/PD

		N	%
Proximity to accommodation	Same home with a patient	56	70.0
	Same building	18	22.5
	Same different neighborhood	6	7.5
Relationship with the patient	Spouse or partner	47	58.8
	Child	29	36.3
	Brother	2	2.5
	Person with pay	2	2.5
Day care, hours	0–5	53	66.3
	6–10	25	31.2
	>10	2	2.5
Care period, years	Average [max., min.]	4.8 (2.9) [0.5, 13.0]	

Table 27.3 Comparison of frequency distributions of characteristics of two groups of patient caregivers in dialysis: peritoneal dialysis (PD) and hemodialysis (HD)

		Patients'		
		Caregivers in		
		PD	HD	
		%		*p*-Value
Number	*N*	30	50	–
Sex	Men	6.7	60.0	<0.001
	Women	93.3	40.0	
Age, years	Average	62.1 (8.8)	59.2 (11.2)	0.179
	41–59	36.7	56.0	0.094
	60–79	63.3	44.0	
Marital status	Married	96.7	92.0	0.404
	Unmarried, divorced, widowed	3.3	8.0	
Family members living in the same house	To 2	53.3	38.0	0.120
	3	33.3	28.0	
	4+	13.4	34.0	
Education	Primary school	33.3	30.0	0.457
	Secondary school	33.3	20.0	
	High school	16.7	26.0	
	Higher education	16.7	24.0	
Monthly income, €	<800	53.3	42.0	0.325
	800+	46.7	58.0	
Residential area	Rural	30.0	20.0	0.309
	Urban	70.0	80.0	
Proximity to accommodation	Same home with a patient	76.7	66.0	0.287
	Same building	13.3	28.0	
	Same or different neighborhood	10.0	6.0	
Relationship to the patient	Spouse or partner	72.0	52.0	0.310
	Child	26.7	42.0	
	Brother	–	4.0	
	Person with pay	3.3	2.0	
	0–5	70.0	64.0	0.515
Day care, hours	6–10	30.0	32.0	
	>10	–	4.0	
Care period, years	Average value (median)	4.4 (4.5)	5.1 (5.0)	0.340

Checked χ^2 and Mann-Whitney

Comparing the self-reported mental health status between the two groups of caregivers with the question "How would you generally characterize your mental health status due to your involvement with patient care?," it was clear that caregivers who are in PD (CPD), in comparison to their counterparts in HD (CHD) patients, showed a significantly higher percentage of very good health (43.3% vs. 10.0%, $p = 0.002$). According to the question "How much has your life been affected by your involvement with patient care (social, family, professional, etc.)?," no significant difference in the influence of the caregivers of the two groups ($p > 0.05$) has arisen. As for the numbers, the CPDs state a slightly higher percentage of effect, compared to their counterparts in HD patients (16.7% vs. 30.0%, $p > 0.05$).

The average scores of Physical and Mental Health Quality of Life were found at moderate to low levels, or 47.0 (±7.8) and 42.9 (±8.4) respectively, with possible limits 0–100 and the higher score indicating better Quality of Life. Physical health had significantly higher average scores than mental health ($p < 0.001$), while their reliability, estimated through the Cronbach coefficient was found to be 0.833 and 0.785 or excellent.

The average score of the Zarit Scale was found to be 29.9 (±11.4), with possible limits 0–88, in which a higher score indicates a higher burden. Furthermore, its reliability was rated at 0.914 (excellent) as well as its 4 subscales—Personal Intensity, Role Intensity, Relationship Deprivation, and Care Management—in which they were rated from 0.812 to 0.941. However, according to its categorization, the prevalence of the moderate or severe burden was found in 18.7% of caregivers and the small or no burden in 33.8%.

Examining the rating of the Fear Scale due to COVID-19, its average value is found in moderate to high levels of fear or in 20.6 (±4.7), with possible limits of 7–35, in which a higher score indicates higher fear. Its reliability was also rated at 0.837 or excellent. According to the limit of 16.5 points, the prevalence of high fear due to COVID-19 was found to be very high in 82.5% of the caregivers.

In both groups of caregivers, there were similarly significant correlations between the scales, where, among other things, the Health Charge is significantly associated with lower levels of Physical and Mental Health Quality of Life ($p < 0.05$) or with higher levels of Fear due to COVID-19 ($p < 0.05$). In addition, Personal Intensity as a burden is significantly associated with lower levels of Physical and Mental Health, Quality of Life ($p < 0.05$), or Role Intensity, with higher levels of Fear due to COVID-19 ($p < 0.05$). It is also noted that in both groups of caregivers, of PD and HD, the high sense of Fear due to COVID-19 is significantly associated with lower levels of Mental Health Quality of Life (rho = −0.571 and − 0.310, respectively; $p < 0.05$).

Among the groups of caregivers who were already included in PD or HD, the increased age is significantly associated with lower levels of Physical Health and Quality of Life (rho = −0.362 and − 0.645, respectively; $p < 0.05$), while most hours of care per day are associated with higher levels of Health Charge (rho = 0.440 and 0.321, respectively; $p < 0.05$) or charge with Personal Intensity (rho = 0.553 and 0.431, respectively; $p < 0.05$). It is also noted, among other things, that most hours of care per day are associated with higher levels of Fear due to COVID-19 in the group of the caregivers who have taken care of patients in PD (rho = 0.499, $p < 0.05$).

Regarding Quality of Life, in both Physical and Mental Health, there is no significant difference between the group of caregivers of HD patients and those who undergo PD (percentage point of average levels +4.6% and − 0.5%, respectively; $p > 0.05$) or in the sense of Fear due to COVID-19 (+6.6%; $p > 0.05$). In contrast, the Health Burden seems to be significantly higher by +27.2% in the group of caregivers of HD patients compared to those of PD (mean values 33.4 vs. 24.3 or + 27.2%, respectively; $p < 0.001$), by +23.8% in the burden of Personal Intensity ($p = 0.001$), by +35.1% in the burden of Intensity of the Role ($p = 0.001$), and by +68.4% in the burden of Care Management ($p = 0.002$) (Table 27.4).

Table 27.4 Comparison of the levels of Quality-of-Life Scale (SF-12), Zarit Health Fear, and Fear Due to COVID-19 (FCV-19S), between the two groups of the caregivers of PD patients and the ones of HD patients

Scales and their subscales		Caregivers				*D*-difference	*p*-Value
		Patients on dialysis who are included in:					
		PD		HD			
		Average price	Standard deviation	Average price	Standard deviation		
Quality of life[a]	Physical health	45.6	8.7	47.8	7.1	+4.6%	0.217
	Mental health	43.0	8.7	42.8	8.4	−0.5%	0.919
Health burden[b]		24.3	8.3	33.4	11.7	+27.2%	<0.001
Personal intensity		12.2	4.2	16.0	5.1	+23.8%	0.001
Intensity of the role		4.8	2.1	7.4	3.7	+35.1%	0.001
Deprivation of relationships		6.1	2.4	7.0	2.6	+12.9%	0.098
Care management		0.6	1.5	1.9	1.7	+68.4%	0.002
Fear due to COVID-19[c]		19.7	4.1	21.1	5.0	+6.6%	0.187

[a]Higher score (→ 100) determines a higher Quality of Life; [b]Higher score (→ 88) determines higher charge; [c]Higher score (→ 35) indicates higher anxiety, fear, or anxiety due to COVID-19

Moreover, while checking the grading of the charge between the two groups of caregivers, we found a significantly higher grade in the group of the caregivers of the HD patients compared to caregivers in PD, with moderate or severe burden (26.0% vs. 6.7%, respectively; $p = 0.002$), confirming that the caregivers of the patients who will join or have already joined the HD will have a significantly higher health burden.

27.4 Discussion

The purpose of this study was to estimate the prevalence of the caregivers of patients undergoing any form of extra-renal dialysis—either HD or PD—as well as to compare the frequency and degree of their burden. In order to determine the Quality of Life—physical and emotional—an evaluation of the effects on their health was conducted with the below results.

27.4.1 Characteristics of Caregivers

A total of 80 people participated in the study, 50 of them being the caregivers of patients undergoing HD and the rest of them being the caregivers of patients undergoing PD. About 2/3 of all patient caregivers were women with an average age of 60.5 years, while in similar studies the average age of patient caregivers reaches 75 years [12]. In terms of proximity to patients, about seven out of ten live in the same household as the patient, with six out of the ten caregivers being the spouses/companions of the patients and with 4.8 years as an average care period, a percentage close to the one in the study by Belasco et al. [4].

Homogeneity was found in the characteristics of PD caregivers and those in HD and, in general, there were quite a few similar characteristics, with the most important being their proximity to the residence, their marital status, the day care, and their relationship to the patient ($p > 0.05$). The caregivers of patients in PD were found to have, in comparison to their counterparts in HD, a significantly higher percentage of very good health ($p = 0.002$) [6].

27.4.2 Quality of Life, Burden, and Fear Due to COVID-19

The 80 participating caregivers of the study were found moderate to low levels of Physical and Mental Health Quality of Life, with higher levels of Mental Health ($p < 0.001$). The prevalence of moderate or severe burden was found at 18.7% of caregivers and little or no charge at 33.8%. Fear due to COVID-19 was found to be moderate to high while the prevalence of a high sense of fear was found to be very high in 82.5% of caregivers.

27.4.3 Characteristics, Quality of Life, Burden, and Fear Due to COVID-19

In both groups of caregivers, among others, the Health Charge was found to be significantly associated with lower levels of Physical and Mental Health Quality of Life ($p < 0.05$) or with higher levels of Fear due to COVID-19 ($p < 0.05$). The burden in a similar study in 2019 was found to be mild to moderate, with female caregivers being superior to the male population [1]. Quality of Life, in both Physical and Mental Health, does not differ significantly between the group of caregivers of patients with HD and those already in PD ($p > 0.05$) or the feeling of Fear due to COVID-19 ($p > 0.05$). In fact, the caregivers' own attitude toward the patients and the burden that they have undertaken has a strong dynamic toward the patients themselves. No matter how energetically and enthusiastically the care of the patient begins, the long-term involvement exhausts them physically and alters their psychosynthesis [12].

In contrast, the Health burden seems to be significantly higher by +27.2% in the group of caregivers of HD patients compared to those who undergo PD ($p < 0.001$) or by +68.4% in the burden of Care Management ($p = 0.002$). A similar study showed the exact opposite result with HD caregivers being charged at a rate of 35% compared to PD caregivers, whose burden was 13% [5]. In Mexico, too, the attitudes of PD caregivers toward those undergoing HD differ by the same proportion, with the former showing lower loads of influence [9].

Basically, partners/wives are those who support the patient the most, and according to the results they also have low rates of burden. The emotional bond and connection between them as well as the culture of the Greek family do not allow in most cases the manifestation of difficulties and reluctance to take such responsibility. The comparison of the caregivers of both methods shows the independence, flexibility, and freedom provided by the PD method by adjusting the treatment schedules by themselves, but also the possibility of applying the treatment in their home space compared to the HD method. The caregivers of the patients of HD are forced to follow the program of the unit, and in fact, the duration of the treatment is very long and in several cases their stay in the area is necessary.

The sample of the research may be considered small and the results are not very safe, since the research was conducted in one of the three units of the city taking into account the limitations of the study. The development of the present study will be more ideal and its continuation by studying cases from both public and private units in Greece, so that the results include a wider range of patients and caregivers.

27.5 Conclusions

During the pandemic period of COVID-19, the role of the caregivers of the patients, both of those who follow the PD method and those who have joined the HD, is particularly important. Their Quality of Life has been partially affected in all dimensions.

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28

Attitudes of Employees in Unaccompanied Children's Shelters and Work-Related Stress During the COVID-19 Pandemic

Eirini-Chrysovalandou Andravizou,
Emmanouil Zoumakis, Dimitrios Vlachakis,
Christina Kanaka-Gantenbein,
and Flora Bacopoulou

Abstract

Data related to the stress of employees in shelters for unaccompanied minors are scarce, especially when considering the escalation of the refugee issue. This study analyzed aspects of this issue as it was carried out in child protection organizations in Greece, which is a country where a huge number of immigrants and refugees pass through and thousands of professionals are employed in this field.

More specifically, the aim of this study was to examine the stress (general, perceived, work-related) and burnout symptoms of a specific group of employees exposed to the COVID-19 quarantine restrictions, employees at the 'front line' of care in shelters that host unaccompanied minors and teenagers.

The study was carried out from March 2020 to December 2021, when social restrictions and other preventive measures were imposed. The study sample was recruited from non-governmental organizations and shelters for unaccompanied minors, in the urban area of the center of Athens, i.e. the International Organization for Migration, The Home Project, Arsis, Iliachtida, and Zeuxis. The sample consisted of employees at the 'front line' of care in shelters that hosted unaccompanied minors and teenagers. Participants were professionals whose duty was to deal with and respond to the needs of children and adolescents within the shelters they lived in. Participants completed the following questionaires before and after the pandemic restrictions: the Job Stress Measure (JSM), the Maslach Burnout Inventory (MBI), the Perceived Stress Scale (PSS), the Stress in General Scale (SiGS) and a questionnaire of 11-items regarding COVID-19, focusing on

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E.-C. Andravizou
School of Medicine, National and Kapodistrian University of Athens, Athens, Greece

E. Zoumakis · C. Kanaka-Gantenbein
First Department of Pediatrics, School of Medicine, Aghia Sophia Children's Hospital, National and Kapodistrian University of Athens, Athens, Greece
e-mail: zoumakis@bioacademy.gr; ckanaka@med.uoa.gr

D. Vlachakis
Laboratory of Genetics, Department of Biotechnology, School of Applied Biology and Biotechnology, Agricultural University of Athens, Athens, Greece
e-mail: dimvl@aua.gr

F. Bacopoulou (✉)
Center for Adolescent Medicine and UNESCO Chair in Adolescent Health Care, First Department of Pediatrics, School of Medicine, Aghia Sophia Children's Hospital, National and Kapodistrian University of Athens, Athens, Greece
e-mail: fbacopoulou@med.uoa.gr

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the professionals' perceived stress, working conditions, working demands and the impact of COVID-19 on all the aforementioned.

The study sample consisted of 50 employees (40 females, 10 males; mean age ± SD 31.46 ± 7.91 years) in hostels for unaccompanied minors. A statistically significant difference was found only in SiGS, with increased stress after COVID-19 ($p = 0.001$). In terms of sex, significant differences were found at baseline in PSS and Emotional Exhaustion ($p = 0.036$ and $p = 0.028$, respectively) (females revealed higher levels than males). Age and educational level were factors that interacted with the increased levels in SiGS after COVID-19 ($p = 0.015$ and $p = 0.006$, respectively). Moreover, significant differences were found at baseline in PSS ($p = 0.004$), with higher levels observed in employees with higher education. Workers who did not work remotely had lower levels in Personal Accomplishment after COVID-19 compared to employees who worked remotely ($p = 0.050$). Interestingly, the JSM showed a tendency for decreased stress levels after the implementation of the quarantine, suggesting that the employees' work-related stress remained approximately at the same levels. On the other hand, perceived stress increased as the job demands remained the same, while social and personal outlet was in appeasement.

The necessity for more research to be held among health professionals is evident and is also imperative to carry out interventional studies to manage stress and thus, provide better mental health services to unaccompanied minors. There is also need for further research in similar populations of professionals outside the urban context of Athens, i.e. in the Greek islands near the sea borders, where the refugees' entries are higher in number and more frequent.

Keywords

Burnout · Unaccompanied minors · Refugee · Stress · Work stress · Pandemic · COVID-19

28.1 Introduction

Employees often face difficulties due to work exhaustion (burnout). Stress, insecurity, high competition, demanding duties, lack of support and demanding or even exhausting working hours are factors related to symptoms of work fatigue [1]. The aforementioned conditions are often encountered in various workplaces, especially in the field of human service professions [2].

Working with immigrants and refugees can also aggravate burnout symptoms among professionals. A common cause of employees' burnout symptoms is their interaction with humans and focus on people's difficulties and problems (psychological, physical, etc.). Thus, it is common for them to internalize uncomfortable feelings of anger, resentment, frustration, etc. They often do not process these emotions in a manageable way, which leads to frustration and ambiguity [3]. Consequently, employees can get emotionally exhausted and vulnerable in terms of stress, less resilient and prone to anxiety [4]. In the long term, continuous exposure to work environments with intense demands and stress has a negative effect on the physical and mental health of employees who work with refugees and leads to intense conscious and unconscious changes in their daily life [5]. The demanding work conditions seem to have worsened over the last 2 years, with the extraordinary conditions brought by the coronavirus disease 2019 (COVID-19) pandemic, to which most of the employees in human service professions were exposed to.

The aim of this study was to examine the stress (general, perceived, work-related) and burnout symptoms of a specific group of employees exposed to the COVID-19 quarantine restrictions, employees at the 'front line' of care in shelters that host unaccompanied minors and teenagers.

28.1.1 Introductory Statistics on the Refugee Issue

Research has been carried out to study the extent of the refugee crisis and arrivals in recent years, while the refugee issue was on the rise. Refugee arrivals since 2014 have fluctuated according to the legislations that changed and the amount of the population that eventually moved out of Greece.

In 2014, arrivals in the Aegean Sea were 41,038, and in 2015, they increased to more than 856,723. The number of arrivals decreased in 2016 to 173,450 and in 2017 to 29,718. In 2018, from January until October 18, the arrivals reached 25,766 refugees [6, 7].

Following the agreement between the European Union (EU) and Turkey, i.e. from March 2016, arrivals in Greece were significantly reduced, while in 2018, an increase was observed again. During the same year, among 25,766 refugees who arrived in Europe, 29.2% were Syrian, 23.3% were Afghan, 9.4% were from Iraq, 4.5% were from the Democratic Republic of Congo and 14.5% from other East and North African countries, according to data from UNHCR [8].

In 2018, most people arrived in Greece by the sea and 12,207 by land. Also 39.6% were minor males whereas 50% were women and children. The global population of people displaced against their will increased by 2.3 million in 2018. By the end of the year, nearly 70.8 million people were displaced by force worldwide because of persecution, conflict, violence or human rights violations. As a result, the number of displaced population, especially unaccompanied minors, was high [7, 8].

Crossing through the Mediterranean land led to over 1500 deaths or missing people in 2021, while in 2020, the number reached 1754. From January until September 2021, over 48,000 arrivals were recorded, while in 2020, the number of arrivals was almost half, i.e. 25,400 arrivals in the corresponding period [9].

The Russian invasion in Ukraine has also forced millions of people to leave their country of origin, even though it was only for precautionary reasons. There have been 8.8 million crossings from Ukraine since the war began, according to UNHCR [6]. A total of 73,850 people requested international protection in March 2022, which was 11% more than in March 2021.

Restrictions imposed due to the coronavirus pandemic resulted in a reduction in migration flows to the EU. However, the number of arrivals started to increase again in 2021 and 2022, partly due to the Russian-Ukrainian war [9].

28.1.2 COVID-19 Impact

In 2021, a total of 632,315 asylum applications were registered in the EU, 33.8% more than in 2020, the year in which the pandemic began. In 2019, 744,810 applications were registered, significantly less than the one million applications submitted in 2015 and 2016 [10]. It seems that the pandemic also created conditions for reduction in migration flows, unfortunately without improving at all the living conditions of existing refugees and migrants. The Greek state in conjunction with the non-governmental organizations (NGOs) and their staff member groups started making efforts to respond appropriately, to provide care employing cultural sensitivity and respect to every refugee. However, the provision of mental health care to refugees and immigrants faced many obstacles during this effort [11].

The ongoing lockdowns and quarantines, which were taken under consideration in this research, also affected employees, not only because they could not work face-to-face but also because of the nascent fear of closure of businesses due to possible bankruptcy. A great amount of work and education was conducted remotely, mass gatherings were prohibited, visits to specific populations (nursing homes, prisons, etc.) were not freely permitted, borders were closed for a while, traveling was reduced to the minimum and vaccination certificates were demonstrated only when appropriate [12]. This was a constantly stressful situation for society in general and especially for professionals who worked with other human beings facing similar stressors and distress in their everyday life.

28.1.3 Stress and Impact on Employees

Stressful working conditions appear to have an impact on employees on a physical, behavioral and psychological level. Employees are affected on many levels in their quality of life, and this may also affect the quality of their services. In the field of health professionals, burnout, defined as the syndrome of emotional exhaustion and cynicism [13], is even more common. Maslach et al. define this as 'the state of a person who faces exhaustion, accompanied by feelings of ineffectiveness and reduced ability to perform and provide' [14]. Employees may end up being frequently absent from work, avoiding training programs and supervisions at the workplace. At the level of personal resources, the desire for personal achievement is exhausted and the goals are disoriented and unrealistic [15]. At a physical level, sleep disorders, rapid heartbeat, sexual dysfunction, eating disorders, muscle pains, headaches, etc. may occur. At a behavioral level, it is possible to experience emotional fatigue, lack of organizational skills, reduced interaction in social life or even tensions at an interpersonal level. Often, people feel the need to resign from their jobs [16]. At a psychological level, burnout appears to lead to irritation, stress, tension and feelings of helplessness. These may escalate to symptoms of anxiety, chronic stress and depression.

28.1.4 Burnout of Employees in Shelters for Unaccompanied Minors

Mainly, NGOs care for and often cover the needs of the refugees they accommodate. Thus, the workload that staff members must face is demanding. Health professionals work through creating relationships with children and adolescents. They obtain information from their history, testimonies and often their traumatic experiences. They also support young accompanied children in their academic and psychological journey and cover their health-related needs from the very beginning of their stay at the shelters they live in. Both the initial contact and the general work within the shelters can cause stress to the members of staff, a secondary level of post-traumatic stress, or even cause symptoms of avoidance or emotional exhaustion, which can lead to occupational burnout [15, 17].

When employees constantly deal with the aforementioned symptoms and remain out of personal inner work and therapy, their mental health is threatened. Homeostatic mechanisms become inactive, and often they lose their resilience to stressful situations as they constantly deal with work insecurity and distress. In international literature, the situation, as described, is mentioned in different ways, such as compassion fatigue [18], secondary post-traumatic stress [19] and vicarious traumatization [17, 20, 21].

Data related to the stress of employees in shelters for unaccompanied minors are scarce, especially when considering the escalation of the refugee issue. This study analyzed aspects of this issue as it was carried out in child protection organizations in Greece, which is a country where a huge number of immigrants and refugees pass through and thousands of professionals are employed in this field.

28.2 Methods

28.2.1 Methods and Procedure

This study was carried out from March 2020 to December 2021, a period during which the COVID-19 restrictions were imposed. It was conducted among professionals of child protection organizations in Greece under conditions of social exclusion (quarantine) due to the pandemic.

The study sample was recruited from NGOs and shelters for unaccompanied minors in the urban area of the center of Athens, i.e. the International Organization for Migration, The Home Project, Arsis, Iliachtida, and Zeuxis.

28.2.2 Participants

The sample consisted of employees at the 'front line' of care in shelters that hosted unaccompanied minors and teenagers. Participants were professionals whose duty was to deal with and respond to the needs of children and adolescents within the shelters they lived in.

28.2.3 Inclusion Criteria

The selection criteria were for the workers to be directly involved in the daily needs of the children and adolescents, to cover shifts and to have very good knowledge of the Greek and English languages, even if they were not their native languages. Professionals had to take on parental caring roles inside the temporary home of the refugee minors.

28.2.4 Exclusion Criteria

Employees, such as cleaners and other supporting, administrative staff or volunteers in the workplace, were excluded from the study. Additionally, employees in the accounting or legal departments or those who were supervisors or managers were excluded from the study.

28.2.5 Ethical Considerations

The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments. The study's protocol (no 56303/2020) was approved by the School of Medicine of the National and Kapodistrian University of Athens, Greece.

28.2.6 Measures

Participants had to respond to questionnaires, which measure work stress and perceived stress in general, as described below. Upon enrollment in the study, they received a unique personal code which remained the same until the end of the study. Participants used the given code to complete the questionnaires, to insure their anonymity and abide by the data protection legislation. The completion of the questionnaires was carried out within the employees' working space and hours, which was usually limited, but sufficient. The first page of the questionnaires referred to the demographics of the participants. Age, academic level and marital status were mentioned, as well as if they dealt with a medical issue or if they received any kind of medication. The following measures were used:

Job Stress Measure (JSM) – Judge et al. (1994) [22]

It consists of 16 items, in which the participants indicate with a 1–5 Linkert scale the extent to which each of the items produces stress at their work, i.e. 1 – produces no stress, 2 – produces little stress, 3 – produces some stress, 4 – produces quite a bit of stress, 5 – produces a great deal of stress. It has been used to measure job and life attitudes of male executives, where it showed positive correlation between stress and workload, job insecurity and difficulties in working relationships and physical and mental condition of workers.

In the present study, the reliability of the JSM measured by Cronbach's alpha was $\alpha = 0.912$ at baseline and $\alpha = 0.913$ at after the COVID-19 quarantine restrictions.

Maslach Burnout Inventory (MBI) – Maslach et al. (1996) and Maslach and Jackson (1981) [23]

The MBI currently has three distinct versions in use and has been used in a range of professional settings. The three-dimensional construct is composed of emotional exhaustion, depersonalization and professional efficacy. The first two forms are addressed to healthcare professionals, i.e. Human Services Survey (MBI-HSS), and teachers, i.e. Educators Survey (MBI-ES). The MBI-HSS' three-factor structure has been validated on samples of healthcare professionals and social workers, like the main sample of this research. It is important to mention an adjustment made in the MBI questionnaire [23] for this research, where a specific word was replaced with a more appropriate one for the population studied. Specifically, in all the questions where the word 'student' is mentioned, it was replaced with the word 'unaccompanied guest'.

In the present study, the reliability of the MBI measured by Cronbach's alpha at baseline was $\alpha = 0.753$ (Depersonalization), $\alpha = 0.687$

(Personal Accomplishment) and α = 0.900 (Emotional Exhaustion). PostCOVID-19 quarantine restrictions, Cronbach's alpha for the same tool was $\alpha = 0.829$ (Depersonalization), $\alpha = 0.871$ (Personal Accomplishment) and α = 0.754 (Emotional Exhaustion).

The Perceived Stress Scale (PSS) (14 Items) – Cohen et al. (1983) [24]
The PSS, a 14-item instrument designed by Sheldon Cohen, is one of the most widely used psychological instruments for measuring the perception of stress. It measures the degree to which situations in someone's life are appraised as stressful. PSS can range from 0 to 40, with higher scores indicating higher levels of perceived stress. Scores ranging from 0 to 13 indicate low stress, scores ranging from 14 to 26 indicate moderate stress, whereas scores ranging from 27 to 40 indicate high perceived stress.

In the present study, the reliability of the PSS measured by Cronbach's alpha was α = 0.812 at baseline and α = 0.752 post COVID-19 quarantine restrictions.

The Stress in General Scale (SiGS) – Jeffrey M. Stanton et al. (2001) [25]
This is a general measure of work stress in which three diverse samples of workers provided psychometric and validity evidence. All evidence converged on the existence of two distinct subscales, each of which measured a different aspect of general work stress. The original scale utilizes three response options: "yes" (coded as 3 points) , "no" (coded as 0 points) and "I can't decide" (coded as 1.5 points).

In the present study, the reliability of the SiGS measured by Kuder-Richardson was $\alpha = 0.805$ at baseline and $\alpha = 0.711$ after the COVID-19 quarantine restrictions.

After the period of social exclusion due to the double restriction of quarantine in the Greek society, the above questionnaires were re-distributed with the addition of one more questionnaire:

11-Item Questionnaire Regarding Work Stress Distributed in the Midst of Lockdowns
This questionnaire measured physical and psychological symptoms that occurred due to the COVID-19 pandemic. Furthermore, it pointed out which employees had to work remotely, who got sick from the virus and whether they felt fear or stress due to the virus, the working conditions and family obligations.

28.2.7 Statistical Analysis

Continuous variables are shown as mean ± standard deviation or as median and interquartile range for non-normally distributed variables. Comparisons of continuous data were carried out with the use of student t-test after checking the assumption of homogeneity of variance or Mann-Whitney U test for non- parametric data. Comparisons between pre- and post-COVID-19 measures were carried out with t-test for paired samples or Wilcoxon test for non-parametric data. Pearson or Spearman's rho correlation coefficients identified correlations between continuous variables. Differences (Δ) in correlations were calculated as the difference between post-measure minus the baseline. *p* values were based on 2-tailed tests, and statistical significance was set at $p < 0.05$. Statistical analysis was carried out using the SPSS software 25 version for Windows (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.).

28.3 Results

A total of 50 employees (40 females, 10 males; mean age ± SD 31.46 ± 7.91 years) in hostels for unaccompanied minors participated in the study. Participants' demographics characteristics as well as their data concerning the COVID-19 pan-

Table 28.1 Demographic characteristics of the study sample and data concerning the COVID-19 pandemic

	n	%
Sex		
Women	40	80.0
Men	10	20.0
Age (years)		
<30	28	56.0
31+	22	44.0
Educational level		
Till high school	10	20.0
Bachelor	28	56.0
Master	11	22.0
PhD	1	2.0
Did you feel any changes/upheavals in your working and daily conditions?		
Yes	42	84.0
No	8	16.0
Did you take on multiple roles (role confusion)?		
Yes	27	54.0
No	23	46.0
Were you suspended from work due to governmental order?		
Yes	8	16.0
No	42	84.0
Did you work remotely?		
Yes	15	30.0
No	35	70.0
Was there a balance between work responsibilities and family responsibilities?		
Yes	30	60.0
No	20	40.0
Do you belong to a vulnerable group (elderly, immunosuppressed patients or with a chronic condition)?		
Yes	2	4.0
No	48	96.0
Did you feel concerned about possible exposure to the virus during work (exposure of yourself or your family indirectly)?		
Yes	35	70.0
No	15	30.0
Were you ill until the month of December 2021?		
Yes	19	38.0
No	31	62.0
Were you quarantined (due to illness or contact with a case or for preventive reasons)?		
Yes	23	46.0
No	27	54.0

Values are expressed as absolute (*n*) and relative frequencies (%)

demic are presented in Table 28.1. More specifically, 84.0% of the workers felt that several changes/upheavals in their working and daily conditions happened, and 54.0% felt they took on multiple roles (role confusion). A minority of 16.0% during the COVID-19 restrictions were suspended from work and 30.0% worked remotely. Six out of 10 participants felt that there was a balance between work responsibilities and family responsibilities, 4.0% did not belong to a vulnerable group, 70.0% were concerned about possible exposure to the virus during work, 38.0% got ill until December 2021 and 46.0% got quarantined.

In Table 28.2, all variables are compared at baseline and post COVID-19 quarantine restrictions. A statistically significant difference was found only in SiGS, with increased stress after COVID-19 ($p = 0.001$). In terms of sex, significant differences were found at baseline in PSS and Emotional Exhaustion ($p = 0.036$ and $p = 0.028$ respectively) (females revealed higher levels than males). Age and educational level were factors that interacted with the increased levels in SiGS after COVID-19 ($p = 0.015$ and $p = 0.006$, respectively). Moreover, significant differences were found at baseline in PSS ($p = 0.004$), with higher levels observed in employees with higher education. Workers who did not work remotely had lower levels in Personal Accomplishment after COVID-19 compared to employees who worked remotely ($p = 0.050$).

Correlation coefficients between the differences pre- and post-COVID-19 quarantine restrictions are presented in Table 28.3. Significant associations were found between PSS and Depersonalization ($r = 0.497$, $p < 0.001$), PSS and Emotional Exhaustion ($r = 0.433$, $p = 0.002$), Depersonalization and Emotional Exhaustion ($r = 0.311$, $p = 0.028$), Depersonalization and JSM ($r = 0.345$, $p = 0.014$), Emotional Exhaustion and JSM ($r = 0.695$, $p < 0.001$) and Emotional Exhaustion and SiGS with negative correlation ($r = -0.417$, $p = 0.003$).

28.4 Discussion

This research studied the factors that affected the mental health (stress, burnout symptoms) of a specific group of employees exposed to the COVID-19 quarantine restrictions. This group consisted of employees who took on caring roles for unaccompanied minor children and teenagers in their temporary accommodation, i.e. shelters. The aim was to examine their psychological state in relation to the special working conditions brought by the pandemic, and more specifically to analyze the stress they experienced while providing specialized health care.

Limitations of this research are the small study sample, the predominance of females, and the limited number of organizations involved in the study.

The COVID-19 pandemic generally increased the stress levels of workers, especially older ones. Furthermore, women were generally more stressed before and after the COVID-19 pandemic and were preferred for jobs in caring roles. Also, education was a significant factor for workers in more demanding positions, who showed higher rates of stress before and after the pandemic. Finally, the restrictions of the pandemic did not affect job stress levels (JSM), since the duties of the employees were not significantly changed, but perceived stress levels increased (PSS), since employees did not have the necessary outlet after the demanding work as care providers.

A significant difference was found between females and males in the Perceived Stress Scale as females perceived their everyday life as more stressful and showed higher levels of emotional exhaustion, even before the aggravating conditions of the pandemic. These findings are in agreement with a literature review, which claims that women in demanding work positions, such as hospitals or big companies, present high rates of stress. A common characteristic between nurses and unaccompanied minors' shelter workers is the demanding long shifts. More specifically, research has shown that the above job specialties do not have fixed hours during the week, and the shifts may differ from afternoon to morning. In fact, the circadian rhythm is often deregulated due to night shifts, which do not allow substantial mental and physical rest. This is a working condition that has not been changed by the health crisis of COVID-19 for healthcare workers and caregivers working in these shelters [26].

According to statistical data, female participants in caring roles seem to be significantly more in number than men. There is a preference for women regarding positions in which parental duties are taken, as required in shelters for unaccompanied minors. The nature of the work is demanding as the workers are expected to cover

Table 28.2 Study variables before and after the COVID-19 pandemic according to participants' demographic and other characteristics

	PSS		Depersonalization (MBI)		Personal accomplishment (MBI)		Emotional exhaustion (MBI)		JSM		SiGS	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
	25.00 ± 6.96	26.00 ± 6.61	10.00 (7.00)	9.50 (8.00)	45.00 (8.00)	43.50 (9.00)	27.50 (14.00)	27.00 (18.00)	39.00 ± 12.62	38.62 ± 11.98	22.00 (7.00)	24.00 (5.00)
$_{p}1$	0.452		0.939†		0.447†		0.996†		0.873		**0.001**	
Sex (p2)	0.349		0.787		0.183		0.799		0.407		0.877	
Male (*n* = 40)	26.03 ± 6.97	26.40 ± 6.95	11.30 ± 5.83	11.45 ± 6.29	44.50 (9.00)	43.50 (7.50)	28.98 ± 12.11	29.33 ± 13.57	40.35 ± 12.56	38.98 ± 12.31	20.85 ± 5.02	24.10 ± 2.87
Female (*n* = 10)	20.90 ± 5.47	24.40 ± 4.99	10.10 ± 4.23	9.50 ± 4.22	46.00 (7.00)	43.00 (11.00)	22.80 ± 5.92	24.70 ± 12.18	33.60 ± 11.97	37.20 ± 11.06	24.10 ± 5.88	27.70 ± 6.36
$_{p}3$	**0.036**	0.398	0.545	0.359	0.481†	0.568†	**0.028**	0.331	0.132	0.680	0.083	0.112
Age (p2)	0.113		0.971		0.457		0.638		0.643		**0.015**	
≤30 (*n* = 28)	25.71 ± 6.68	24.86 ± 6.73	9.00 (10.50)	10.00 (6.00)	44.50 (7.50)	44.50 (7.50)	28.25 ± 12.23	27.89 ± 11.27	38.39 ± 13.13	39.00 ± 11.48	22.50 ± 4.21	23.93 ± 2.57
31+ (*n* = 22)	24.09 ± 7.35	27.45 ± 6.31	10.00 (7.00)	9.00 (9.00)	46.00 (9.00)	42.50 (8.00)	27.09 ± 10.43	29.05 ± 15.79	39.77 ± 12.20	38.14 ± 12.85	20.23 ± 6.30	25.95 ± 5.17
$_{p}3$	0.418	0.170	0.844†	0.377†	0.702†	0.347†	0.725	0.765	0.705	0.803	0.134	0.076
Educational level (p2	0.131		0.367		0.409		0.392		0.848		**0.006**	
Up to secondary (*n* = 10)	19.50 ± 5.64	24.50 ± 7.21	10.20 ± 5.16	8.20 ± 4.10	48.00 (9.00)	46.50 (4.00)	27.40 ± 10.71	23.90 ± 15.97	36.40 ± 15.49	35.10 ± 15.04	18.90 ± 6.89	27.00 ± 5.03
Higher (*n* = 40)	26.38 ± 6.62	26.38 ± 6.50	11.28 ± 5.66	11.78 ± 6.16	43.50 (9.00)	42.50 (9.00)	27.83 ± 11.66	29.53 ± 12.55	39.65 ± 11.94	39.50 ± 11.15	22.15 ± 4.71	24.28 ± 3.59
$_{p}3$	**0.004**	0.428	0.588	0.089	0.063†	0.198†	0.917	0.236	0.472	0.304	0.083	0.054
Remote working (p2)	0.648		0.784		**0.021**		0.692		0.880		0.706	
Yes (*n* = 15)	26.07 ± 7.37	28.00 ± 4.96	12.93 ± 6.25	12.47 ± 6.61	42.00 (10.00)	46.00 (10.00)	28.80 ± 12.17	30.93 ± 10.26	42.27 ± 12.69	41.33 ± 10.52	22.47 ± 4.36	25.27 ± 4.89
No (*n* = 35)	24.54 ± 6.83	25.14 ± 7.10	10.26 ± 5.08	10.46 ± 5.64	46.00 (7.00)	43.00 (8.00)	27.29 ± 11.17	27.31 ± 14.42	37.60 ± 12.51	37.46 ± 12.52	21.09 ± 5.66	24.63 ± 3.64
$_{p}3$	0.484	0.164	0.118	0.278	0.152	**0.050**	0.671	0.384	0.235	0.299	0.404	0.612

Values are expressed as mean ± standard deviation (SD) or median (interquartile range) for non-normally distributed variables

p^1: *p*-value of t-test for paired samples or †Wilcoxon test (for non-parametric variables)

p^2: Interaction of characteristics in repeated measures

p^3: *p*-value of t-test for independent samples or †Mann-Whitney U test (for non-parametric variables)

PSS Perceived Stress Scale, *MBI* Maslach Burnout Inventory, *JSM* Job Stress Measure, *SiGS* Stress in General Scale

Table 28.3 Correlation coefficients between study variables

	[1]	[2]	[3]†	[4]	[5]	[6]
Δ PSS [1]	1					
Δ depersonalization (MBI) [2]	0.497^{***}	1				
Δ personal accomplishment (MBI) [3]†	−0.058	−0.191	1			
Δ emotional exhaustion (MBI) [4]	0.433^{**}	0.311^{*}	−0.033	1		
Δ JSM [5]	0.317^{*}	0.345^{*}	−0.064	0.695^{***}	1	
Δ SiGS [6]	−0.056	−0.271	−0.011	-0.417^{**}	−0.215	1

Δ means the difference between post-measure minus the baseline. Pearson's correlation coefficients or †Spearman rho correlation coefficients

PSS Perceived Stress Scale, *MBI* Maslach Burnout Inventory, *JSM* Job Stress Measure, *SiGS* Stress in General Scale

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

the emotional needs and gaps the minors may have. They are also expected to filter the minors' aforementioned difficulties and tolerate such complications within their working environment without always having the necessary training or specialization whilst facing their own personal challenges and stress.

The health crisis caused by the SARS-CoV-2 virus seems to have increased stress levels. The conditions of fear and alienation that accompanied the pandemic seem to have deprived people of psychological outlet. The work pressures and perceived stress that accumulated during the imposed curfew have been provoking challenges in the personal and working lives of research participants.

Another important factor regarding the stress levels, alongside the long duration of the pandemic itself, was age. Older people seem to have experienced more stress after the pandemic. SARS-CoV-2 was and remains to this day an aggressive virus for the respiratory system, but generally is life-threatening to people with pre-existing health issues and elderly people, who often have underlying diseases. So, it seems that older participants experienced the health crisis threat with higher levels of anxiety after the quarantine period.

The factor of education should also be taken into consideration, as increased stress levels were found in participants who graduated from higher academic institutions. From one point of view, this is a group of employees who take on more demanding roles in the micro-system of shelters, and on the other hand, their knowledge of their subject forms higher criteria for better quality service provision. Deprivation of corresponding working conditions leads to frustration, irritation and stress at work.

It is worth mentioning that the Job Stress Measure showed a tendency for decreased stress levels after the implementation of the quarantine, suggesting that the employees' work-related stress remained approximately at the same levels. Due to the nature of the particular job, the conditions in everyday life inside the shelters did not change radically (as, e.g., a doctor's life). Demanding shifts were still going on, and the care of children remained necessary regardless of the social changes brought by the pandemic. Providing services and dealing with people do not allow the workers to stop or pause. Therefore, the levels of job stress after the COVID-19 period were almost the same as the job demands were almost the same. In fact, many public services remained closed, others were offering limited appointments to avoid overcrowding and others were held remotely (e.g. sessions with psychologists, courses, etc.), thus reducing the obligations of escorting minors. The physical exhaustion of the workers who responded to the needs of many children at the same time was also reduced. These may explain the small tendency of decreased job stress levels. On the other hand, perceived stress increased as the job demands remained the same, while social and personal outlet was in appeasement. Suppressed emotions were accumulating, and it seems like perceived stress levels (PSS scores) were affected.

The necessity for more research to be held among health professionals is evident, and it is also imperative to carry out interventional studies to manage stress and, thus, provide better mental health services to unaccompanied minors. There is also need for further research in similar populations of professionals outside the urban context of Athens, i.e. in the Greek islands near the sea borders, where the refugees' entries are higher in number and more frequent.

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29

Perceived Social Support in Parents of Hospitalized Children During COVID-19

Dimitra Mourdoukouta, Maria Polikandrioti,
Evangelos Dousis, Eleni Evangelou,
Afrodite Zartaloudi, Chrysoula Dafogianni,
Georgia Toulia, Niki Pavlatou, Vasiliki Tsoulou,
and Ioannis Koutelekos

Abstract

It was March 2020 when the World Health Organization declared a global pandemic due to the spread of a virus known as SARS-CoV-2, which started in Wuhan (China) and spread across the world. From that time onward, all governments took specific measures to minimize virus outspread. Human beings faced several challenges in each aspect of life mainly the more vulnerable ones, such as parents with sick children who encountered not only with hospitalization but also with the negative effects posed by pandemic.

Purpose: Purpose of this study was to explore levels of perceived social support and the associated factors in parents of hospitalized children.

Method and material: In the study were enrolled 110 parents (30 fathers and 80 mothers) of hospitalized children. Data were collected by the completion of "The Multidimensional Scale of Perceived Social Support (MSPSS)," which included patients' self-reported characteristics. The statistical significance level was $p < 0.05$.

Results: From the 110 participants, 50% scored over 22, 22, and 20 (median) in support from significant ones, family, and friends, respectively. In addition, 25% of parents scored above 25, 25, and 24, respectively. With respect to the possible range of scores (4–28), these values indicate high levels of social support. Statistically significant higher levels of support from significant ones were experienced by parents who desired to be COVID-19 vaccinated ($p = 0.019$) and had a person at home belonging to a vulnerable group ($p = 0.001$). In terms of support from family, statistically significantly higher levels had parents who had been COVID-19 vaccinated ($p = 0.003$), who had not experienced family conflicts during pandemic ($p = 0.026$), and those who had a person at home belonging to a vulnerable group ($p = 0.001$). Regarding support from friends, statistically significant levels were experienced by parents who wished to be vaccinated ($p = 0.012$) and who had not experienced family conflicts during pandemic ($p = 0.050$).

Conclusion: Through this unprecedented global health issue, levels of support remained high. Vaccination, having a vulnerable person

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D. Mourdoukouta · M. Polikandrioti · E. Dousis ·
E. Evangelou · A. Zartaloudi · C. Dafogianni ·
G. Toulia · N. Pavlatou · V. Tsoulou · I. Koutelekos
(✉)
Department of Nursing, University of West Attica,
Athens, Greece

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at home, and intra-family conflicts were associated with support. A better understanding of support in parents with hospitalized children may help in the planning of rational and cost-effective interventions.

Keywords

Social support · Parents · Hospitalized children

29.1 Introduction

Coronavirus disease (COVID-19) is an ongoing pandemic caused by the SARS-CoV-2 coronavirus and was first identified in Wuhan City, the capital of Hubei Province, China, in December 2019. As of November 2021, there are 259,502,031 confirmed cases and 5,183,003 deaths, worldwide [1]. The coronavirus (COVID-19) outbreak has steadily spread globally and forced the world to take urgent health and social measures to contain the spread of the virus [2]. The measures taken by governments across the world, such as physical distancing, enforced lockdown measures, social restrictions, have serious effects on the global economy, public health, and mental health of the population [1, 2].

In terms of educational systems, this pandemic led to near-total closures of educational institutions. As of May 6, 2020, schools were suspended in 177 countries affecting over 1.3 billion learners, worldwide. School closures have far-reaching economic and societal consequences, including the disruption of everyday behaviors and routines, failure in developing vital social skills or social interaction, and physical inactivity [3].

The aforementioned picture becomes more complicated when the child is hospitalized due to other disease during the COVID-19 period. For example, a densely populated hospital is a high-risk area for virus-borne infections, where children may touch various items randomly, thus leading to SARS-CoV-2 transmission or greater possibility of infection due to low immunity [4]. At the same time, parents worry they may get infected in hospital, or concern about lack of personal protective equipment for medical staff, shortage of physicians and other personnel, strained diagnostic facilities, limited blood supplies, beds' unavailability, and scheduling outpatient consultations. Furthermore, hospital policy changes lead to restricting parental presence, disruptions to family unit, and limited family-centered care [5–7]. Parents of sick children during COVID-19 epidemic face immense emotional burden, which in turn may affect the child's recovery [4, 6].

Therefore, the pandemic crisis created the need for social support, which stems from family, friends, partners, and the intimate environment. Social support has been broadly and consistently linked to improved health outcomes in a variety of chronic illnesses irrespective of clinical settings or geographic variations [8, 9].

The role of social support among parents of hospitalized children in a pediatric hospital during coronavirus pandemic is important, especially in terms of psychosocial well-being and management of parental stress.

The study purpose was to explore levels of perceived social support among parents with hospitalized children and the associated factors.

29.2 Method and Material

29.2.1 Design, Setting, and Period of the Study

In the present cross sectional study were enrolled 110 parents (30 fathers and 80 mothers) of hospitalized children at a public pediatric hospital during February–April 2021. It was a convenience sample.

29.2.2 Sample: Inclusion and Exclusion Criteria

During the period when the research was conducted, from a total of 125 parents who were initially identified as eligible to participate in the study, only 110 were finally enrolled because 10 refused to participate.

Criteria for inclusion in the study were as follows: (a) age over 18 years, (b) ability to write, read, and understand the Greek language, and (c) ability to read and sign the informed consent form. The exclusion criteria for parents were as follows: (a) medical history of mental illness, and (b) living in another city or rural area.

29.2.3 Data Collection and Procedure

The collection of data was performed by the method of interview using a research instrument designed to serve the purposes of the study. Completion of each questionnaire lasted approximately 15 min and took place for each participant in a private room when there was no task for child care. Data were collected in afternoon when participants had no tasks to perform.

29.2.3.1 Research Instrument

The instrument used was a questionnaire, which included self-reported characteristics and the "Multidimensional Scale of Perceived Social Support (MSPSS)." In terms of demographic characteristics were collected: gender and age of parents and children. In addition, were collected the following self-reported characteristics: frequency of visiting the hospitalized child, degree of information about child's health problem and the pandemic, experience of stress due to the pandemic, compliance to safety measures vaccination against coronavirus, and having at home a person of vulnerable group. Moreover, were recorded parents' experiences during COVID-19, such as tachycardia, insomnia, uncertainty about health system, financial worries, fear about future, loss of pleasure, anxiety about safety, and intra-family conflicts.

29.2.4 Assessment of Perceived Social Support

To evaluate the social support of the parents, the Multidimensional Scale of Perceived Social Support questionnaire (MSPSS) was used. This scale had been translated and culturally adapted to the Greek standards by Theofilou P. It assesses three dimensions of social support: support from significant ones, family, and friends. The questions of each dimension expressing "support" are rated at a 7-point Likert scale from 1 to 7. In order to calculate the final score of each dimension of social support, we add the scores of questions corresponding to each dimension and divide by the number of questions included in each dimension. These scores reflect the degree of support felt by the parents. Higher scores indicate higher support [10, 11].

29.2.5 Ethical Considerations

The study was approved by the Ethical Committee of the hospital where it was conducted. Patients who met the entry criteria were informed by the researcher about the purposes of this study. Written informed consent was obtained for all patients being interviewed. Data collection guaranteed anonymity and confidentiality. All subjects had been informed of their rights to refuse or discontinue participation in the study, according to the ethical standards of the Declaration of Helsinki (1989) of the World Medical Association.

29.2.6 Statistical Analysis

Nominal data are presented with absolute and relative (%) frequencies, while continuous ones with mean, standard deviation (SD), median, and interquartile range (IQR). Normality was tested with Kolmogorov-Smirnov and graphically with histograms and Q-Q plots. Kruskal-Wallis and Mann-Whitney tests were performed to evaluate the association between social support and parent's characteristics as well as the Spearman's rho coefficient. Multiple linear regression was performed to assess the impact of patient's characteristics (independent factors) on their social support. Results are presented as β-coefficients and 95% confidence interval (95% CI). The observed significance level of 5% was considered statistically significant. All statistical analyses were performed with version 25 of the SPSS statistical program (SPSS Inc., Chicago, IL, USA).

29.3 Results

29.3.1 Sample Description

Table 29.1 presents demographic characteristics of participants. In particular, fathers accounted for 27.3% of the sample, while the average age of the parents was 38.6 years. The average age of the hospitalized child was 5.7 years and 51.8% of the hospitalized children were boys.

Table 29.2a presents parents' self-reported characteristics. More in detail, 77.3% of parents remained in hospital during hospitalization, 51.8% stated to be very informed about their child's health problem, 26.4% stated they experienced a lot of stress at hospital stay due to the pandemic, 37.3% felt very informed about the pandemic, and 83.6% complied with safety measures. In terms of vaccination, 17.3% were vaccinated, 28.3% wished to be vaccinated, and 40% were afraid of the side effects of the vaccine.

Table 29.2b presents parents' experiences during the COVID-19 period. More in detail, 16.4%, 12.7%, 26.4%, 30.9%, 39.1%, 50.9%, and 27.3% of participants experienced tachycardia, insomnia, uncertainty about health system, financial worries, fear for future, loss of pleasure, and anxiety about their safety, respectively. Moreover, 9.1% experienced a family conflict and 32.7% had someone at home belonging to a vulnerable group, out of whom 94.4% were anxious about that person's safety.

Table 29.1 Distribution of the sample according to demographic characteristics ($N = 110$)

	N (%)
Parent	
Father	30 (27.3)
Mother	80 (72.7)
Hospitalized child	
Boy	57 (51.8)
Girl	53 (48.2)
	Mean (SD)
Parent's age	38.6 (6.9)
Child's age	5.7 (4.1)

Table 29.3 presents results concerning the perceived social support by parents. At least 50% of the parents scored more than 22, 22, and 20 (median) in support from significant ones, family, and friends, respectively. In addition, 25% of parents had scores above 25, 25, and 24, respectively. The average scores were 22.5 for support from significant ones, 22.1 for support from family, and 21.2 for support from friends. These values with respect to the possible range of scores [4–28] indicate high levels of social support experienced by parents. In addition, parents felt more support from significant ones and family and less from their friends.

Factors Associated with Parents' Social Support

Tables 29.4 and 29.5 present the association of the social support of parents of hospitalized children with their characteristics.

A statistically significant association was shown between the score of social support from significant ones (Table 29.4) and the desire to be vaccinated ($p = 0.019$), and whether they had a person at home belonging to a vulnerable group ($p = 0.001$). More specifically, parents who wished to be vaccinated had higher levels of support from significant ones (median 25) than parents who did not (median 20) or those who did not know yet (median 22). In addition, higher levels of support from significant ones were experienced by parents who had a person belonging to a vulnerable group at home (median 24.5) than those who did not (median 21).

A statistically significant association was found between the score of social support from family (Table 29.4) and the vaccination so far ($p = 0.003$), whether they experienced family conflicts during pandemic ($p = 0.026$), and whether they had at home a person belonging to a vulnerable group ($p = 0.017$). More specifically, parents who had not been vaccinated so far also had higher levels of family support (median 23) than parents who had been vaccinated (median 20). Parents who had not experienced family conflict during the pandemic had higher levels of

Table 29.2a Distribution of the sample according to self-reported characteristics ($N = 110$)

	N (%)
How often do you visit the hospitalized child?	
I remain in hospital	85 (77.3)
Once a day	17 (15.5)
Twice a day	8 (7.3)
Are you informed about your child's health?	
Very	57 (51.8)
Enough	53 (48.2)
A little	0 (0.0)
Do you experience stress during hospital stay due to pandemic?	
Very	29 (26.4)
Enough	43 (39.1)
A little	20 (18.2)
Not at all	18 (16.4)
Are you informed about the pandemic?	
Very	41 (37.3)
Enough	68 (61.8)
A little	1 (0.9)
Not at all	0 (0.0)
Did you follow the safety measures proposed by the government for COVID-19?	
Yes	92 (83.6)
No	2 (1.8)
Sometimes	16 (14.5)
Have you been COVID-19 vaccinated so far?	
Yes	19 (17.3)
No	91 (82.7)
Do you want to be vaccinated?	
Yes	26 (28.3)
No	17 (18.5)
I do not know/I do not answer	15 (16.3)
I will consider it in the future	34 (37.0)
Are you afraid of the side effects of the vaccine?	
Yes	44 (40.0)
No	27 (24.5)
Sometimes	39 (35.5)
Do you have someone in your home who belongs to a vulnerable group?	
Yes	36 (32.7)
No	74 (67.3)
If so, are you worried about his safety?	
Yes	34 (94.4)
No	2 (5.6)

family support (median 24) than parents who had (median 20 and 21). In addition, higher levels of family support were experienced by parents who had in their home a person belonging to a vulnerable group (median 24) than those who did not (median 21).

A statistically significant association was found between the score of social support from friends (Table 29.5) and desire to be vaccinated ($p = 0.012$), and whether they experienced family conflicts during the pandemic ($p = 0.050$). More specifically, parents who wished to be vaccinated also had higher levels of support from friends (median 24) than parents who did not wish (median 20) or those who did not know yet (median 20 and 21). In addition, higher levels of support from friends were experienced by parents who had not experienced family conflicts during the pandemic (median 24) than by parents who had (median 20).

Impact of Factors on Parents' Social Support

Multiple linear regression was performed to assess the effect of parental characteristics (independent factors) on the social support they expe-

Table 29.2b Distribution of the sample according to experiences during COVID-19 period ($N = 110$)

	N (%)
During COVID-19 period, did you experience tachycardia?	
Yes	18 (16.4)
No	55 (50.0)
Sometimes	37 (33.6)
During COVID-19 period, did you experience insomnia?	
Yes	14 (12.7)
No	52 (47.3)
Sometimes	44 (40.0)
During COVID-19 period, did you experience uncertainty about national health system?	
Yes	29 (26.4)
No	15 (13.6)
Sometimes	66 (60.0)
During COVID-19 period, did you suffer financial worries?	
Yes	34 (30.9)
No	36 (32.7)
Sometimes	40 (36.4)
During COVID-19 period, did you experience fear about future?	
Yes	43 (39.1)
No	13 (11.8)
Sometimes	54 (49.1)
During the COVID-19 period, did you experience a loss of pleasure due to daily limitations?	
Yes	56 (50.9)
No	7 (6.4)
Sometimes	47 (42.7)
During the COVID-19 period, were there any family conflicts?	
Yes	10 (9.1)
No	39 (35.5)
Sometimes	61 (55.5)
During your COVID-19 period, did you experience anxiety about your safety?	
Yes	30 (27.3)
No	16 (14.5)
Sometimes	65 (58.2)

Table 29.3 Levels of social support experienced by parents of hospitalized children ($N = 110$)

	Mean (SD)	Median (IQR)
Social support from:		
Significant ones (range: 4–28)	22.5 (3.6)	22 (20–25)
Family (range: 4–28)	22.1 (4.2)	22 (20–25)
Friends (range: 4–28)	21.2 (3.9)	20 (20–24)

rienced (dependent variable) (Table 29.6). Parents who did not have a person belonging to a vulnerable group at home had 1.9 points lower support scores from significant ones than parents who had such a person at home ($\beta = -1.95$; 95% CI: −3.82 to −0.07; $p = 0.042$). Furthermore, parents who had not yet been vaccinated had 2.4 points higher family support score than parents who had been vaccinated ($\beta = 2.40$; 95% CI: 0.40–4.40; $p = 0.019$). Parents who had not experienced family conflicts during the pandemic had 4.6 points higher score of family support than parents who had ($\beta = 4.59$; 95% CI: 1.87–7.32; $p = 0.001$). In addition, parents who do not wish to be vaccinated had 3.2 points lower support score from friends than parents who wished ($\beta = -3.17$; 95% CI: −5.52 to −0.83; $p = 0.008$).

29.4 Discussion

The present study showed that participants experienced high levels of perceived social support, which is considered a particularly encouraging finding through a difficult period such as COVID-19 pandemic. A relevant study in China among general population ($N = 263$) showed that the majority received increased support from friends and family, while 52.1% of participants felt horrified due to the pandemic [12]. Similarity in Egypt, among 510 adults participants, 24.2% and 40.6% reported increased support from friends and family, respectively, while 53.9% felt horrified [13]. However, pre-pandemic social support levels (from partner, family, and friends) are associated with those during the pandemic [14]. Noteworthy, in the present study, 39.1% experienced fear about future and 26.4% uncertainty about national health system. Uncertain and potentially dangerous situations (pandemic) or traumatic experiences (earthquakes, terrorism) trigger responses such as confusion, fear, and worry [2].

Results also revealed elevated levels of support from family and friends among parents who had not experienced intra-family conflict during the pandemic. This finding has two potential aspects. On the one hand, parents have succeeded in maintaining right parenting, facilitating constructive dialogue, and encouraging autonomy within family frame. On the other hand, this finding may indirectly indicate a lack of support for people who experience conflict and violence or even their reluctance to reveal such problems. Intra-family violence is absent when parents are realistic, objective, and flexible toward children or family members. Interestingly, quarantine represents a good opportunity to improve parent–child interaction and build children's self-esteem and confidence [2, 15, 16].

However, research highlights increased conflicts during COVID-19 pandemic. Family dynamics and intra-family bonds are complicated by several stressors, such as duration of quarantine periods, fears of infection, inadequate supplies or information, social stigma, psychological distress, frustration, lower parental resilience, increased financial insecurity, economic loss, general uncertainty, prolonged isolation from schools, limited support systems, changes in daily routines, and number and age of children (younger) [17–19]. Possibly, during isolation children adopt difficult behaviors that tend to provoke more harsh responses from parents who may no longer have the strength to face such challenges. Low social support may be a consequence of domestic violence or alternatively a risk factor for it. Furthermore, anticipated stigma or fear of social rejection as a consequence of abuse may be an obstacle for help-seeking behavior, thus leading to isolation. Social support may inhibit escalation of violence by facilitating instrumental support (lending money, transportation) to help the victim to abandon abusive relationships, and by offering strategies to mitigate violence [20, 21]. Notably, during Covid-19 period emerged an urgent global need for programmes aimed to prevent violence by trained multidisciplinary staff [22].

In the present study, 55.5% experienced intra-family conflicts. It is highlighted that data from the United States, China, Brazil, and Australia show increases in violence. In China, the first country to quarantine Wuhan province, abuse cases tripled in February 2020 compared to previous year. Similarly, France demonstrated a 32–36% increase in reports of home abuse after lockdown measures. Accordingly, in the United States increases in domestic abuse are ranging from 21 to 35% while in Australia, there was a 75% increase in Internet searches for domestic abuse support [20].

Parents who had a person belonging to a vulnerable group at home experienced elevated levels of support from family. In COVID-19 pandemic, grandparents may become more easily infected and consequently families try to remodel domestic spaces to ensure isolation and prevent transmission. A possible contamination is perceived as a threat to family integrity, or triggers concerns about death. From this finding, it is assumed that parents manage to respond to these experiences by receiving support from family.

A noticeable result of the present study was that higher levels of support from significant

Table 29.4 Factors associated with parents' social support from significant ones and family

	Support from significant ones			Support from family		
	Mean (SD)	Median (IQR)	*p*-Value	Mean (SD)	Median (IQR)	*p*-value
Parent			0.165			0.238
Father	23.3 (3.6)	24 (20–27)		23.1 (3.9)	24 (20–27)	
Mother	22.3 (3.6)	22 (20–24.5)		21.8 (4.3)	21 (20–24.5)	
Hospitalized child			0.615			0.363
Boy	22.7 (3.7)	23 (20–26)		22.6 (4.0)	23 (20–26)	
Girl	22.4 (3.5)	22 (20–24)		21.6 (4.5)	21 (20–24)	
How often do you visit the hospitalized child?			0.400			0.699
I remain in hospital	22.4 (3.6)	22 (20–25)		22.0 (4.3)	22 (20–25)	
Once/Twice a day	23.1 (3.7)	24 (20–25)		22.6 (3.8)	24 (20–26)	
Are you informed about your child's health?			0.098			0.335
Very	23.0 (3.9)	24 (20–27)		22.2 (4.8)	23 (20–26)	
Enough	22.0 (3.2)	22 (20–24)		22.0 (3.5)	21 (20–24)	
Do you experience stress during your hospital stay			0.661			0.739
due to the pandemic?						
Very	23.2 (3.4)	22 (20–27)		22.0 (4.6)	21 (20–26)	
Enough	22.8 (3.3)	23 (20–25)		22.7 (3.3)	23 (20–25)	
A little	22.0 (3.8)	21.5 (20–24.5)		22.4 (3.9)	23 (20–25)	
Not at all	21.6 (4.5)	22 (20–24)		20.7 (5.8)	21 (17–24)	
Are you informed about the pandemic?			0.708			0.393
Very	22.6 (3.9)	23 (20–25)		21.6 (4.9)	21 (20–24)	
Enough	22.4 (3.5)	22 (20–24)		22.4 (3.8)	22.5 (20–25)	
Did you follow the safety measures proposed by the government for COVID-19?			0.051			0.188
Yes	22.7 (3.6)	23 (20–25)		22.4 (4.3)	23 (20–25)	
Sometimes	21.3 (3.4)	20 (20–21.5)		21.3 (3.0)	20 (20–21)	
Have you been COVID-19 vaccinated so far?			0.098			0.003
Yes	21.4 (3.7)	20 (20–23)		19.9 (4.0)	20 (16–20)	
No	22.8 (3.6)	23 (20–25)		22.6 (4.2)	23 (20–26)	
Do you want to be vaccinated?			0.019			0.155
Yes	24.8 (3.1)	25 (23–28)		23.8 (4.3)	24.5 (20–27)	

(continued)

Table 29.4 (continued)

	Support from significant ones			Support from family		
	Mean (SD)	Median (IQR)	*p*-Value	Mean (SD)	Median (IQR)	*p*-value
No	21.9 (4.5)	20 (20–24)		22.2 (3.8)	21 (20–24)	
I do not know/I do not answer	22.2 (3.8)	22 (20–26)		22.1 (5.9)	24 (20–25)	
I will consider it in the future	22.1 (2.9)	22 (20–24)		22.1 (3.1)	22 (20–24)	
Are you afraid of the side effects of the vaccine?			0.825			0.472
Yes	22.2 (4.1)	22 (20–24.5)		21.9 (4.6)	22 (20–25)	
No	22.8 (3.2)	23 (20–25)		21.4 (4.7)	20 (20–25)	
Sometimes	22.8 (3.4)	22 (20–25)		22.8 (3.3)	23 (20–26)	
During COVID-19 period, did you experience tachycardia?			0.059			0.089
Yes	24.2 (3.5)	24 (20–28)		22.6 (5.3)	24 (20–27)	
No	22.8 (3.7)	23 (20–25)		22.6 (4.4)	24 (20–26)	
Sometimes	21.3 (3.3)	21 (20–23)		21.2 (3.2)	20 (20–24)	
During COVID-19 period, did you experience insomnia?			0.623			0.978
Yes	23.6 (3.3)	23.5 (20–27)		22.1 (4.6)	22.5 (20–25)	
No	22.4 (3.7)	22.5 (20–25)		22.0 (4.5)	23 (20–24)	
Sometimes	22.3 (3.7)	22 (20–24.5)		22.2 (3.8)	21 (20–26)	
During COVID-19 period, did you experience uncertainty about national health system?			0.107			0.709
Yes	23.8 (3.3)	24 (20–28)		22.8 (4.0)	23 (20–27)	
No	22.6 (4.8)	24 (19–28)		20.8 (7.3)	21 (16–28)	
Sometimes	22.0 (3.4)	22 (20–24)		22.1 (3.3)	22 (20–25)	
During COVID-19 period, did you suffer financial worries?			0.200			0.417
Yes	22.4 (3.7)	22.5 (20–24)		21.6 (4.6)	20.5 (20–25)	
No	23.4 (3.6)	24 (20–27.5)		22.7 (4.6)	23.5 (20–27)	
Sometimes	21.9 (3.6)	21 (20–24)		22.1 (3.5)	21 (20–24.5)	
During COVID-19 period, did you experience fear about the future?			0.194			0.795
Yes	23.3 (3.6)	23 (20–27)		22.3 (4.4)	23 (20–26)	

(continued)

Table 29.4 (continued)

	Support from significant ones			Support from family		
	Mean (SD)	Median (IQR)	*p*-Value	Mean (SD)	Median (IQR)	*p*-value
No	21.6 (4.5)	20 (20–24)		20.8 (6.5)	20 (20–24)	
Sometimes	22.1 (3.4)	22 (20–24)		22.3 (3.4)	21 (20–24)	
During the COVID-19 period, did you experience a loss of pleasure due to daily limitations?			0.355			0.426
Yes	23.1 (3.6)	23 (20–26.5)		22.5 (4.6)	23 (20–26)	
No	22.3 (5.1)	24 (16–28)		21.7 (5.6)	24 (16–28)	
Sometimes	22.0 (3.4)	21 (20–24)		21.7 (3.6)	21 (20–24)	
During the COVID-19 period, were there any family conflicts?			0.057			0.026
Yes	21.4 (4.6)	22.5 (20–24)		19.1 (5.8)	20 (19–23)	
No	23.8 (3.8)	24 (20–28)		23.2 (4.4)	24 (20–28)	
Sometimes	22.0 (3.2)	22 (20–24)		21.9 (3.5)	21 (20–24)	
During your COVID-19 period, did you experience anxiety about your safety?			0.321			0.754
Yes	23.0 (4.2)	22.5 (20–28)		22.1 (4.4)	21.5 (20–27)	
No	23.4 (4.8)	24.5 (19.5–28)		21.8 (7.1)	24 (18–28)	
Sometimes	22.1 (3.0)	22 (20–24)		22.2 (3.1)	21.5 (20–24)	
Do you have someone in your home who belongs to a vulnerable group?			0.001			0.017
Yes	24.3 (3.6)	24.5 (22.5–28)		23.3 (4.9)	24 (20–27)	
No	21.7 (3.4)	21 (20–24)		21.6 (3.8)	21 (20–24)	
	rho	*p*-Value		rho	*p*-Value	
Parent's age	0.126	0.188		0.012	0.898	
Child's age	0.109	0.258		0.089	0.354	

others and friends were experienced by parents who wanted to be vaccinated, while parents who had been vaccinated had higher support from family. Vaccines have been treated differently by the population on a global scale. Advice from friends, family, and colleagues is cited as a reason for supporting vaccination. Reasons for vaccine hesitancy are safety concerns, misconceptions about their effectiveness, lack of awareness, low understanding of disease severity, and belief in alternative medicine [23–25]. A recent survey of potential acceptance of a COVID-19 vaccine in 13.426 randomly selected individuals across 19 countries, most with a high COVID-19 burden, illustrated that 71.5% responded that they would take a vaccine if it were proven safe and effective, and 48.1% would be vaccinated if their employer recommended it [26]. In Asian nations with high trust in governments (China, South Korea, and Singapore), the vaccination acceptance exceeded

Table 29.5 Factors associated with parents' social support from friends

	Support from friends		
	Mean (SD)	Median (IQR)	*p*-value
Parent			0.610
Father	21.7 (3.8)	21.5 (19–24)	
Mother	21.1 (3.9)	20 (20–24)	
Hospitalized child			0.893
Boy	21.1 (4.3)	20 (20–24)	
Girl	21.4 (3.4)	20 (20–24)	
How often do you visit the hospitalized child?			0.896
I remain in hospital	21.2 (3.9)	20 (20–24)	
Once/Twice a day	21.3 (4.0)	21 (18–24)	
Are you informed about your child's health?			0.506
Very	21.4 (4.4)	21 (20–24)	
Enough	21.1 (3.2)	20 (20–24)	
Do you experience stress during your hospital stay due to the pandemic?			0.204
Very	21.9 (3.5)	21 (20–24)	
Enough	21.7 (3.5)	20 (20–24)	
A little	21.3 (3.5)	20 (20–24)	
Not at all	19.2 (5.1)	20 (16–22)	
Are you informed about the pandemic?			0.587
Very	21.7 (3.7)	20 (20–24)	
Enough	20.9 (4.0)	20 (20–24)	
Did you follow the safety measures proposed by the government for COVID-19?			0.057
Yes	21.6 (3.5)	21 (20–24)	
Sometimes	19.1 (5.2)	20 (16.5–21)	
Have you been COVID-19 vaccinated so far?			0.524
Yes	20.9 (3.7)	20 (20–24)	
No	21.3 (3.9)	20 (20–24)	
Do you want to be vaccinated?			0.012
Yes	22.9 (3.2)	24 (20–25)	
No	18.9 (5.4)	20 (16–24)	
I do not know/I do not answer	20.1 (3.4)	20 (17–22)	
I will consider it in the future	21.8 (3.1)	21 (20–24)	
Are you are afraid of the side effects of the vaccine?			0.057
Yes	20.0 (4.4)	20 (16–24)	
No	21.9 (3.5)	20 (20–24)	
Sometimes	22.1 (3.2)	22 (20–24)	
During COVID-19 period, did you experience tachycardia?			0.687
Yes	21.9 (4.0)	20 (20–25)	
No	21.2 (4.3)	20 (20–24)	
Sometimes	20.9 (3.1)	20 (20–23)	
During COVID-19 period, did you experience insomnia?			0.749
Yes	22.1 (3.9)	21.5 (20–24)	
No	21.2 (4.3)	20 (20–24)	
Sometimes	21.0 (3.4)	20 (19–24)	
During COVID-19 period, did you experience uncertainty about the Country's national health system?			0.201
Yes	22.2 (3.9)	21 (20–25)	

(continued)

Table 29.5 (continued)

	Support from friends		
	Mean (SD)	Median (IQR)	*p*-value
No	19.6 (6.0)	20 (16–24)	
Sometimes	21.2 (3.1)	20 (20–24)	
During COVID-19 period, did you suffer financial worries?			0.206
Yes	20.4 (3.6)	20 (17–24)	
No	21.6 (4.7)	20.5 (20–24)	
Sometimes	21.6 (3.2)	21.5 (20–24)	
During COVID-19 period, did you experience fear about the future?			0.646
Yes	21.3 (3.5)	20 (20–24)	
No	19.8 (6.2)	20 (16–24)	
Sometimes	21.5 (3.5)	20.5 (20–24)	
During the COVID-19 period, did you experience a loss of pleasure due to daily limitations?			0.962
Yes	21.4 (3.8)	20 (19.5–24)	
No	19.4 (8.1)	24 (16–24)	
Sometimes	21.3 (3.1)	20 (20–24)	
During the COVID-19 period, were there any family conflicts?			0.050
Yes	20.4 (3.8)	20 (16–24)	
No	22.3 (4.7)	24 (20–25)	
Sometimes	20.7 (3.2)	20 (18–23)	
During your COVID-19 period, did you experience anxiety about your safety?			0.945
Yes	21.4 (3.9)	20 (20–24)	
No	20.5 (6.2)	20 (16–24)	
Sometimes	21.3 (3.1)	20 (20–24)	
Do you have someone in your home who belongs to a vulnerable group?			0.060
Yes	22.3 (3.9)	24 (20–25)	
No	20.7 (3.8)	20 (20–24)	
	rho	*p*-value	
Parent's age	0.129	0.179	
Child's age	0.059	0.541	

80% while in middle-income countries, such as Brazil, India, and South Africa, was noticed a relatively high tendency to acceptance [26]. In the present study, 40% declared to be afraid of side effects.

Descriptive results demonstrated that 26.4% experienced anxiety about hospital stay. Parents of sick children do not consider hospital as a safe place or believe that care is suboptimal because attention has shifted to patients with COVID-19 over other patients. At the effort to reduce the risk of COVID-19 transmission, the medical centers have limited access to care for children with chronic conditions or follow the necessary change in care delivery, such as distant follow-up appointments [27–29].

Furthermore, 50.9% experienced loss of pleasure due to limitations in everyday life and 12.7% insomnia. Although no correlation was found between support and these characteristics, a relevant study in 2020 participants showed 63% and 52% lower risk for depressive symptoms and poor sleep quality, respectively, in those who reported higher social support compared to low support [30]. High levels of loneliness, high levels of COVID-19-specific worry, and low distress tolerance are associated with depression, anxiety, and posttraumatic disorder [31]. Social support from friends moderates the relationship between repetitive negative thinking and depression during COVID-19 [32].

Table 29.6 Impact of factors on parents' social support

	Significant ones		Family		Friends	
	β-coef (95% CI)	*p*-value	B-coef (95% CI)	*p*-value	B-coef (95% CI)	*p*-value
Have you been COVID-19 vaccinated so far?						
Yes	–		Ref. Cat.		–	
No	–		2.40 (0.40–4.40)	0.019	–	
Do you want to be vaccinated?						
Yes	Ref. Cat.		–		Ref. Cat.	
No	−1.87 (−4.00 to 0.27)	0.085	–		−3.17 (−5.52 to −0.83)	0.008
I do not know/I do not answer	−2.09 (−4.29 to 0.11)	0.063	–		−2.28 (−4.78 to 0.23)	0.075
I will consider it in the future	−1.83 (−3.76 to 0.11)	0.064	–		−0.60 (−2.70 to 1.49)	0.570
During the COVID-19 period, were there any family conflicts?						
Yes	–		Ref. Cat.		Ref. Cat.	
No	–		4.59 (1.87 to 7.32)	0.001	0.78 (−2.20 to 3.77)	0.603
Sometimes	–		2.61 (−0.06 to 5.29)	0.055	0.10 (−2.76 to 2.97)	0.943
Do you have someone in your home who belongs to a vulnerable group?						
Yes	Ref. Cat.		Ref. Cat.		–	
No	−1.95 (−3.82 to 0.07)	0.042	−1.44 (−3.20 to 0.32)	0.109	–	

Social isolation exacerbates the family's personal vulnerabilities by limiting accessible support options. Strengthening supportive relationships, in early parenthood, may have long-term benefits mainly in future diversities or other stressful life events [14]. It is well established that social isolation (absence of social relationships) and loneliness (subjective dissatisfaction with relationships) are determinants of health that predict premature mortality, depression, cardiovascular disease, and cognitive decline as well as unhealthy behaviors (smoking and physical inactivity) [33, 34].

Limitations of the Study

The present study has some limitations. Firstly, convenience sampling is not representative of all parents living in Greece, thus the results cannot be generalized. Secondly, the study design was cross-sectional, thus not permitting investigation for causal relation between support and parents' characteristics. Finally, there was no other assessment that would allow evaluation of possible changes in perceived social support through time.

Conclusions

The present study showed high levels of social support of parents. Having a person at home belonging to a vulnerable group was associated with higher levels of support from significant ones and family. Participants who had not experienced family conflicts during pandemic experienced higher levels of support from family and friends. Participants who wanted to be vaccinated experienced higher levels of support from significant ones and friends while higher levels of support from significant others were experienced by parents who had been COVID-19 vaccinated.

This knowledge can be transferred to prioritize targets for pandemic-related health care interventions that are enhancing social support.

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Investigation of the Level of Burnout in Health Care Professionals in COVID-19 Pandemic Conditions

Aspasia Valavani, Eleftheria Garavela,
Ioanna V. Papathanasiou, Konstantinos Tsaras,
Evangelos C. Fradelos, Dimitrios Papagiannis,
Paraskevi Kirgou, Dimitrios G. Raptis,
Konstantinos I. Gourgoulianis, and Foteini Malli

Abstract

The coronavirus disease 2019 (COVID-19) pandemic has led to high levels of stress and anxiety for health care professionals. The purpose of this study was to investigate the burnout of health care professionals in COVID-19 pandemic conditions. Quantitative research was performed, and the Copenhagen Burnout Inventory was used to study burnout. The research sample consisted of 360 health care professionals. Health professionals have been found to have fairly high levels of personal burnout, work burnout, and burnout associated with patient interactions. It has also been found that women and health professionals working in department for patients with COVID-19 have significantly greater burnout. However, it was found that age, marital status, years of service, specialty, non-basic degree, and whether they or a first-degree relative had COVID-19 were not correlated to burnout. Given the very high level of burnout among health professionals, it is necessary to develop appropriate strategies to reduce burnout.

Keywords

Burnout · Health professionals · Pandemic · COVID-19

30.1 Introduction

Stress in the workplace is considered, worldwide, as a risk factor for the health and safety of workers. More specifically, the health care sector is a constantly changing environment and working conditions in hospitals are becoming increasingly demanding and stressful. Despite WHO's efforts to promote healthy work envi-

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A. Valavani · E. Garavela · D. G. Raptis · F. Malli (✉)
Respiratory Disorders Lab, Faculty of Nursing,
University of Thessaly, Larissa, Greece

I. V. Papathanasiou
Community Nursing Lab, Faculty of Nursing,
University of Thessaly, Larissa, Greece

K. Tsaras · E. C. Fradelos
Faculty of Nursing, University of Thessaly,
Larissa, Greece
e-mail: ktsa@uth.gr; efradelos@uth.gr

D. Papagiannis
Public Health and Vaccines Lab, Faculty of Nursing,
University of Thessaly, Larissa, Greece

P. Kirgou · K. I. Gourgoulianis
Department of Respiratory Medicine, Faculty of
Medicine, School of Health Sciences, University of
Thessaly, Larissa, Greece
e-mail: kgourg@uth.gr

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ronments, a large number of work-related deaths are observed every year. Several studies focusing on the health care sector have shown that health professionals are exposed to diverse and severe occupational stressors, such as: time pressure, low social support at work, high workload, uncertainty about patient treatment, and emotional reactions due to of exposure to sick and dying patients [18].

Although there are many variations in the prevalence of burnout syndrome among health care professionals, it is observed that nurses, who work in intensive care units, as well as in clinics with patients suffering from HIV or cancer, experience a higher rate of burnout. Also, the nursing staff who treat patients with AIDS, experience the feeling of futility, as well as the fear of transmitting the disease. Results of studies have proven that workers in Intensive Care Units and Emergency Departments show a high rate of stress, as they constantly interact with many infectious diseases [21].

Workers in highly stressful jobs are at high risk of burnout, such as health care workers during the coronavirus disease 2019 (COVID-19) pandemic. As doctors and nurses are forced to care for infected patients, they face higher rates of infection and fear of spreading the infection to their families. Understanding the risk of health professional burnout is very important, as it depends on them to maintain the quality of health care [17].

Health care professionals who work on the front line face daily a heavy workload combined with many difficulties and stress, resulting in the risk of work burnout [17]. The results of a survey conducted in Italy by Barello et al. [5], in which 376 health care providers who treated patients infected with COVID-19 took part, show that the emotional exhaustion of the study population was very high during this period. In America, a survey carried out by the Society of Critical Care Medicine, among 9492 health professionals working in Intensive Care Units and investigating their stress, using a scale rated from 0 to 10, found that during the pandemic, increased from 3 to 8 [22].

Data about burn out of health care workers during the pandemic COVID-19 in Greece are scarce. The aim of the present research is to investigate the professional burnout of health care during the COVID-19 pandemic. In more detail we aimed to assess the extent of burn out at health care workers who managed COVID-19 patients and examine possible association at the level of burn out with sociodemographic parameters.

30.2 Methods

30.2.1 Sample

The sample of this research consists of 360 health professionals. Convenience sampling was used. This type of sampling ensures easy and quick data collection, and has a low cost [3].

The method used to explore and answer the research questions posed is quantitative research, and the questionnaire was used as a means of data collection.

The questionnaire of this research consisted of 29 questions. The section of the questionnaire was divided into two parts: a) demographic data (gender, age, marital status, years of service, specialty, qualification other than a basic degree, Agency/Hospital, work in a department that treats patients with COVID-19, history at COVID-19, history at COVID-19 in a member of the first degree of kinship), and b) professional burnout.

The Copenhagen Burnout Inventory scale was used to measure burnout. This scale was created by Kristensen and her colleagues [15] and has been weighted in Greek by Papaefstathiou and his colleagues [19]. The scale consists of 19 questions and includes 3 subscales: personal burnout (6 questions), work-related burnout (7 questions), and client-related burnout (6 questions). Each question is answered on a five-point Likert scale. The higher the score, the higher the burnout [19].

The questionnaire was distributed via Google Forms during the period February–June 2021. In addition, permission was obtained for the use of the Copenhagen Burnout Inventory as well as permission to distribute the questionnaire from the corresponding institution ethics committee.

30.2.2 Statistical Analysis

For the statistical analysis of the data, IBM SPSS (International Business Machines Statistical Package for the Social Sciences) version 26 was used. Descriptive statistics, independent t-tests, one-way analysis of variance (ANOVA), and reliability testing with the Cronbach alpha coefficient were performed. Data are presented as frequency, percentage, mean, median, or standard deviation. The use of these parametric tests is justified by the fact that, based on the normality test performed with the Kolmogorov-Smirnov test, all data follow a normal distribution (sig > 0.05). The level of statistical significance was set as $p < 0.05$.

30.3 Results

The sample includes 360 health professionals. Regarding the demographic characteristics of the participants, 16.9% of the sample ($n = 61$) were male and 83.1% ($n = 299$) were female. The participants' ages ranged from 21 to 61 with a mean age of 37.81 ± 8.88 years. Specifically, 34.7% ($n = 125$) were 21–30 years old, 24.2% ($n = 87$) were 31–40 years old, 34.2% ($n = 123$) were 41–50 years old, and 6.9% ($n = 25$) were 51–61 years old. Also, 41.4% of participants ($n = 149$) were single, while 53.6% ($n = 193$) were married or cohabiting and 5% ($n = 18$) were divorced or in dimension. Regarding years of service, these ranged from 0.5 to 39 years with a mean of 11.91 ± 9.27 years. Specifically, 51.1% ($n = 184$) had 0.5–10 years of experience, 30% ($n = 108$) had 11–20 years, 15.6% ($n = 56$) had 21–30 years, and 3.3% ($n = 12$) had 31–39 years of work experience. Furthermore, 70.3% of the participants ($n = 253$) were nurses, 19.7% ($n = 71$) doctors and 10% ($n = 36$) were paramedics. Also, 31.1% of participants ($n = 112$) had a master's degree, and 3.3% ($n = 12$) had a doctorate diploma. In addition, 50% of the participants ($n = 180$) worked in a department treating patients with COVID-19 while the remaining 50% ($n = 180$) did not work in such a department. Additionally, 68.1% of the participants ($n = 245$) had not contracted COVID-19 and 21.9% of participants ($n = 79$) stated that a first-degree relative had COVID-19.

Regarding the level at burnout of the participants, we observed that health care professionals have quite high levels of personal burnout (75.31 ± 24.42), work-related burnout (78.99 ± 19.52) and client-related burnout (77.62 ± 19.67). Overall, it was found that the participants had high level at burnout (77.40 ± 19.99). Additionally, we observed that women have increased personal burnout (76.56 ± 20.19), work-related burnout (75.46 ± 23.14), and total burnout (74.99 ± 19.21) (Table 30.1).

It was found that participants who work in a department that treats patients with COVID-19 have significantly higher personal burnout (88.90 ± 16.56), work-related burnout (89.12 ± 19.77), client-related burnout (73.47 ± 25.67), as well as total burnout (86.54 ± 21.34). Additionally, working with patients hospitalized with COVID-19 is associated with increased burnout for health care professionals (Table 30.2).

However, in terms of whether participants have had suffered from COVID-19 and whether a first-degree relative has had COVID-19, all variables were found to have equal mean values (p value >0.05) and thus there is no statistically significant difference (Tables 30.3 and 30.4).

Regarding age and its possible assumption with burnout levels we observed it was found that there is no statistically significant. Similarly, regarding marital status and years of service, there was no significant correlation with burnout levels.

Also, regarding the specialty and qualification other than the basic degree, it was also found in this case that all the variables have equal mean values. Therefore, neither specialty nor qualifica-

Table 30.1 Investigation of differences in burnout according to gender

	Men *n* = 61		Women *n* = 299		
	M	*SD*	*M*	*SD*	*P* value
Personal burnout	69.19	25.35	76.56	20.19	0.03
Work-related burnout	74.64	19.89	77.89	19.50	0.04
Client-related burnout	73.97	18.54	75.45	23.14	0.11
Total burnout	72.71	20.33	74.99	19.21	0.04

Table 30.2 Investigation of differences in burnout depending on the work in a department where patients with COVID-19 are hospitalized

	Work in a department where patients with COVID-19 are hospitalized *n* = 180		No work in a department where patients with COVID-19 are hospitalized *n* = 180		
	M	*SD*	*M*	*SD*	*P* value
Personal burnout	88.90	16.56	59.98	23.57	0.00
Work-related burnout	89.12	19.77	60.90	19.78	0.00
Client-related burnout	73.47	25.67	50.48	23.32	0.00
Total burnout	86.54	21.34	60.19	22.46	0.00

Table 30.3 Burnout level according to personal history at COVID-19

	History at COVID-19 *n* = 115		No history at COVID-19 *n* = 245		
	M	*SD*	*M*	*SD*	*P* value
Personal burnout	75.67	23.44	70.91	28.76	0.90
Work-related burnout	78.82	20.19	72.34	19.97	0.92
Client-related burnout	74.14	18.76	75.63	23.48	0.87
Total burnout	76.97	21.01	73.17	25.81	0.97

Table 30.4 Burnout level in participant according to whether a first-degree relative had COVID-19

	A first-degree relative had COVID-19 *n* = 79		No first-degree relative had COVID-19 *n* = 281		
	M	*SD*	*M*	*SD*	*P* value
Personal burnout	71.46	26.12	70.72	19.45	0.93
Work-related burnout	73.82	19.83	71.49	22.89	0.49
Client-related burnout	70.88	23.97	65.17	24.51	0.76
Total burnout	76.80	24.74	74.55	20.37	0.90

tion other than the basic degree is related to burnout.

Finally, reliability was checked with the Cronbach alpha coefficient ($\alpha = 0.875$), so there is very high reliability.

30.4 Discussion

Based on the results of the research carried out, we demonstrated that health care professionals in the midst of the COVID-19 pandemic have a high degree of burnout. Furthermore, women and health professionals working in wards treating patients with COVID-19 were found to have significantly increased burnout than men and participants not working in wards treating patients with COVID-19. However, age marital status, years of service, specialty, qualification other than a basic degree, and whether they or a first-degree relative had COVID-19 were not related to burnout.

The high burnout of health care professionals during the COVID-19 pandemic has been confirmed by various research studies that have been done worldwide [4, 7, 12, 14, 16, 17]. In Greece, Pappa and her colleagues found that health professionals experience high levels of burnout. On the contrary, Ilias et al. [11] concluded that moderate level of burnout prevails.

In addition, the finding that women have greater burnout compared to men is confirmed by many studies ([2, 6, 8, 14]; Gualano [10]). In the same context, Kasparidou [13] demonstrated that health care professionals who work in COVID-19 departments and are frequently in contact with patients suffering from COVID-19 have the highest burnout levels. Barello et al. [5] evaluated 376 Italian health care providers who interacted with infected patients with COVID-19 for burnout, psychosomatic symptoms, and self-perceived general health. They observed high levels of emotional exhaustion, physical symptoms, and work-related stress in their study population. In the same context, Zerbini et al. [23] demonstrated that in Germany, nurses working on COVID-19 wards had worse burnout scores compared to their colleagues that worked in regular wards, while doctors reported similar scores regardless of the workload due to COVID-19.

Nevertheless, Aydin Sayilan et al. [2] and Ferry et al. [9] found that educational level is related to burnout, and indeed that the higher the educational level, the greater the professional burnout. Some studies have found that specialty is related to burnout, and in particular it has been found that doctors [14] and nurses (Lasalvia et al. [11, 16]) have increased burnout levels. AlJhani et al. [1] also found that health care professionals who are younger and have fewer years of service experience greater burnout. All these differences in tandem (with the findings of the present study) may be explained by the fact that our study sample was a smaller in addition the workloads due to COVID may be influenced by national public health policies that differ between countries. An additional explanation may be that the different instruments used to assess burnout between studies.

The present research also has some limitations. The first limitation is that the sample is relatively small and does not reflect the burnout levels of all Greek health professionals. The second limitation is the fact that convenience sampling was used and the questionnaire was distributed electronically. The third limitation is the fact that the working hours of health professionals and the presence of children were not studied. Finally, other variables such as anxiety, stress, depression, and secondary traumatic stress were not studied.

In conclusion, we observed a high level of professional burnout of health care professionals that highlight the need to develop appropriate strategies to reduce burnout. Doctors and nurses play an integral role in the health care system, and the effects of their burnout are not limited to themselves, but burnout potentially affects the entire health system. Further studies are needed in order to study the physical health of health professionals as well as their psychological resilience and quality of life after the pandemic.

30.5 Conclusions

Burnout is a major professional problem among health care providers. During the coronavirus (COVID-19) pandemic, the frontline workforce faces high workloads and multiple psychosocial stressors, which can affect their mental and emotional health, leading to symptoms of burnout. Additionally, sleep deprivation and a critical lack of psychosocial support may exacerbate such symptoms in the midst of COVID-19. Global evidence informs the need for multiple, evidence-based approaches to addressing burnout during this pandemic. Such interventions may include raising awareness of work-related stress and burnout, promoting awareness and self-care practices to promote mental well-being, ensuring optimal mental health services, using digital technologies to address workplace stress and providing mental health interventions and improving organizational policies and practices that emphasize addressing burnout among health care providers. As COVID-19 may impose unique stressors in the workplace in addition to the pre-existing psychosocial burden among individuals, it is essential to prevent burnout through effective measures that ensure the mental and emotional well-being of health care providers worldwide.

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Moderate Severity SARS-CoV-2 (COVID-19) Affects Ocular Vergence Indices: Eye Tracking-Based Study

Alex O. Trofimov, Darya I. Agarkova,
Kseniia A. Trofimova, Kyrill Lidji-Goryaev,
and Denis E. Bragin

Abstract

Objective: Since the start of the SARS-CoV-2 (COVID-19) pandemic, it has become clear that the brain is one of the main targets for acute and chronic damage. Although neurodegenerative changes have yet to be investigated, there is already a large body of data on damage to its fiber tracts. A mobile eye tracker is possibly one of the best tools to study such damage in a COVID hospital setting. At the same time, the available data indicate that eye tracking parameters, even in healthy volunteers, demonstrate a distinct gender-specific difference.

The aim of the work is to evaluate functional and structural impairments of the fiber tracts and to find possible gender-specific dynamics of eye tracking indicators in the acute period of COVID-19 pneumonia (Delta variant) of moderate severity.

Materials and methods: A single-center non-randomized retrospective study included 84 patients in the acute period of moderate severity SARS-CoV-2 (COVID-19) pneumonia (Delta variant) (Group 1). The mean time from admission was 1.4 ± 1.2 days. M:41, F:43. According to thoracic CT, the lung involvement ranged from CT 1 to CT 2. SpO2 ranged from 95% to 99%. The mean age was 35.5 ± 14.8 years (from 18 to 60). The control group (Group 2) included 158 healthy volunteers without pathology of the vision organs and central nervous system.

The eye vergence index (VRx) was determined using eye tracking as a motion correlation coefficient between the angular velocities of the left and right eyeballs and was a measure of the conjugation of horizontal and vertical eye movements.

The mobile complex Eye Tracker Low-Speed 20 (BVG LLC, the Netherlands) was used. Eye tracking parameters were assessed by vertical and horizontal eye vergence (VVRx and HVRx).

Statistical analysis was done using the methods of parametric and non-parametric statistics.

Results: Moderate COVID-19 pneumonia resulted in a significant decrease in both VVRx and HVRx compared to controls (0.763 ± 0.127 and 0.856 ± 0.043; $p < 0.000001$; 0.729 ± 0.018 and 0.776 ± 0.023

A. O. Trofimov (✉) · D. I. Agarkova ·
K. A. Trofimova · K. Lidji-Goryaev
Department of Neurological Diseases, Privolzhsky Research Medical University, Nizhny Novgorod, Russia

D. E. Bragin
Lovelace Biomedical Research Institute, Albuquerque, NM, USA

Department of Neurology, University of New Mexico School of Medicine, Albuquerque, NM, USA

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$p < 0.000001$, respectively). VVRx values were significantly higher in men (0.775 ± 0.046 and 0.747 ± 0.091, $p = 0.019$, respectively), while XVRx values were significantly higher in women (0.665 ± 0.018 and 0.728 ± 0.024, $p < 0.0000001$, respectively).

Conclusions: SARS-CoV-2 (COVID-19) of moderate severity is accompanied by a significant deterioration in eye tracking performance proving functional and structural impairments ($p < 0.05$). VVRx was significantly higher in men, and HVRx was substantially greater in women reflecting gender-specific differences.

Keywords

COVID-19 · Eye tracking · Vergence

31.1 Introduction

SARS-CoV-2 virus affinity to the nervous tissue has been established in a large body of studies [18], but the neurological complications that can develop in COVID-19 convalescents are still poorly understood [12].

COVID-19 is thought to primarily affect the respiratory system, however, even in the case of a mild course, there is evidence of chronic inflammation development and neurodegenerative changes in the brain [1, 2].

Moreover, in practice, some patients with COVID-19 pneumonia have clinical signs similar to brain damage consequences, such as headache, slow thinking, and blurred vision [20]. It is assumed that this may be due to the defeat by the COVID-19 virus of both nuclei of cranial nerves and cerebral pathways.

The eye movement conjugation is provided by the activation and involvement of several areas at once, including parietal and frontal lobes, as well as the thalamus, tegmenta, etc. [19].

It has been shown that the dorsolateral prefrontal cortex regulates eyeball movements via her direct connections with the main and supplementary frontal ocular fields as well associative and motor fields in the posterior parietal cortex, the anterior cingulate cortex and in the brainstem superior colliculus [14].

According to several studies, the assessment of conjugation of eye movements is an objective physiological parameter of brain fiber pathways state and can be used in brain damage of various etiologies [8, 10, 11].

However, so far, only little is known about conjugate eye movement impairments dynamics as a potential marker of fiber pathways damage at COVID-19 [9].

The hypothesis is that in cerebral hypoxia absence cases, eye tracking parameter changes reflect the impairments of conjugate gaze already in an early stage of COVID-19 infection.

The aim of this work was to study eye tracking indicators dynamics in the acute period of moderate COVID-19 infection (Delta variant) and to evaluate its possible gender specificity.

31.2 Materials and Methods

31.2.1 Study Design and Population

This non-randomized single-center retrospective study was approved by the Ethics Committee of Privolzhsky Research Medical University and conformed to the standards of the Declaration of Helsinki. Informed consent was obtained from each patient.

The study involved 84 patients (41 men, 43 women, all right-handed) in the acute period of moderate severity SARS-CoV-2 (COVID-19) (delta variant – B.1.617.2) at 2–3 days after admission to the COVID-19 Department of Regional Hospital named after Semashko (Group 1) from June 2021 to October 2021.

The mean age was 36.3 ± 4.8 years (range 18–61 years). The median height was 174.3 ± 7.5 cm and weight 78.5 ± 5.2 kg.

The mean time from admission was 1.9 ± 1.2 days. The diagnosis of moderate severity SARS-CoV-2 was based on the presence of positive results of reverse transcription—polymerase chain reaction (PCR) testing and the lung involvement ranged from grade CT 1 to grade CT 2.

SpO2 ranged from 95% to 99%.

The control group (Group 2) included 158 healthy volunteers without pathology of the vision organs and central nervous system. A second group was matched by age, height, weight, and gender. They had not been diagnosed with COVID-19 disease before the eye tracking nor had any neurological symptoms.

All patients were free of any known ophthalmological diseases or injuries and were not taking ocular medications.

The inclusion criteria were as follows:

Moderate severity SARS-CoV-2 (COVID-19) (delta variant – B.1.617.2) at 2–3 days after an admission
GCS 15 before eye tracking assessment
Positive results of PCR testing at admission
SpO2 more than 95%
Lung involvement grade CT 1–2
Age older than 21 and younger than 60 years

The exclusion criteria were as follows:

Mild or severe COVID-19 GCS less than 15 before eye tracking assessment
Any variant exception delta (alpha, omicron, etc.)
Any brain lesion on CT/MRI
Negative result of PCR testing at admission
SpO2 less than 95%
Intact lung (grade CT 0) or high grade of lung involvement (grade CT 3–4)
Age younger than 16 years or older than 60 years
Use monoclonal antibodies drugs for the treatment
Any neurodegenerative diseases or mild cognitive impairment or bipolar disorder or depression or cerebrovascular disease or traumatic brain injury history, alcohol, or drugs addiction disorder

31.2.2 Eye Tracking Configuration

Binocular eye movements (saccades and smooth pursuits) were recorded continuously at 20 Hz as a series of visual cues configured in mobile eye tracking system software and were presented on a tablet screen (EyeTracker, BVG Software Group LLC, the Netherlands).

The room lights and electronic devices were switched off during eye-tracking follow-ups.

The protocol included a calibration procedure when the tablet screen was black for 10 s to allow the participant an opportunity to adapt their eyes.

The circle marker (diameter 0.3 cm) was presented on the monitor for 20 s. The marker moved across the screen randomly at different speeds, making it possible to track the saccades and the smooth pursuits. The circle color changed from white to red every 2 s so the patient could maintain attention on the circle center [14].

The low-quality frames (i.e., unrecognized pupils, incorrect initial frames, and blinking frames) were excluded manually using the network refinement function. A 300 best consecutive eye tracking was analyzed before the tablet screen was switched off. The total procedure duration was 30 s.

The calculated parameters (for each eye separately) were: the vertical and horizontal Angular Velocity (AV), Left Vertical Speed (LVS), Right Vertical Speed (RVS), Left Horizontal Speed (LHS), and Right Horizontal Speed (RHS).

As resulting parameters which assessing the conjugate eye movements, we proposed the indices of vertical and horizontal eye vergence reactivity (Vergence reactivity index—VRx) were calculated as a moving correlation coefficient between the corresponding AV of the right and left eye by analogy with the calculation of cerebrovascular reactivity index (pressure reactivity index—PRx) [5] (Formula 1).

$$r = \frac{cov(X,Y)}{\sigma_X \sigma_Y} = \frac{\sum_{i=1}^{N}\left(X_i - \bar{X}\right)\left(Y_i - \bar{Y}\right)}{\sqrt{\sum_{i=1}^{N}\left(X_i - \bar{X}\right)^2}\sqrt{\sum_{i=1}^{N}\left(Y_i - \bar{Y}\right)^2}}$$

where cov is the covariance, σX is the standard deviation on the axis X, and σY is the standard deviation on the axis Y.

Thus, the VRx index was an objective indicator reflecting oculomotor activity conjugation. As with any correlation coefficient, the value of the

VRx indices varies between +1 and −1, where +1 is the complete correlation between the angular velocities of the left and right eyes, and −1 is the complete independence between the angular velocities of the left and right eyes.

Horizontal VRx (HVRx—Left versus Right Horizontal Speed) and vertical VRx (VVRx Left versus Right Vertical Speed) were distinguished.

31.2.3 Statistical Analysis

Data were evaluated for normality using the Shapiro-Wilk criterion. Continuous variables are expressed as mean ± standard deviation. The statistical analysis was performed using nonparametric statistics and correlation analysis methods. The level of significance was set at 0.05. All analyses were performed using the software package Statistica 12 (TIBCO Software Inc., Palo Alto, USA).

31.3 Results

The acquired and analyzed data are summarized in Table 31.1.

In healthy men and women (Group 2), the eye movement conjugation had statistically significant gender-specific differences: vertical and horizontal eye vergence indices, as well as correlation coefficients between their values in men were significantly higher than in women ($p = 0.002$ and $p = 0.035$, as well as $r = 0.4343$ and $r = 0.149$, respectively).

In practice, this means that the gaze of male volunteers is more synchronized than that of female volunteers.

Moderate COVID-19 resulted in a significant decrease in both VVRx and HVRx compared to controls (0.763 ± 0.127 and 0.856 ± 0.043; $p < 0.000001$; 0.729 ± 0.018 and 0.776 ± 0.023 $p < 0.000001$, respectively). VVRx values were significantly higher in ill men (0.775 ± 0.046 and 0.727 ± 0.091, $p = 0.019$, respectively), while HVRx values were significantly higher in ill women (0.663 ± 0.018 and 0.718 ± 0.024, $p < 0.0000001$, respectively). Thus, the moderate COVID-19 had a destabilizing effect on eye movement conjugation, which was accompanied by a significant decrease in the values of eye vergence indices ($p < 0.05$) in both genders compared to the control group.

31.4 Discussion

We started collecting COVID-19 patient's eye-tracking data in Nizhny Novgorod in September 2020. And to date, we have recorded 84 moderate COVID-19 pneumonia patients (delta variant). We compared our data with 178 age-gender-matched volunteers.

All of them were free of any neurodegenerative diseases (Parkinson's, Alzheimer's, Huntington's diseases, etc.), as well as mild cognitive impairment, bipolar disorder, depression, cerebrovascular disease or traumatic brain injury history, and alcohol or drugs addiction disorder.

It has been shown that eye movement conjugation in healthy men and women has statisti-

Table 31.1 Data on comparison of the analyzed parameters

	Group 1	Group 2	*P*
I. VVRx (all)	0.763 ± 0.127	0.856 ± 0.043	<0.0001[a]
II. VVRx (men)	0.775 ± 0.046	0.862 ± 0.159	<0.0001[a]
III. VVRx (women)	0.727 ± 0.091	0.853 ± 0.171	<0.0001[a]
IV. HVRx (all)	0.729 ± 0.018	0.776 ± 0.023	<0.0001[a]
V. HVRx (men)	0.663 ± 0.018	0.774 ± 0.248	<0.0001[a]
VI. HVRx (women)	0.718 ± 0.024	0.754 ± 0.229	<0.0001[a]
P (II–III)	0.019[a]	0.002[a]	–
P (V–VI)	<0.0000001[a]	0.035[a]	–

[a] Significant difference ($p < 0.01$)

cally significant gender-specific differences: vertical and horizontal eye vergence indices, as well as correlation coefficients between their values in men were significantly higher than in women ($p = 0.001877$ and $p = 0.035202$, as well as $r = 0.4343$ and $r = 0.149$, respectively).

In practice, this means that the gaze of male volunteers is more synchronized than that of female volunteers.

In the study group, cerebral CT and/or MRI analysis did not reveal any parenchymal lesions. Thus, motor and sensory pathways were structurally intact and functioning normally in COVID-19.

However, the data obtained indicated that moderate COVID-19 infection caused gaze desynchronization in both genders and also changed the gender characteristics of gaze focusing compared to volunteers.

Thus, moderate COVID-19 had a destabilizing effect on eye movement conjugation, accompanied by a significant decrease in the values of eye vergence indices ($p < 0.05$) in both genders compared to the control group.

Moreover, these alterations are similar to those reported in the early stage of neurodegenerative diseases [4, 13, 14, 15, 17].

First, it has been shown that the COVID-19 virus has a tropism for the vascular endothelium, which can lead to cerebral microcirculation disorders and the development of latent cerebral ischemia. This is evidenced by the data of a meta-analysis by Taquet et al., who found an almost twofold increase in the incidence of ischemic stroke in COVID-19 convalescents. This was predominantly expressed for the delta variant, as opposed to the alpha and omicron variants.

Also, for delta variant convalescents, a one and a half-fold increase in the risk of developing neurodegenerative brain damage and the persistent cognitive deficit was shown. The authors suppose that this indicates a neurotransmitter disbalance and, as a result, might serve as the second cause of eye movement disconjugate at COVID-19 infection [20].

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Moreover, it has been shown that COVID induces multiple microembolism, microhemorrhage, and endothelial damage with the formation of antiphospholipid syndrome, dysfunction of the glymphatic system, as well as the formation of antineuronal and antiglial antigens are the causes of the development of systemic inflammation and neuroimmune reactions in COVID-19, and consequently—eye movement disorders [6].

However, further research is required to explicate gender-specific eye tracking impairments at COVID-19 infection.

31.5 Limitation of the Study

As far as we know, our study is one of the first to study eye tracking for COVID-19 infection, therefore it is not without some limitations. The main limitation of this study was the relatively small sample size. This will require repeating and validating the results of the study on a larger independent cohort. However, it seems that the sample size was enough for a preliminary study.

Another serious limitation was the retrospective nature of this work, and therefore, a certain shift in the patient population cannot be completely ruled out.

Despite the tablet with the eye tracker was not certified as a medical device and a medical application, the eye tracking parameters values given by the eye tracker were in agreement with the literature [7].

In addition, although the calculation error according to previous studies was not more than 5% at an amplitude of 20° [16], the analysis of the angular velocity matrix was carried out in the Cartesian coordinate system neglecting the lens curvature, which is also a work limitation.

Thus, further research is needed for the understanding of these phenomena.

31.6 Conclusion

SARS-CoV-2 (COVID-19) of moderate severity is accompanied by a significant deterioration in eye tracking performance, proving functional and structural impairments ($p < 0.05$). VVRx was significantly higher in men, and HVRx was substantially greater in women reflecting gender-specific differences.

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Interdisciplinary Collaboration and Communication Among Doctors and Nurses in ICUs During the COVID-19 Pandemic and Their Importance in Professional Life Quality Improvement

Charalampos Platis, Arvanitidis Theodoros, Maria-Elissavet Psomiadi, and Panagiotis Theodorou

Abstract

To investigate interdisciplinary cooperation and communication among doctors and nurses along with its role in improving the quality of their professional life, a cross-sectional survey was designed. The study was carried out from February to April 2021 through the application of an anonymous, structured, self-completed, closed-ended questionnaire in a convenience sample consisting of 110 healthcare professionals currently working in the intensive care units (ICUs) of three distinct hospitals (response rate: 76.4%). It was observed that medical personnel manifested a more positive stance toward interdisciplinary collaboration than nursing while women seemed to believe more than men that nurses' administrative skills are not valued enough by doctors. Nurses with limited work experience reported that doctors show scarce respect to nurses in the presence of patients' parents and companions while male nurses acknowledged more the provision of multidimensional care given to patients. Occupational stress, professional satisfaction, and burnout levels were mainly moderate across study participants.

Keywords

Interdisciplinary cooperation · Professional life quality · ICU · Medical personnel · Nursing personnel

32.1 Background

Collaboration is the process in which knowledge, experience, skills, and competencies of healthcare professionals are merged to serve a common goal [1] while sharing with one another their respective responsibility through communication [2]. With proper cooperation interpersonal relationships are improved as all partners show the required respect to their peers, embrace their role, and contribute by communicating openly,

C. Platis
Greek DRG Institute SA, Athens, Greece

A. Theodoros
Kavala General Hospital, Kavala, Greece

M.-E. Psomiadi (✉)
Directory of Operational Preparedness for Public Health Emergencies, Ministry of Health, Athens, Greece

P. Theodorou
School of Social Sciences, Postgraduate Course – Health Care Management, Hellenic Open University, Patra, Greece

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consequently achieving better outcomes at personal and collective levels [3]. Interprofessional collaboration as a concept encompasses the relationships among the members of organizations, groups, or distinct professional branches, who coexist and cooperate to achieve a common goal [4]. It consists of the basis of proper function of any healthcare organization [5] as it enhances the potential for healthcare services recipients' of better outcomes, ensures quality provision of care and ensures patients' safety [6].

Communication aims at the proper coordination and sharing of organization's activities not only at the executive level but also among employee groups of different specializations [7]. Communication between doctors and nurses at a nursing ward or in a hospital department can be characterized as special, as the complexity and abundance of messages, hasty evaluation, lack of attention and shared vocabulary impact significantly its effectiveness [8]. Adequate collaboration between peers, shared therapeutic goals, confidentiality, camaraderie, attendance to speaker, suitable flow of work, and ensured personal space affect as well communication effectiveness in such a setting [9] and especially in an Intensive Care Unit (ICU) all the while defining effective cooperation that results in better treatment outcomes [10].

Professional life quality is a characteristic more frequently encountered while recruiting and maintaining qualified personnel, as it enhances such a potential [11]. In hospitals, where professional life quality is lacking, absenteeism and increased turnover are rather common, especially among nurses. Through ameliorating the quality of their working environment, it is anticipated for their performance to be increased while burnout and absenteeism to become scarce [11].

The purpose of this study was to explore interdisciplinary cooperation and communication between doctors and nurses working in ICUs along with their role in their professional life quality improvement. Also, to assess how differentiated personnel's specific characteristics were, based on their demographics, in particular during the Covid-19 pandemic period.

32.2 Materials and Methods

32.2.1 Study Population

To serve the study purpose a cross-sectional quantitative survey was conducted through the application of a dedicated research tool in a convenience sample. The study sample consisted of the medical and nursing personnel, who had been working for more than one moth in the ICUs of three public hospitals within the Greek National Health System (NHS). 110 questionnaires were distributed of which 84 were fully completed (76.4% response rate), in Thessaloniki's General Hospital "Ippokratio," Kavala's General Hospital and Alexandroupoli's University General Hospital. The study was carried out from February to April 2021, following the Scientific and Administrative Hospitals' Boards respective permissions under the condition of study's compliance with all the ethical research principles concerning personal data safeguarding.

32.2.2 Research Tool

The research tool, an anonymous, structured, self-completed, closed-ended questionnaire, was formulated by three distinct ones, the first of which facilitated collecting participants' demographics. The second investigates the attitudes of doctors and nurses regarding their communication and interdisciplinary collaboration through the Communication and Collaboration among Physicians and Nurses Scale [12], that had been previously translated and weighted in Greek [13, 14]. It is comprised by 28 questions, the first 13 of which explore the relationships between medical and nursing personnel, while of the remaining 15, 7 explore nurses' stance on cooperating with the medical staff, 4 nurses' decision-making process regarding patient care, and 4 nurses' perceptions on communications and being informed.

The third questionnaire incorporated into the research tool was the Professional Quality of Life Scale that investigates healthcare personnel's professional life quality through 30 questions exploring their previous work experiences [15].

Its questions assess their experiences with regard to their current occupational circumstances via a 5-item Likert scale, reflecting on how frequently they had experienced certain events in the last 30 days prior to the study and on how they had impacted their quality of life. The 30 questions can be further divided into three different constructs: professional satisfaction (questions 3, 6, 12, 16, 18, 20, 22, 24, 27, 30), occupational stress (questions 1r, 4r, 8, 10, 15r, 17r, 19, 21, 26, 29r), and burnout (questions 2, 5, 7, 9, 11, 13, 14, 23, 25, 28). *R* implies that in this question's answer there would be a scale reversal based on the rule: 1→5, 2→4, 3→3, 4→2, 5→1.

Cronbach's alpha coefficient values of internal consistency for all questionnaires' dimensions, that are depicted in Table 32.1, deemed the newly synthesized questionnaire as suitable for our survey. The Communication and Collaboration among Physicians and Nurses Scale was deployed after the licensing of its translators while the Professional Quality of Life Scale after the permission of its creators.

32.2.3 Statistical Analysis

Descriptive statistics were applied for all variables while the Kolmogorov-Smirnov test was deployed for normality testing. Students' t-test and Spearman's correlation coefficients were used to investigate the relations between variables. If more than two independent variables presented with statistically significant relations at the level of 0.05 ($p < 0.05$) in the bivariate analysis, multivariate linear regression was applied, and, in particular, multiple linear regression with backward stepwise linear regression. In this case, the coefficients' beta, the corresponding 95% confidence intervals and the p values are reported. The bilateral level of statistical significance was set at 0.05.

Table 32.1 Cronbach's alpha coefficient values

Questionnaire dimension	Cronbach's alpha	Items
Interdisciplinary cooperation and communication		
Interdisciplinary cooperation between medical and nursing personnel	0.92	13
Relationships between medical and nursing personnel	0.62	7
Decision-making process regarding patient care	0.86	4
Nurses' perceptions on communications and being informed	0.3	4
Professional life quality		
Professional life quality	0.75	30

32.3 Results

Participants' demographics are summarized in Table 32.2. Participants' responses to the Communication and Collaboration Scale and the Professional Quality of Life Scale are depicted in Tables 32.3 and 32.4 correspondingly. With regard to the Professional Quality of Life subscales, participants expressed moderate professional satisfaction (73.81%), moderate occupational stress (71.43%) as well as moderate burnout levels (72.62%). Sub-scales descriptives are reported in Table 32.5 and the correlations between them in Table 32.6; a low positive correlation ($r = 0.4$) was found between the burnout and occupational stress ones, all the while a mild, negative one ($r = 0.6$) between the burnout and job satisfaction sub-scales.

From the bivariate analyses among participants' demographics and the Communication and Collaboration Scale items, statistically significant relations were identified among the scale items and specialization, sex, and work experience at the level of 0.05 ($p < 0.005$). Concerning specialization, it is observed that medical personnel present with an average higher score than nurses that consequently indicates the more positive stance that medical doctors maintain regarding interdisciplinary cooperation. All statistically significant relations among the scale items and specialization are summarized in Table 32.7. About gender, a statistically significant relation emerged at the level of 0.05 with the item "the doctor values nurse's administrative abilities" ($p = 0.02007$); as women present with an average lower score (*M*: 3.6212, SD: 0.7599), than men

Table 32.2 Sample's demographics

Characteristics	N	%
Sex		
Male	18	21.42
Female	66	78.58
Age (in years)		
20–29	14	16.67
30–39	25	29.76
40–49	31	36.91
>49	13	15.47
No answer	1	1.19
Marital status		
Single	26	30.95
Married	51	60.72
Divorced	6	7.14
Widowed	1	1.19
Number of children		
0	30	35.71
1	12	14.28
2	32	38.1
3	9	10.72
>3	1	1.19
Monthly income (€)		
<1000	31	36.91
1000–1500	40	47.62
>1500	13	15.47
Specialization		
Medical doctor	19	22.62
Nurse	65	77.38
Educational level		
High school graduate	10	11.9
Technological Institute graduate	40	47.62
University graduate	10	11.9
MSc holder	22	26.2
PhD holder	2	2.38
Years of service		
0–4	23	2.38
5–9	9	10.72
10–14	20	23.81
15–19	18	21.42
20–24	9	10.72
>24	5	5.95
Working relationship		
Indefinite term	57	67.85
Fixed-term	27	32.15
Work department		
COVID ICU	65	77.38
ICU	19	22.62

(*M*: 4.0555, SD: 0.6391), it can be supported that nurses' administrative abilities are not valued enough by doctors.

To investigate the relations between work experience and the Communication and Collaboration Scale items, the study participants were divided into those with experience of up to 10 years and those with more. A statistically significant relation emerged at the level of 0.05 with the item "the doctor shows respect to nurse respect in the presence of the patients' parents and companions" ($p = 0.02459$). Nurses with a shorter work experience present with an average lower score in the scale (*M*: 3.612903, SD: 1.0544), than their more experienced colleagues (*M*: 4.115385, SD: 0.7581), believing less that the doctor shows them respect in the presence of patients' parents and companions.

A statistically significant relation was identified at the level of 0.05 with the item "in this department a multidimensional approach to patient care is applied" ($p = 0.0445$). It was observed that male employees (*M*: 4.357, SD: 0.6333) presented with an average higher score than their female colleagues (*M*: 3.903, SD: 0.9754), acknowledging that multidimensional care is provided to patients more frequently.

According to our findings, doctors seem to feel more satisfied as professionals, women and doctors seem experience higher occupational stress levels than nurses or their male colleagues, while women manifest burnout more than their male colleagues (Table 32.8).

32.4 Discussion

According to our findings, participants demonstrated moderate professional satisfaction similarly to previous analogous studies [16, 17], even though it has been highlighted that nurses working in ICUs express low professional satisfaction levels due to fatigue and stress [18]. However, recently it was supported that nurses working in closed wards manifest higher professional satis-

Table 32.3 Participants' responses to the communication and collaboration scale

	Mean	Standard deviation	Median	Minimum	Maximum
Interdisciplinary cooperation between medical and nursing personnel					
The doctor shows respect to the nurse respect in the presence of the parents and patients' companions	3.92	0.9077	4	1	5
The doctor is informed by the nurse about patient's condition	3.988	0.8139	4	1	5
The doctor–nurse relationship ensures Cooperation	4.298	0.8327	4	2	5
The doctor trusts nurse's work	3.714	0.8859	4	1	5
The physician accepts nurse's decisions regarding patient care	3.183	0.8906	3	1	5
The nurse feels an integral part of the patient's care team	3.869	0.9022	4	2	5
The doctor evaluates fairly nurse's work	3.398	1.023	3	1	5
The doctor collaborates with the nurse for treatments and decision management	3.024	1.150	3	1	5
The doctor shows sensitivity to nurse's marital status	2.893	1.1087	4	1	5
The doctor shows sensitivity to nurse's personal needs	2.964	1.0464	3	1	5
The physician accepts nurse's responsibility in patient care	3.714	0.7536	4	2	5
The doctor assesses nurse's administrative abilities	3.096	0.8918	3	1	5
The physician accepts nurse's opinion on treatment and decision management	2.833	0.9548	3	1	5
Relationships between medical and nursing personnel					
Sometimes I am not informed properly by the department doctors	3.375	0.8997	4	2	5
Communication with doctors is very good	3.077	0.7767	4	1	5
Sometimes it is necessary to check the accuracy of the order given to me	4	0.6123	4	2	5
I am interested in communicating with the doctors in the department	4.031	0.7282	4	2	5
It is easy to ask the on-call department doctor for instructions	3.677	0.8857	4	1	5
The time I work in the department has been a great experience for me	4	0.9354	4	1	5
In this department a multidimensional approach to patient care is applied	3.692	0.967	4	1	5
Decision-making process regarding patient care					
Are nurses involved with decision-making?	2.554	0.8483	3	1	4
Is there a doctor–nurse collaboration in decision- making?	2.328	0.8738	2	1	4
Are doctors and nurses communicating prior to making decisions?	2.438	0.9063	2	1	4
Are doctors and nurses communicating openly when making decisions?	2.484	0.8543	3	1	4

(continued)

Table 32.3 (continued)

	Mean	Standard deviation	Median	Minimum	Maximum
Nurses' perceptions on communications and being informed					
I was informed about patient's condition when needed	3.554	0.9359	4	1	5
I was informed on time when patient's condition changed	3.446	0.8297	4	1	5
I found an unjustified delay in getting informed about patient's condition	2.831	0.8762	3	1	5
Nurses call doctors on a regular basis regarding patients-care related issues	3.354	0.8914	3	1	5

Table 32.4 Participants' responses to the Professional Quality of Life Scale

	Mean	Standard deviation	Median	Minimum	Maximum
I am happy	3.476	0.8427	4	2	5
I am deeply concerned about more than one person whom I support	3.506	0.771	2	3	5
I get satisfaction from being able to support people	4.083	0.7793	2	4	5
I feel connected to others	3.405	0.9457	1	3	5
I bounce/I am startled by unexpected sounds	2.619	1.0855	1	2	5
I feel refreshed after working with those I support	3.305	0.8845	1	3	5
I find it difficult to separate my personal from my professional life	2.226	1.0337	1	2	5
I'm not as productive at work because I lose sleep due to traumatic experiences of the people I care for/support	1.976	0.7911	1	2	5
I think I may have been affected by the traumatic stress of those I support	2.405	0.9832	1	2	5
I feel trapped by my work	2.643	1.2088	1	3	5
I have felt irritated about various things due to the assistance I have been providing	3.107	0.9941	1	3	5
I like my job	4.159	0.9225	1	4	5
I feel depressed due to the traumatic experiences of the people I assist	2.452	0.9366	1	2	5
I feel like I'm experiencing the trauma of someone I've helped	2.179	0.9959	1	3	5
My beliefs support me	3.747	1.022	1	4	5
I am happy with how I manage to follow the techniques and protocols for support	3.619	0.8051	2	4	5
I'm the person I've always wanted to be	3.771	0.8163	2	4	5
My work makes me feel satisfied	3.69	0.931	1	4	5
I feel exhausted because of my work	3.512	0.9755	1	3	5
I have pleasant thoughts/feelings about those I support on how I could help them	3.679	0.7307	2	4	5
I feel overwhelmed because my workload seems endless	3.357	1.0017	1	3	5
I believe I can make a difference through my work	3.205	0.777	1	3	5
I avoid certain activities or situations because they remind me of scary experiences of the people I support	2.00	0.9183	1	2	4
I'm proud of what I can do to help	3.81	0.9628	3	4	5
I have disturbing/frightening thoughts as a result of helping others	1.929	0.8033	1	2	4
I feel like I'm bogged down by the system	3.012	1.2172	1	3	5

(continued)

Table 32.4 (continued)

	Mean	Standard deviation	Median	Minimum	Maximum
I have thoughts that I am successful as a professional	3.289	0.8629	1	4	5
I cannot recall significant parts of my work involving injury victims	2.341	0.8347	1	2	4
I am a man who cares a lot	4.143	0.6611	3	4	5
I am happy I chose to do this job	3.714	1.103	1	4	5

Table 32.5 Professional Quality of Life sub-scales' descriptives

Subscale	Mean	Standard deviation	Median	Minimum	Maximum
Professional satisfaction	36.3	6.08	51.15	24.87	70.87
Occupational stress	24.67	5.52	56.49	28.87	74.15
Burnout	25.90	4.9	50.19	25.72	68.55

Table 32.6 Correlations among Professional Quality of Life sub-scales

Subscale	Professional satisfaction	Occupational stress	Burnout
Professional satisfaction	–	$r = -0.17$ ($p = 0.1171$)	**$r = -0.6$ ($p < 0.001$)**
Occupational stress	$r = -0.17$ (p = 0.1171)	–	**$r = 0.4$ ($p < 0.001$)**
Burnout	**r = −0.6 ($p < 0.001$)**	**$r = 0.4$ ($p < 0.001$)**	–

r Pearson's correlation coefficient

faction levels as they do not interact with patients' relatives or other people that might disoriented them from executing their duties all the while feeling greater altruism and professionalism compared to nurses of other hospital wards [19].

Despite the literature supporting that ICUs' nurses present with significant levels of occupational stress and burnout in comparison to their peers that work in other hospital departments [20–23], those participated in our study showed moderate occupational stress and burnout levels. A finding rather interesting as during the COVID-19 pandemic, both nurses and doctors, were the two occupational groups most heavily burdened; consequently, leading them in demonstrating significant burnout [24–28] and occupational stress levels [29], while presenting reduced professional satisfaction [30, 31]. In accordance with previous findings, burnout and occupational stress have been correlated in our study positively [32, 33] while burnout and professional satisfaction negatively [34–36]. Besides gender being associated with burnout, either with regard to the male or female sex, women in our study were more frequently identified with burnout than their men colleagues [37–39].

Doctors, in our study, appeared more professionally satisfied than nurses; a finding that agrees with previous relevant ones [40] and disagrees with others [39, 41]. They as well express a more positive stance toward multidisciplinary cooperation, validating past findings indicating that doctors maintain a more positive image to nurses, regarding interdisciplinary cooperation, or acknowledge satisfactory cooperation with other specialties in a setting of shared trust and respect [42]. However, studies have supported that nurses are characterized by a more positive attitude toward interdisciplinary cooperation in general as they tend to showcase continuous effort to improve it [43–47]. A meta-analysis on the subject concluded that although doctors believed more than nurses the existence of proper cooperation between them, nurses had a more positive attitude toward it [48]; especially in departments that require more frequent communication and collaboration between personnel, nurses, and doctors cooperate more frequently and effectively [49, 50].

Finally, nurses with lesser work experience appeared to believe that doctors do not show the required respect while in presence of patient's parents and companions, supporting the finding of a corresponding study that decisions made by nurse, and especially those with limited work experience, were oftentimes underestimated by the doctors [13]. In this study, nurses reported feeling less important members of the patients' care team, despite male nurses acknowledging more the provision of multidimensional care to ICU patients than then female peers [13].

32.4.1 Limitations

The main limitation of our study concerns the sampling method applied as well as its size. Due to the restriction measure established to mitigate

Table 32.7 Correlations among specialization and interdisciplinary cooperation sub-scale questions

		M	SD	*p*
The doctor shows respect to the nurse respect in the presence of the parents and patients' companions	Doctors	4.631579	0.4955	<0.001
	Nurses	3.718750	0.8991	
The doctor is informed by the nurse about patient's condition	Doctors	4.157895	0.7647	0.885
	Nurses	3.938462	0.8268	
The doctor–nurse relationship ensures cooperation	Doctors	4.736842	0.4524	<0.001
	Nurses	4.169231	0.8762	
The doctor trusts nurse's work	Doctors	4.210526	0.7132	<0.001
	Nurses	3.569231	0.8833	
The physician accepts nurse's decisions regarding patient care	Doctors	3.777778	0.7320	<0.001
	Nurses	3.015625	0.8635	
The doctor evaluates fairly nurse's work	Doctors	3.947368	0.9112	0.6729
	Nurses	3.846154	0.9053	
The doctor collaborates with the nurse for treatments and decision management	Doctors	4.368421	0.7608	<0.001
	Nurses	3.109375	0.9105	
The doctor shows sensitivity to nurse's marital status	Doctors	4.000000	1	<0.001
	Nurses	2.738462	1.034	
The doctor shows sensitivity to nurse's personal needs	Doctors	4.105263	0.6578	<0.001
	Nurses	2.538462	0.9532	
The physician accepts nurse's responsibility in patient care	Doctors	4.000000	0.7453	<0.001
	Nurses	2.661538	0.9232	
The doctor assesses nurse's administrative abilities	Doctors	4.263158	0.533	<0.001
	Nurses	3.553846	0.7077	
The physician accepts nurse's opinion on treatment and decision management	Doctors	3.842105	0.8983	<0.001
	Nurses	2.875000	0.7663	

Table 32.8 Multilinear regression analysis results

Dependent variable	Independent variable	Coefficient b	95% CI b	*p* value
Professional satisfaction	Specialization	−1.931	−3.493 to −0.369	0.057
Occupational stress	Sex	2.714	2.258 to 4.706	0.032608
	Specialization	2.215	0.837 to 3.593	0.029591
Burnout	Sex	3.482	2.258 to 4.706	<0.001

the COVID-19 concurrent pandemic, there had been a significant delay in receiving the clearance required from the hospitals to conduct the study. Under such circumstances, appeared as most appropriate to deploy a convenience sampling method to recruit participants for a sample not as vast as it was originally designed, also dictated by the increased workload of doctors and nurses in all study hospitals.

32.5 Conclusions

Hospitals consist an intriguing workplace as many professionals of various specialties are employed, where open communication and proper cooperation should prevail, in order to achieve its best possible function. Our findings shall support future initiatives for improving communication and interdisciplinary cooperation among doctors and nurses, not only working in ICUs but also employed in the ICU, but also in healthcare settings in general. With multidisciplinary training of healthcare professionals being a "potentially effective method for enhancing practice based on cooperation" [49], patient safety and quality care are ensured [5, 6] all the while healthcare teams and organizations work more efficiently and effectively [50].

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Job Satisfaction and Burnout Levels of the Human Resources of a Public Oncology Hospital During the COVID-19 Pandemic

Panagiotis Theodorou, Maria Georgantoni,
Psomiadi Maria-Elissavet, Platis Charalampos,
and Bellali Thalia

Abstract

To investigate job satisfaction and burnout levels among the personnel of a public oncology hospital amid the COVID-19 pandemic, a cross-sectional survey was designed. The study was carried out from December 2021 to January 2022 through the application of an anonymous, structured, self-completed, closed-ended questionnaire, consisting of the Job Satisfaction Survey (JSS) and the Copenhagen Burnout Inventory (CBI) in a convenience sample comprised by 117 employees of "Agioi Anargyroi" General Oncology Hospital (response rate: 98%). It was observed that while overall job satisfaction was reduced, several of its determining dimensions like supervision, relationship with co-workers, or work nature were increased. Also, an average overall burnout of 49% was observed across all participants, with women, nurses, and those with a lower educational level experiencing it more intensely. The COVID-19 pandemic outbreak affected negatively healthcare professionals who experienced significant personal and occupational burnout, consequently reducing their job satisfaction.

Keywords

Job satisfaction · Burnout · Human resources · COVID-19

33.1 Background

Job satisfaction and burnout are two multifaceted and interlinked notions. The emergence of the COVID-19 pandemic in late 2019 acted as a determining factor of the relation among them, as in tandem with the already existing shortages in personnel and personal protective equipment, they increased the stress and insecurity the healthcare professionals were under, directly affecting job satisfaction and burnout dimensions [46].

To date there is no commonly accepted definition for job satisfaction. However, the one pro-

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P. Theodorou
School of Social Sciences, Postgraduate Course – Health Care Management, Hellenic Open University, Patra, Greece

M. Georgantoni
General Oncology Hospital of Kifissia "Agioi Anargyroi", Athens, Greece

P. Maria-Elissavet (✉)
Directory of Operational Preparedness for Public Health Emergencies, Ministry of Health, Athens, Greece

P. Charalampos
Greek DRG Institute SA, Athens, Greece

B. Thalia
Department of Nursing, International Hellenic University, Thessaloniki, Greece

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vided by Locke [37] remains among the most important ones, describing it as individuals' positive emotional response of the individual towards a specific task to the extent that respective professional values are correspondingly fulfilled. Regarding the healthcare sector, it has been found that professionals' high levels of job satisfaction lead in positive outcomes for the employees themselves, the patients they care for as well as to the organization they work for. It enhances employees' productivity and effectiveness while contributing to ameliorating the care provided, hospitals' efficiency, and patients' satisfaction from the health system as a whole [68].

The relation between job satisfaction and burnout is rather perplexed and multifaceted. One of its dimensions is attributed to the degree of satisfaction healthcare professionals experience and how this affects the appearance of feelings of exhaustion as burnout limits significantly how satisfied they feel from their work [4, 16]. Several studies though support that depending on one's levels of job satisfaction, his stress and burnout levels can be reduced [9, 14, 55], while higher burnout levels result in decreased job satisfaction [6, 8].

Freudenberger [21] described the symptoms of physical and mental burnout in mental healthcare professionals even though its most complete definition was provided by Maslach [40] who identified it as a professional condition where healthcare employees lose their interest and positive attitude towards the patients they care for, are not satisfied with their work, and develop a negative image of themselves. Burnout's effects on employees do not concern only concern his physical and mental well-being but also his behavior, both at work and in his social-personal life. It has been associated with increased incidence of errors and postoperative complications, postoperative morbidity, reduced productivity, low quality healthcare services, and reduced patient satisfaction [43].

The purpose of this study was to determine the relation between job satisfaction and burnout of healthcare professionals in a public oncology hospital during the COVID-19 pandemic. This study also explores demographics' impact on job satisfaction and burnout separately as well as in the relation among them.

33.2 Materials and Methods

33.2.1 Study Population

To serve the study purpose, a cross-sectional quantitative survey was conducted through the application of a dedicated research tool in a convenience sample. The survey was carried out at a Greek public hospital located in Athens: "Agioi Anargyroi" General Oncology Hospital from December 2021 to January 2022, following the required permission of hospital's scientific and administrative boards. The study sample comprised the entirety of the hospital's human resources—medical, nursing, and administrative personnel—under any working relation, without any exclusion criteria. One-hundred twenty questionnaires were distributed and 117 were returned completed in full (98% response rate).

33.2.2 Research Tool

The research tool, an anonymous, structured, self-completed, closed-ended questionnaire, formulated by three distinct ones, was designed to serve the study purposes. While its first part facilitated the collection of participants' demographics and occupational characteristics, the second included the Job Satisfaction Survey (JSS) and the third the Copenhagen Burnout Inventory (CBI). The JSS includes 36 questions that explore professional satisfaction with regard to nine occupational dimensions: remuneration, promotion, supervision, additional benefits, anticipated benefits, working conditions, peers, work nature, and communication. Four questions correspond to each dimension, while the answers are provided via a 5-item Likert scale ranging from "totally agree" to "totally disagree" [61]. JSS was translated and weighted for the Greek population by [50]. Cronbach's alpha coefficient was estimated at 0.89, indicating its appropriateness for this study. The CBI consists of 19 questions that investigate the three burnout dimensions: personal, occupational, and burnout attributed to catering to patients. Responses are provided through a 5-item Liker scale ranging from "to a very small extent" to "to a very large extent" [31]. CBI has been translated and weighted for the Greek population by Papaefstathiou et al. [50]. Cronbach's alpha coefficient was estimated over 0.81 for all questionnaire dimensions deeming it suitable for this study.

33.2.3 Statistical Analysis

Descriptive statistics were applied for all variables, while the Kolmogorov–Smirnov test was deployed for normality testing. Students' t-test, Pearson's and Spearman's correlation coefficients were used to investigate the relations between variables. If more than two independent variables presented with statistically significant relations at the level of 0.05 ($p < 0.05$) in the bivariate analysis, multiple linear regression analysis was applied. In this case, the coefficients' beta, the corresponding 95% confidence intervals (CI), and the p-values are reported. The bilateral level of statistical significance was set at 0.05. Data analysis was conducted with IBM's Statistical Package for Social Sciences (SPSS) 21.0.

33.3 Results

Participants' demographics are summarized in Table 33.1, while the descriptions of JSS and CBI are described in Tables 33.2 and 33.3, respectively. Regarding job satisfaction, participants manifested moderate levels related to supervision, peers, work nature, and communication, all the while reduced ones concerned remuneration, promotion, additional benefits, anticipated benefits, and working conditions. The average score in the scale was 99.6 indicating low professional satisfaction levels across participants. The average burnout level observed across the survey participants was 49.7%, with the highest scoring being attributed to personal burnout (58.1%) and

Table 33.1 Participants demographics and occupational characteristics

Characteristics	N	%
Sex		
Male	33	28.2
Female	84	71.8
Age (in years)		
20–29	7	6
30–39	18	15.4
40–49	47	40.2
>49	45	38.5
No answer		
Marital status		
Single	73	62.4
Married	7	6
Divorced	3	2.6
Widowed	7	6
Number of children		
0	41	35
1	20	17.1
2	46	39.3
3	7	6
>3	3	2.6
Monthly income (€)		
<1000	36	30.8
1000–1500	51	43.6
>1500	30	25.6
Profession		
Medical doctor	39	33.3
Nurse	44	37.6
Administrative employee	34	29.1
Educational level		
High school graduate	25	21.4
Technological institute graduate	23	19.7
University graduate	25	21.4
MSc holder	35	29.9
PhD holder	9	7.7
Years of service		
0–4	7	6
5–9	18	15.4
10–14	15	12.8
15–19	18	15.4
20–24	15	12.8
>24	44	37.6
Working relationship		
Indefinite term	96	82
Fixed-term	21	18
Working hours		
Morning	90	76.9
Afternoon	2	1.7
Circular	25	21.4

(continued)

Table 33.1 (continued)

Characteristics	N	%
Administrative position		
Yes	24	20.5
No	93	79.5

Table 33.2 Job satisfaction survey's descriptions

Subscale	Mean	Standard deviation	Median	Minimum	Maximum
Remuneration	7.7	2.7	7	4	16
Promotion	8.8	2.6	8	4	16
Supervision	15.7	3.6	16	6	20
Additional benefits	8.8	2.7	9	4	18
Anticipated benefits	9.6	3	9	4	19
Working conditions	9.3	3	9	4	20
Peers	14	2.6	14	8	20
Work nature	13.8	3	14	4	20
Communication	12.1	2.9	12	5	20
Overall satisfaction	99.6	16.8	98	62	158

the lowest one to its patient-related dimension (36.8%).

The correlations between job satisfaction and burnout dimensions is presented in Table 33.4. In particular, it was found that the greater the job satisfaction, the lesser the burnout the participants experienced, independently of their corresponding dimensions. Greater overall, personal, occupational and burnout attributed to catering to patients, were associated with lower satisfaction emerged from remuneration, promotion, supervision, additional benefits, anticipated benefits, working conditions, peers, work nature, communication, as well as overall satisfaction. Regarding the bivariate correlations among participants' demographic and occupational characteristics and JSS subscales, no statistically significant relation between demographics the scale exploring satisfaction related to communication was observed. It was as well found that higher educational level was associated with greater satisfaction from remuneration and additional benefits, while fixed-term employees were more satisfied from promotions; those working under circular programs were more satisfied from the working conditions when compared to those working mornings.

The multivariate analysis resulted in employees being more satisfied with supervision when they didn't have an administrative position ($b = 1.9$, 95% confidence interval [CI] = 0.3 to 3.5, $p = 0.02$), whereas higher educational level ($b = -0.4$, 95% CI = −0.9 to −0.02, $p = 0.043$) and male sex ($b = 1.1$, 95% CI = 0.02 to 2.1, $p = 0.046$) were associated with greater satisfaction from additional benefits. Employees working morning hours ($b = 0.7$, 95% CI = 0.003 to 1.3, $p = 0.048$) as well as those working in open wards ($b = 1.2$, 95% CI = 0.03 to 2.3, $p = 0.044$) appeared more satisfied with their work nature when compared to those working in circular programs and closed wards, respectively. Notwithstanding, women presented greater overall ($b = 8.5$, 95% CI = 1.3 to 15.7, $p = 0.022$) personal ($b = 9.5$, 95% CI = 1.5 to 17.4, $p = 0.021$) and occupational ($b = 10.5$, 95% CI = 1.8 to 18.9, $p = 0.02$) burnout, while employees with lower educational levels also manifested greater overall ($b = 3.6$, 95% CI = 1.1 to 6.1, $p = 0.005$) personal ($b = 3.2$, 95% CI = 0.4 to 6, $p = 0.026$) and occupational burnout ($b = 3.3$, 95% CI = 0.2 to 6.2, $p = 0.034$). Finally, nurses presented with greater related -to-patients burnout ($b = 13.1$, 95% CI = 4.8 to 21.5, $p = 0.002$), while higher educational level was as well positively corelated with it ($b = 13.2$, 95% CI = 4.8 to 21.5, $p = 0.023$).

Table 33.3 Copenhagen burnout inventory's descriptions

Subscale	Mean	Standard deviation	Median	Minimum	Maximum
Personal burnout	58.1	20.3	58	0	100
Occupational burnout	54.1	21.5	50	0	100
Patient-related burnout	36.8	22.6	33	0	100
Overall burnout	49.7	18.6	49	4	96

Table 33.4 Correlations among job satisfaction and burnout dimensions

	Personal burnout	Occupational burnout	Patient-related burnout	Overall burnout
Remuneration	−0.4 (<0.001)	−0.4 (<0.001)	−0.4 (<0.001)	−0.5 (<0.001)
Promotion	−0.3 (<0.001)	−0.4 (<0.001)	−0.3 (<0.001)	−0.5 (<0.001)
Supervision	−0.2 (0.04)	−0.2 (0.02)	−0.2 (0.01)	−0.2 (0.01)
Additional benefits	−0.3 (0.001)	−0.3 (0.001)	−0.3 (0.004)	−0.4 (0.001)
Anticipated benefits	−0.5 (<0.001)	−0.6 (<0.001)	−0.5 (<0.001)	−0.6 (<0.001)
Working conditions	−0.3 (<0.001)	−0.4 (<0.001)	−0.2 (0.01)	−0.3 (<0.001)
Peers	−0.5 (<0.001)	−0.5 (<0.001)	−0.4 (<0.001)	−0.5 (<0.001)
Work nature	−0.4 (<0.001)	−0.6 (<0.001)	−0.6 (<0.001)	−0.6 (<0.001)
Communication	−0.3 (0.003)	−0.4 (<0.001)	−0.4 (<0.001)	−0.4 (<0.001)
Overall satisfaction	−0.5 (<0.001)	−0.7 (<0.001)	−0.5 (<0.001)	−0.7 (<0.001)

Values expressed as Pearson's correlation coefficient

33.4 Discussion

In agreement with previous studies that indicated reduced or moderate levels of professional satisfaction among healthcare professionals [23, 29, 36, 45, 56, 58, 63], our findings highlight how supervision, peers, work nature, and communication were the dimensions that attributed mostly to the study participants' moderate satisfaction levels, whereas remuneration, promotions, additional benefits, anticipated benefits, and working conditions impacted their overall satisfaction negatively. However, the higher job satisfaction of nurses has been noted as well [33, 42, 60].

According to the analysis results, men presented with a higher level of overall satisfaction (103.2% vs. 98.2%) a finding that agrees with the one of Akbari's et al. [5], even though the opposite has been supported by the literature as well [18, 49]. Doctors manifest higher overall satisfaction compared to nurses (99.9% vs. 97.8%), as it is directly related to both the nature of their work and their work environment [35, 47]. As many surveys have highlighted in the past, satisfaction from remuneration and salary is decreased among healthcare professionals [23, 28, 44, 48, 66], a phenomenon observed in our survey as well.

As in another survey among Greeks healthcare professionals, satisfaction from promotion is rather reduced [52]. Supervision was found to affect satisfaction moderately as fixed-term and non-administrative employees appeared more satisfied by a finding consistent with ones from relevant studies [2, 15, 25, 65]. Additional and anticipated benefits were found to reduce satisfaction across the study participants as corresponding surveys have reported in the past [26, 39, 44–46, 62]. However, participants with a higher educational level appeared gaining more satisfaction from the additional benefits they obtained; a finding rather interesting as many studies have resulted differently [53, 59].

Concerning working conditions our study results indicate reduced job satisfaction as adverse working conditions undermine it [27, 38, 54, 67]. In addition, those working in circular shifts presented more satisfied with their working conditions contrary to previous findings that associated it with low satisfaction rates [1, 51]. Relations with peers affected participants' job satisfaction moderately, while men expressed greater satisfaction from women accordingly to previous findings [11, 26, 28, 62, 65].

In accordance with Pelecha's and Antoniadis' (2013) findings, work nature affected the job satisfaction of our survey participants at a moderate level, with those working morning hours being the more satisfied. Lastly, communication was found to impact participants' overall satisfaction as well mildly, with men and nurses being seemingly more satisfied than women and doctors correspondingly; analogous conclusions have reached surveys in the past [24, 32].

An average total burnout 49.7% was observed across the study participants. The fact that personal burnout contributed the most as its dimension with the highest average value (58.1%) while the lowest was attributed to patient-related burnout (36.8%) has been as well highlighted by similar surveys [3, 10, 12, 13, 47, 57]. Women and those with poorer educational background present with greater overall burnout a fact that is also reflected in the studies of Duarte et al. [17] and Khasne et al. [30], contrary to ones by Lin et al. [34] and Maslach & Leiter [41] which support that highly educated people experience greater levels of burnout due to their increased work expectations [40].

Furthermore, women manifest greater personal burnout (61.1%) when compared to men (50.1%) in accordance with previous findings that highlight how emotionally sensitive they are [20, 40] as they are experiencing higher workloads due to their at-home additional responsibilities [7]. As oftentimes observed [3, 12, 13, 19, 57], nurses demonstrated the highest rates of personal burnout (62.6%) followed by the administrative personnel (56.7%) besides educational level being repeatedly negatively associated negatively with it [46]. As anticipated, occupational burnout was rather high among nurses (60.3%) [10, 17, 22, 30] and women [20, 40]. Finally, burnout related to patients' care is higher among nurses (47.1%) as corresponding studies have indicated before [46].

33.4.1 Limitations

The main limitations of our study concern the time of its conduction as it coincided with the fourth COVID-19 pandemic and the study sample. As the completion of the survey questionnaires was done during the personnel's working hours, we presume that might have negatively impacted the amount of completed questionnaires collected given the circumstances the personnel worked under. Besides the study sample being quite large, it pertains solely to employees of a specific hospital, so it can neither be considered as representative of the entirety of healthcare human resources nor the findings based on this sample can be generalized. Lastly, the fact that different corresponding studies explore burnout among healthcare professionals through the application of distinct models that do not address similar burnout dimensions, can be considered as a limitation as well, as comparisons among studies' findings are scarce.

33.5 Conclusions

Our findings could be useful to hospital administrations not only to determine the levels of job satisfaction and burnout among their employees but also for developing more effective strategies for human resources management. It is important to enhance personnel's professional satisfaction all the while empowering it to combat burnout through dedicated working groups that provide support to healthcare professionals, ultimately resulting in the improvement in the healthcare services provided.

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Investigation of Physical Activity Levels and Associated Factors of Greek Older Adults During COVID-19 Pandemic: A Community-Based Cross-Sectional Study

Maria Tsekoura, K. Fousekis, M. Roukounaki,
E. Giannoulatou, G. Kolokithas,
A. Sakellaropoulou, An Gridelas, A. Kastrinis,
E. Billis, and E. Tsepis

Abstract

The purpose of this cross-sectional study was to investigate the self-reported impact of the COVID-19 pandemic on physical activity (PA), anxiety, and depression amongst Greek older adults. Participants were older adults (>60 years) recruited from community centers of Achaia (Open Care Centers for Older Adults), in Western Greek mainland during the period of December 2020–March 2021. The information was gathered through telephone interviews. Questions on social demographics, health history, diagnosis, quarantine, and hospitalization were asked, as well as impact of the pandemic health status and physical activity behavior. The level of PA was assessed via the International Physical Activity Questionnaire (IPAQ) questionnaire, while anxiety and depression via the Hospital and Anxiety and Depression Scale (HADS). The study protocol was approved by the Ethical Committee of the University of Patras. Four-hundred eleven (411) older adults (306 women, 105 men; mean age of 72.47 ± 6.89 years years) completed the survey. About half of the sample (n = 179; 43.5%) reported a decrease in physical activity due to the pandemic and social isolation restrictions. From the total sample, 211 older adults (51.3%) recorded fear of COVID-19 infection and 9 participants (2.1%) reported to have been diagnosed with the COVID-19 infection. The findings of this study demonstrated that PA was associated with place of living ($r = 0.55$; $p \leq 0.001$), incidence of falls ($r = 0.45$; $p \leq 0.001$), COVID-19 infection ($r = 0.6$; $p \leq 0.001$), fear of COVID-19 infection ($r = 0.45$; $p \leq 0.05$), and anxiety ($r = 0.5$; $p \leq 0.001$). In summary, a decline in PA due to

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M. Tsekoura (✉) · K. Fousekis · M. Roukounaki · E. Giannoulatou · E. Billis · E. Tsepis
Department of Physiotherapy, School of Health Rehabilitation Sciences, University of Patras, Rio, Greece

G. Kolokithas · A. Sakellaropoulou · A. Gridelas
Department of Elderly, Open Care Centres for the Elderly, Social Organization Municipality of Patras, Patras, Greece

A. Kastrinis
Department of Physiotherapy, University of Thessaly, Lamia, Greece

P. Vlamos (ed.), *GeNeDis 2022*, Advances in Experimental Medicine and Biology 1425,
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COVID-19 pandemic was reported by the majority of Greek older adults. Results of the present study show that the COVID-19 pandemic may have induced PA behavior changes in many older adults, which may accelerate their risk of developing frailty, sarcopenia, and disability. Interventions to improve PA in older adults should take into account social and community factors and should be key components of current and future pandemic plans, particularly for vulnerable groups.

Keywords

Physical activity · Older adults · COVID-19

34.1 Introduction

The current coronavirus disease 2019 (COVID-19) pandemic has brought dramatic challenges all over the world and has disproportionately impacted people over the age of 60. Older adults are vulnerable to the impact of COVID-19 pandemic [1] and have a higher risk of severe illness, hospitalization, and death [2, 3]. This pandemic has forced nationwide self-isolation (lockdowns) in many countries [4]. Greece as many other countries implemented a number of public health measures such as self-isolation, closing most business service, schools, universities, gyms, sports centers, hygiene strategies, wearing masks in public settings, and avoiding public gatherings. People were requested to practice social distancing and movement was restricted [5]. However, COVID-19 restrictions and social isolation may have an impact on lifestyle behavior (e.g., inactivity, sedentary lifestyles, and psychological derangements [6, 7]. The World Health Organization (WHO) describes a close relationship between physical and mental functions with the level of self-governance and social participation in the community [8, 9].

Older adults usually present low levels of physical activity (PA), and it is plausible to assume that home-isolation during quarantine of COVID-19 may present even more reduced levels of PA [10]. There is strong evidence that PA is linked with functional abilities (e.g., mobility and independence), less stress, depression and anxiety particularly in older people [1, 11–14]. PA and exercise are also recognized as protective factors against viral infections and could play both a positive and a negative role in individual health outcomes [15].

Social isolation can also cause psychological disorders and challenge the mental health of individuals [16, 17]. This prolonged pandemic situation has also made an impact on older adults causing stress, anxiety, panic depression, and fear [18]. Therefore, efforts to protect physical and mental health seem crucial especially for older adults [19]. It is important to identify the protective factors and prepare practical suggestions and guidelines for physical and mental treatment for older adults during COVID-19.

With public health measures such as lockdowns and social distasting, it would be expected that Greek older adults would be faced with changes to their PA behavior and associated dimensions of well-being. Although the 1st Eurofound e-survey highlighted that during the 1st lockdown in Greece, the population reported a feeling of low well-being [20], the literature on PA levels, and the feelings of social isolation of the Greek population during the COVID-19 confinement measures is yet limited and suggest a gap in the literature. A clear need for studies examining this impact during this pandemic period seems important and necessary in order health professions to develop health actions and interventions to improve quality of life and well-being of older people. Thus, the aim of the present study was to investigate the self-reported impact of the COVID-19 pandemic on physical activity (PA), anxiety and stress amongst Greek older adults.

34.2 Material and Methods

34.2.1 Study Design and Participants

Descriptive, community-based cross-sectional, questionnaire-based study was conducted from December 2020 to March 2021 (during the COVID-19 quarantine in Greece) among 411 Greek older adults. Participants were recruited from community centers of Achaia (Open Care Centers for Older Adults) in Western Greece. The information was gathered through telephone interviews.

34.2.2 Measures

Questions on social demographics, health history, diagnosis, quarantine, and hospitalization, perceptions of information concerning COVID-19, how they perceive and comply with the recommendations were asked, as well as impact of the pandemic health status and physical activity behavior. Data collectors were trained on the purpose of the study, details of the questionnaire, interviewing techniques, the importance of privacy, and ensuring the respondents' confidentiality.

34.2.3 Physical Activity

The level of PA was assessed via the Greek version of the International Physical Activity Questionnaire (IPAQ) questionnaire. This questionnaire provides information about the time spent involved in three PA intensity levels: (a) walking, (b) moderate, and (c) vigorous [21].

34.2.4 Anxiety/Depression

Hospital and Anxiety and Depression Scale (HADS) was used to identify participant anxiety and depression.

HADS has been translated in Greek to assess anxiety and depression in Greek population [22].

34.2.5 Ethics

This study protocol received approval from the Ethical Committee of the University of Patras. Participants were informed that their responses would be kept anonymous and that they had the right to withdraw from the study at any time. Thus, informed consent was obtained from all participants.

34.2.6 Statistical Analyses

Descriptive results are presented using means with standard deviation or percentages. *t*-test for independent samples was used to determine the differences between female and male participants. Pearson's correlation coefficient was used to explore the relationship between PA and the other variables. The analyses were performed using the SPSS software version 28.0, and *p*-values of <0.05 were considered significant.

34.3 Results

The sample comprised 411 older adults from Greece (105 males; 25.5% and 306 females; 74.5%) whose ages ranged from 60 to 91 years (mean age: 72.47 ± 6.89 years). Table 34.1 presents the participants' characteristics.

A hundred and seventy-nine (179) participants (43.5%) reported a decrease in physical activity due to the pandemic and social isolation restrictions. Our findings show that 44% of all participants exhibited low physical activity levels, 48% exhibited moderate physical activity levels, and 18% exhibited low physical activity levels. From the total sample, 211 older adults (51.3%) recorded fear of COVID-19 infection and 9 participants (2.1%) reported to have been diagnosed with the COVID-19 infection.

The findings of this study demonstrated that PA was associated with place of living ($r = 0.55$; $p \leq 0.001$), incidence of falls ($r = 0.49$; $p \leq 0.001$), COVID-19 infection ($r = 0.6$; $p \leq 0.001$), fear of COVID-19 infection ($r = 0.45$; $p \leq 0.05$), and anxiety ($r = 0.5$; $p \leq 0.001$).

34.4 Discussion

To our knowledge, this is the first study to assess the impact of the COVID-19 pandemic on PA and associated factors in Greek older adults. The results indicated that older adults' level of physical activity decreased significantly during COVID-19. Social isolation and safety fears due to the COVID-19 pandemic could be a main reason for physical inactivity [23]. Physical inactiv-

Table 34.1 Participants' characteristics

Variable	Total sample (*n* = 411)
Mean ± SD	
Age (years)	72.47 ± 6.89
Height (cm)	161.9 ± 16.03
Weight (kg)	73.74 ± 13.18
BMI	26.6 ± 6.2
Drug (number)	4.3 ± 1.2
Comorbidities (number)	2.8 ± 1.2
Number; percentage	
Gender	
Men	105; 25.5%
Women	306; 74.5%
Physical activity	
Low active	44%
Moderate active	48%
High active	18%
Living alone	236 (57.4%)
Working	
Yes	280 (68.1%)
Smoking	
Yes	43 (10.5%)
Falls history	
Yes	78 (19%)

Abbreviations: *BMI* body mass index, *SD* standard deviation

ity was an important public health challenge facing older adults globally also prior to the COVID-19 pandemic. However, social isolation is an important factor for inactivity and social interaction is an important motivator for older adults in order to leave their home and participate in physical activities [24, 25]. As the COVID-19 pandemic is still spreading globally and levels of inactivity are higher among older adults, health professionals, governments, and public health agencies should support older adults to be physically active [26].

PA matters in older adults because reduces impairment, reduces the risk of disease, develops, and maintains physical and mental function, improves quality of life [26–28]. In addition, inactive older adults may experience more falls and fractures [26] and are more prone to frailty and sarcopenia [29]. In this study, results showed significant correlation between PA and incidence of falls among community-dwelling older adults in Greece. These results are in agreement with several studies in various countries which identified the relationship between falls and level of physical activity among older adults [30–32]. These results point the need to develop strategies to change this condition, regardless of the country of origin [32]. Health professionals and physiotherapist should encourage older adults to be active and to use online resources and programs available. Older adults could learn to use telemedicine platforms (e.g., via tablets, phones) and perform safe, simple, and easy implemented home exercise interventions. Walking in home, gardening activities, home works such as sweeping floors could be also useful [26, 28].

Since the outbreak of the COVID-19 situation, researchers and health professional have drawn attention to mental health indicators such as anxiety, depression, and stress [4, 29, 30]. Mental health problems were a pressing global concern for older adults well before the discovery of COVID-19 [31]. However due to COVID-19 pandemic, anxiety symptoms and depression have worsened among older adults. The risk of infection, social distancing measures, government restrictions, and quarantines have resulted in unfavorable social conditions that in turn may have had negative implications for mental health [31, 32]. A study among Swedish older adults during the pandemic indicated that the majority of older adults were feeling depressed, having trouble sleeping, and were having difficulty concentrating. These findings seem important because Sweden has chosen social distancing for the general population instead of a general lockdown [33]. The current study shows strong links between PA and anxiety during the COVID-19 pandemic. Future studies should consider personal, environmental, and other factors that may influence the level of PA. Various strategies and interventions to maintain physical condition must be developed with exercise protocols that match the needs of the older adults, in order to maintain and improve the health status and quality of life of the elderly population [34].

34.5 Strengths and Limitations

To the best of our knowledge, this study is one of first studies to investigate the impact of the COVID-19 pandemic on the older adults in Greece. The key strength is that the questionnaires were distributed via telephone call which is an ideal research instrument, as it allowed us safety for both researchers and older participants. The main limitation is that the present study was conducted in one region in Western Greece (Achaia), affecting the generalizability of the results.

34.6 Conclusions

The majority of Greek older adults reported a decline in PA due to COVID-19 pandemic. Interventions to improve PA in older adults should take account social and community factors and should be key components of current and future pandemic plans, particularly for vulnerable groups.

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35

Better Understand to Better Predict Subjective Well-Being Among Older Greeks in COVID-19 Era: Depression, Anxiety, Attitudes Towards eHealth, Religiousness, Spiritual Experience, and Cognition

Vaitsa Giannouli and Konstantinos Giannoulis

Abstract

Despite similarities with previous pandemics, the potential physical and psychosocial impact of COVID-19 on older adults is still little investigated in Greece. This study examines the intercorrelations between subjective well-being/life satisfaction, depression, state anxiety, global cognitive function, attitudes towards eHealth, religiousness and spiritual experience in older adults during COVID-19. Results revealed that statistically significant negative correlations exist between subjective life satisfaction and depressive symptomatology as well as with religiousness, a finding that can be explained by the COVID-19 externally imposed religious practice restrictions. Subjective life satisfaction was positively correlated with overall cognition as measured by Mini-Mental State Examination (MMSE). MMSE was also negatively correlated with state anxiety, depression, and attitudes towards eHealth use. The best predictors of subjective well-being is global cognition (as measured by MMSE) and depressive symptomatology (measured by GDS). The conclusions of this study underscore the need to examine in more detail psychological variables during COVID-19 and quality of life in older adults.

Keywords

Subjective well-being · Religiousness · Spiritual experience · Attitudes towards eHealth · Cognition · State anxiety · Depression

35.1 Introduction

The COVID-19 pandemic seems to have negatively influenced many aspects of our everyday life at an individual and social level. For example, the subjectively perceived well-being/quality of life has been negatively affected [1], but surprisingly a striking overall improvement in the attitudes towards using eHealth applications for distance health examinations in different countries has been reported not only in healthcare professionals but also in laypeople [2].

On the other hand, spirituality and religiousness as psychological factors at an individual

V. Giannouli
School of Medicine, Aristotle University of Thessaloniki, Thessaloniki, Greece

K. Giannoulis (✉)
School of Theology, Aristotle University of Thessaloniki, Thessaloniki, Greece

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level are increasingly gaining attention in healthcare and quality of life old age research [3]. Additionally, depression has been found to be the most powerful predictor of subjective well-being/quality of life, along with physical and cognitive function deficits, in both community-dwelling and institutionalized elderly before COVID-19 [4]. Regarding anxiety, research has found that anxiety levels have risen and affected the elderly during the last year [5]. The COVID-19 crisis may be a period during which elders are more susceptible to psychological disorders onset or aggravation (mainly depression and anxiety) which have an impact on quality of life, but also on cognitive abilities [6, 7].

Thus, the aim of the present study is to examine the intercorrelations between subjective quality of life-life satisfaction, depression, state anxiety, global cognitive function, attitudes towards eHealth, religiousness, and spiritual experience in older adults during COVID-19 and to find which is the best predictor for life satisfaction.

35.2 Methods

35.2.1 Participants

A hundred and thirty-three older adults (females: 75, males: 58; Mage = 72.61, SDage = 6.21; Meducation = 7.82, SDeducation = 4.14) were recruited from two cities (an urban center in Northern Greece and a less urbanized city in Northern Greece) from December 2020 to February 2021. At the time of the examination, 80 participants were married or in a relationship living with their partner, and 52 were single or widowed living alone. None of the participants reported themselves to be employed during the COVID-19 lockdown and a year before as they were in retirement. Sixty-five patients were non-active church members and 68 were active church members, while the participants socioeconomic class was indicated by themselves based on their financial income as upper (*n* = 54), middle (*n* = 70), and lower (*n* = 9). None of them was a COVID-19 patient before or during the examination.

Participants gave informed consent and were treated according to the Declaration of Helsinki. The participants had no past or current psychiatric diagnosis. Some participants had been following medication related mainly to various minor health problems (not related to COVID-19). Exclusion criteria were (1) a history of psychiatric, (2) neurological, or (3) substance abuse-dependence, (4) a history of head injury, while (5) non-native speakers of the Greek language and (6) non-Orthodox participants were also excluded from the final sample.

35.2.2 2.2 Measures and Procedure

Participants filled out a demographic questionnaire (age, gender, and education level), and then they were asked to complete a number of questionnaires and tests, which are already validated in the Greek language: (1) the Daily Spiritual Experience Scale (DSES), which consists of 16 questions concerning how an individual experiences in daily life the existence of God (α = 0.960 in this sample) [8, 9], (2) the Systems of Belief Inventory (SBI-15R), which consists of 15 questions regarding religiousness and spirituality ($\alpha = 0.720$ in this sample) [10], (3) the Satisfaction with Life Scale (SWLS) (α = 0.891 in this sample), which is a 5-item measure that is widely used in research for the assessment of life satisfaction (as a global cognitive judgment of one's own life) and as a measure of subjective quality of life [11]. The religious identity of the participants was measured with a single question: Are you a member of the Greek Orthodox Christian church? The measure was coded in a 3-point Likert Scale indicating (1) being an inactive member of the Greek Orthodox Christian church, (2) being an active member, and (3) not belonging to the Greek Orthodox Christian church (those participants were excluded in order to present results concerning a homogeneous faith group) in the current analysis as in a previous study [12]. All elders were also examined after the questionnaire completion with the (4) Mini

Table 35.1 Means, standard deviations, minimum and maximum scores for all administered questionnaires and tests

	Minimum	Maximum	Mean	SD
DSES	35.00	72.00	48.46	4.61
SBI-15R	13.00	44.00	25.61	5.75
GDS	0.00	14.00	2.12	2.85
SWLS	6.00	28.00	15.66	4.08
eHealth attitudes questionnaire	16.00	54.00	38.49	10.25
MMSE	19.00	30.00	27.69	2.21
STAI	20.00	31.00	24.98	3.58

Mental State Examination (MMSE) in order to exclude dementia and ensure correct understanding and completion of the questionnaires, but also in order to explore any cognitive deficits imposed by the lockdown and the pandemic [13], (5) with the Geriatric Depression Scale (GDS) for the detection of depressive symptomatology [14], and with the (6) State Anxiety Inventory (STAI) [15] for measuring state anxiety was also administer in order to measure state anxiety. Attitudes towards eHealth were measured with (6) a brief modified version taking the form of a 4-point Likert scale of the "efficiency to ICT in care" scale of the Information Technology Attitude Scales for Health (ITASH) with scores ranging from 1= strongly disagree to 4= strongly agree ($\alpha = 0.865$ in this sample) [16]. The current sample was a convenience sample recruited from a previous larger sample of participants [12].

The examination protocol took approximately 1 h to complete and the respondents completed all questionnaires individually and anonymously and emailed back their responses to the investigators in a week's deadline, while MMSE was administered during Skype sessions.

35.3 Results

Results revealed that there are a number of statistically significant correlations. More specifically, SWLS negatively correlated with the GDS ($r = -0.257$, $p = 0.003$). SWLS also negatively correlated with the SBI-15R ($r = -0.184$, $p = 0.035$), but a positive correlation was found between SWLS and MMSE ($r = .346$, $p < 0.001$). The GDS negatively correlated with MMSE ($r = -0.180$, $p = 0.038$), and MMSE negatively correlated with STAI ($r = -0.267$, $p = 0.002$). Finally, a negative correlation was found between the questionnaire measuring attitudes towards eHealth and MMSE ($r = -0.264$, $p = 0.003$) (Tables 35.1 and 35.2).

Multiple regression analyses included Daily Spiritual Experience Scale (DSES), Systems of Belief Inventory (SBI-15R), Mini Mental State Examination (MMSE), Geriatric Depression Scale (GDS), State Anxiety Inventory (STAI), and Attitudes towards eHealth Questionnaire as predictors of the Satisfaction with Life Scale (SWLS). The Linear Regression model, "Enter" method, indicated that depression as measured by GDS and overall cognition as measured by MMSE predicted subjective well-being/life satisfaction scores ($R = 0.426$; $R^2 = 0.182$) (Table 35.3).

35.4 Discussion

Greek older adults' subjective well-being/quality of life during COVID-19 is mainly predicted by the overall cognitive status of the older adults as measured by MMSE and the scores on GDS that represent depressive symptomatology [17]. The adverse effects of depression on perceived life satisfaction-quality of life and on cognition are well reported for healthy elders as well as for older patients before COVID-19 [18, 19, 20] and are reconfirmed for the psychological functioning of elders during this period. An interesting finding is the negative correlation between SBI-15R and SWLS scores. This extraordinary finding of lower religiousness-religious practices accompanied by higher life satisfaction-quality of life may be due to the coronavirus restrictions

Table 35.2 Correlations between Daily Spiritual Experience Scale (DSES), Systems of Belief Inventory (SBI-15R), Satisfaction with Life Scale (SWLS), Mini Mental State Examination (MMSE), Geriatric Depression Scale (GDS), State Anxiety Inventory (STAI), and Attitudes towards eHealth Questionnaire

		DSES	SBI-15R	SWLS	GDS	Attitudes towards eHealth questionnaire	MMSE	STAI
DSES	Pearson Correlation Sig. (2-tailed)	1						
SBI-15R	Pearson Correlation	0.027	1					
	Sig. (2-tailed)	0.757						
SWLS	Pearson Correlation	0.115	**−0.184**[a]	1				
	Sig. (2-tailed)	0.189	**0.035**					
GDS	Pearson Correlation	0.024	−0.008	**−0.257**[b]	1			
	Sig. (2-tailed)	0.780	0.929	**0.003**				
eHealth attitudes	Pearson Correlation	0.059	0.026	−0.049	0.155	1		
	Sig. (2-tailed)	0.519	0.778	0.587	0.086			
MMSE	Pearson Correlation	0.010	−0.064	**0.346**[b]	**−0.180**[a]	**−0.264**[b]	1	
	Sig. (2-tailed)	0.908	0.468	**0.000**	**0.038**	**0.003**		
STAI	Pearson Correlation	−0.012	0.123	−0.145	−0.004	0.087	**−0.267**[b]	1
	Sig. (2-tailed)	0.895	0.161	0.096	0.961	0.342	**0.002**	

[a] Correlation is significant at the 0.05 level (2-tailed)
[b] Correlation is significant at the 0.01 level (2-tailed)

Table 35.3 Results for regression analyses for several predictors of satisfaction with Life Scale (SWLS)

	Model	B	Beta	*t*	Sig
	(Constant)	2.313		0.344	0.731
	GDS	−0.240	−0.179	−2.068	0.041
	DSES	0.094	0.112	1.317	0.191
	SBI-15R	−0.111	−0.169	−1.971	0.051
1	eHealth attitudes questionnaire	0.031	0.082	0.928	0.355
	MMSE	0.478	0.275	3.017	0.003
	STAI	−0.099	−0.093	−1.045	0.298

Note: Dependent variable: Satisfaction with Life Scale (SWLS)

at the state level such as imposed lockdown on the behaviors-variables that SBI-15R measures, that is the obligatory constraints on the religious practices and attendance (Beliefs subscale, 10 items), and on the obstacles that COVID-19 posed on the measured everyday face to face support received by the religious community. Thus, those with lower religiousness report higher life satisfaction and quality of life since they did not have to give up their everyday routine, such as religious practice in Churches during the pandemic. These changes should not be perceived as ones own fault, but the right thing to do in order to obey law and to protect oneself and others. Another interesting finding is that MMSE is negatively correlated with attitudes towards eHealth. Although elders with higher cognitive function are expected to be able of better understanding and appreciation of eHealth technology use, we have to keep in mind that eHealth literacy, acceptance, and actual use of eHealth in Greece are lower in the general population when compared to attitudes and practice in other countries [16].

Although this is the first study to explore life satisfaction-quality of life and possible psychological predictors in Orthodox Christian elders during COVID-19 in Greece, there are some methodological limitations to mention due to COVID-19 restrictions. For example, the sample mainly consisted of elders with Internet access or with relatives with Internet access who could arrange the virtual examination, thus raising questions for the generalizability of the results and the representativeness of the sample.

Overall, the above findings may improve the understanding of practicing clinicians regarding elders' life satisfaction-quality of life and will elucidate the influence of other psychological variables in predicting life satisfaction-quality of life during COVID-19 in Greece. Future cross-cultural studies should further investigate these intercorrelations in participants coming from diverse faith backgrounds [21].

Disclosure Statement The authors declare no conflicts of interest.

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36

Distance Under Pandemic Conditions (COVID-19): Professional Burnout of Primary and Secondary Grade Teachers

Evgenia Polimeri, Sophia Martinaki,
Pentagiotissa Stefanatou,
and Konstantinos Kontoangelos

Abstract

This study elaborates on the possibility that distant education via online platforms increased the levels of burnout among teachers of primary and secondary general education during the school year 2020–2021. The main goal was to identify the factors that cause additional stress and intensify burnout. Data was collected with Google Forms by simple random sampling method. A standardized questionnaire was used as a research tool which includes demographic data in the first part of the research and the scale of stress levels, the scale of professional burnout of teachers, as well as the teaching scale self-efficacy.

The final sample consisted of 169 primary and secondary education teachers during the school year 2020–2021 both in live and distant teaching. The results showed that mostly women who were permanently employed in special education or language teachers with 6–15 or more years of experience suffered from depression, anxiety, stress, and burnout. In conclusion, live teaching is considered much more effective, regardless of teacher gender or age, with the exception of teachers experienced in distance education programs. Teachers do not feel ready and sufficient to implement distant learning regarding classroom management and student involvement.

Keywords

Distance education · Primary and secondary teachers · Depression · Anxiety · Burnout · COVID-19

36.1 Introduction

Teaching is one of the main professions afflicted by burnout [18] as primary and secondary education teachers may feel frustrated, tired, and distressed because they have to overcome their stress levels [18] in terms of their teaching ability, their students’performance, keeping up with the curriculum etc. This exhaustion has certainly

E. Polimeri (✉)
Post Graduate Program in Mental Health Promotion-Prevention of Psychiatric Disorders, Athens Medical School, Athens, Greece
e-mail: tzenipolimeri@gmail.com

S. Martinaki
Faculty of Administrative, Economics and Social Sciences, Department of Social Work, University of West Attica, Athens, Greece
e-mail: smartinaki@uniwa.gr

P. Stefanatou · K. Kontoangelos
1st Psychiatric Clinic – Eginitio Hospital, Medical School, National and Kapodistrian University of Athens, Athens, Greece
e-mail: pstefanatou@gmail.com; kontoangel@med.uoa.gr

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negative effects in classroom and school performance. The teaching profession requires a considerably higher emotional resource and working effort than other professions [6].

The burnout phenomenon is an international subject of study. Most researches emphasize on its actual existence and recognize working factors as its main cause [21]. There are also other factors that probably contribute to professional burnout, such as teachers' environment and his temperament. Teaching is much more than a mere profession because it forges not only knowledge but also attitudes and moral values, and that is why teachers should be sufficiently supplied to fulfil their task. For all these reasons, we need to know if they suffer from burnout, what are its causes, and how it should will be treated. On the other hand, distant education is rapidly expanding throughout all educational grades worldwide [9] and the pandemic caused unprecedented conditions that significantly affected the field of education as well. According to UNESCO approximately 1.5 billion of students and teachers were forced to abstain from live teaching and learning [7, 24] and as a result modern and asynchronous forms of distant education were adopted.

The worldwide spread of the pandemic established distant teaching for the first time from 10/3/2020 to 22/5/2020 in order to avoid disruptions in the educational process. In any case, this project involved many difficulties for students, parents, and teachers, as there was a lack of know-how, equipment and lack of training. However, teachers made a lot of effort to support their students and public school. Then, the Ministerial Decision 120126/GD4/12.09.2020 Official Gazette 3882 B: "Providing modern distance education for the school year 2020–2021" and the bulletin 121802/GD4/15.09.2020: "Instructions for the modern distant education for the school year 2020–2021" established the distant learning procedure, specifically in secondary education. Finally, for the first time distant education was considered as formal for first-grade students. However, these changes have caused contradictory feelings among teachers and students. In recent years, research has increasingly focused on understanding the nature of emotions and their impact on learning. That is why emotions cannot be separated from the overall experience of learning, since they play a major role. Furthermore, emotions lead to the development of social relationships in school, affect the effectiveness of learning, and create commitments between teachers and students that function as motivation. It is therefore necessary for teachers, in addition to their teaching skills, to feel socially and emotionally committed to the teaching profession. Of course, the existence of emotions in distant education is limited in comparison to live; however, international bibliography is increasingly concerned with emotional meaning.

If there are negative emotions prevalent, the teachers' levels of anxiety are increased and that leads to professional burnout, especially if the changes concern the teaching form and prevent face-to-face communication. Stress and burnout threaten teachers' mental balance and have an impact on the educational process. Professional stress is the second most frequent problem in the EU, with a percentage of 28% employees [2]. Related research has shown that this problem can reduce efficiency. A 4% productivity reduction has been estimated because workers were absent and approximately 15,000 people waste time due to working accidents under stressful working conditions [22]. In addition, 15 European countries spend about 265 billion a year for stress-related illnesses, according to the International Labor Office.

As stated in the National General Collective Labor Agreement, stress can have adverse effects on every employee and in every workplace, regardless of the organization size or the activity field. According to the WHO, the best ways to prevent stress are good management and work organization and informing management for assistance if employees feel pressured. Educational stress is a condition often accompanied by (pathogenic physiological changes) psychosomatic changes (e.g., rapid heartbeat), due to the demands of the educational work when their psychological and physical well-being are threatened [12]. Therefore, each teacher's perception plays a mediating role. So, each worker perceives the stressors according to his personal perception since this subjective perception of the stressors plays an important role in managing stress [6, 13].

Teaching is one of the most stressful professions and that is why teachers are frequently led to burnout [19]. Research on occupational stress in 26 different professions proved that teachers of different grades are below average in terms of professional satisfaction, psychological well-being, and mental health (Johnson et al. 2005). Sixty to seventy percent of teachers show symptoms burnout [1, 3].

An additional reason for the present research was the fact that other researches demonstrate quite high levels of working stress for primary and secondary education teachers in relation to other employees. This state of stress leads teachers to a negativity towards themselves, their students, and the educational system in general [23], and even sometimes leads them to extreme behaviors such as resignation and psychosomatic disorders.

The pandemic affected the mental state of students [23] and teachers who had cumulative stress due to workload as during the quarantine period they were forced to teach online without any adjustment time given [4]. Many teachers showed symptoms of anxiety, depression, and sleep disturbance (Ng 2007). The outcomes of studies measuring the burnout symptoms that were conducted during the pandemic show the inefficiency of distant learning.

A recent study showed that teacher's burnout hinders their educational performance due to not only anxiety and depression but also due to the rise of domestic violence and divorces [18, 19]. Another study conducted among teachers in three Chinese cities during the pandemic reported a high rate of anxiety (13.67%) mostly affecting women [18, 19], while another study also carried out in China in March [25] showed a percentage of anxiety symptoms (9.1%) in education and psychological support was considered important. Also, in Spain a study conducted at the beginning of the pandemic significant workload and burnout was mentioned [5].

It becomes clear that teachers during the implementation of distant education in secondary grade not only were they supposed to work under unprecedented conditions but they also had to face difficulties directly linked to the characteristics of distant education. Their working conditions, in this particular period, were notably stressful. The implementation of distant learning as a new parameter in the educational process, as shown in the first researches not only internationally but also in Greece, deteriorated the existing problems and increased teachers' stress levels leading them to burnout and thus causing life threating situations.

36.2 Purpose

The purpose of this research is to examine and detect the subjective views of teachers of primary and secondary education of schools in Athens, regarding their professional anxiety and exhaustion as well as the impact on their emothional and mental health it has had on the emotional and mental health of teachers, while implementing distant learning. Examining all parameters is a difficult process with uncertain results but nevertheless it is still very important for education. An important reason for this study was my daily contact with colleagues on the one hand and their anxiety whether they will be able to carry out the new educational process and the view that distant education is equivalent to standard on the other hand. However, teaching conditions are quite different due to the absence of direct communication and interaction between teachers and underage students. It was therefore deemed necessary to check the stress levels in teachers and to take the possibility of burnout into account during distant learning. With the ultimate goal of highlighting the possible factors in order to make the necessary changes in educational choices for better working and educational conditions in the country but also to ensure and protect teachers health under professional conditions.

36.2.1 Research Questions

The questions that arose based on the purpose of this research are: (1) Are the teachers involved in the survey showing signs of burnout? (2) What is the level of burnout of the teachers involved in the survey? (3) Are the levels of teachers' burnout differentiated according to the age of the participants? a. If so, to what extent? (4) Are the levels of teachers' burnout differentiated according to the gender of the participants? a. If so, to what extent? (5) Do the levels of teachers' burnout vary depending on the familiarity of the participants with computers and the internet? a. If so, to what extent? (6) Do the levels of burnout vary depending on the teaching grade of the participants, given that distant education was implemented in secondary education for a longer period of time? a. If so, to what extent? (7) Are the levels of teachers' burnout different from their previous professional condition, before the implementation of e-learning.

36.2.2 Sample

The sample of this survey consists of 169 primary and secondary school teachers during the school year 2021–2022 both in in live and distant teaching conditions. One-hundred thirty-six (80.4%) of the participants are female, while 33 (19.6%) participants are male. One-hundred twenty-eight participants (75.7%) live and work in Attica, while the rest in various districts of Greece. Sixty-five participants (38.5%) work in primary education (teachers and kindergarten teachers) and the rest belong to secondary education. One-hundred twenty-eight (75.7%) participants are permanent teachers, while the rest are substitutes (34–20.1%) or work in private institutions (7–4.1%). The average age of the participants is 45 years (47 in men and 44 in women), while their average experience is 17 years (same in women and men). They have graduated either from Pedagogical Faculties of Preschool or Primary Education (58–34.3%) or from other university faculties (98–58.0%). One-hundred of the participants (59.2%) also have a master degree, one has a PhD, and 32 teachers (18.9%) have a second university degree.

36.2.3 Sampling

The sampling method in this research is simple random sampling. In the quantitative approach, sampling aims at the formation of a sample that will be representative of the population from which it came from [11], with the ultimate goal of coming to conclusions that can be generalized to all members of this population [10]. In this method of simple random sampling, each member has an equal chance to be selected in the sample [11].

36.2.4 Research Tool

The research tool used in this survey to collect data is the standardized questionnaire as it is one of the main tools of quantitative research (along with experimenting) [8] and it is basically the main data collection tool in sample surveys [22]. The format choice of the structured questionnaire enables the collection of a large amount of data in a short period of time [16] but also the quantification and comparison of these data and its correlation with the variables of the research [16]. In this particular survey, the questionnaire was formed and sent electronically. More specifically, Google Forms was used for its formation, while it was sent to teachers via email to every school unit in Greece. This electronic form of the questionnaire did not require the presence of the researcher during its completion, a fact that contributed to more sincere and uninfluenced replies [12]. The questionnaire is divided into five parts: the first part includes demographics; the second part includes the DASS Depression anxiety stress Scale; the third part includes the questionnaire on burnout [18], a special publication for teachers. In the fourth part, the Teachers' Sense of Efficacy Scale (TSES) [23] is used twice [5, 25] with two different conditions: live teaching and distant learning. The fifth part examines some individual elements related to e-learning such as how much time was consumed, teachers' attitude towards remote education, how familiar they are with computers, and how much experience they had in distant learning before the pandemic in general.

The DASS or Depression anxiety stress Scale by [19] is used in its short version in this research; it consists of 3 subscales each containing 14 statements. These emotional condition statements evaluate the individual aspects of depression, anxiety, and stress (despair, misery, inactivity, difficulty in relaxing, etc.). Dass was translated and used in Greek by [2].

The questionnaire concerning burnout by [19] contains 22 topics in its publication for teachers describing feelings related to the profession and evaluating burnout in its 3 dimensions: emotional exhaustion (9 topics), depersonalization (5 topics), and personal achievement (8 topics). The answers show the frequency of participants' feelings on each topic and there is a 7-point Likert scale. This questionnaire has been examined/used in various workplaces [15] including education [14].

The teachers' sense of efficacy scale (TSES) [19 ,20] assesses teachers' perception of their own efficacy. It contains 24 topics on effective performance evaluation which assesses three subfactors: the effectiveness of teaching strategies, class management, and student engagement. Its reliability has been tested through researches in education of the Greek educational system in both primary and secondary education [24].

Most of the questions are closed type, aiming at accuracy in statistical analysis but also at practicality as it is a questionnaire with a self-completing form and the key goal is ease [7]. The scales for measuring stress, burnout, and self-efficacy included questions about the intensity of partcipants' emotions. In these questions, Likert-type ranking scales were used as they enable participants to express themselves clearly, while they are comprehensible at the same time [7].

36.2.5 Data Collection and Analysis

The data was collected as mentioned above via the online tool Google Forms from June to September 2021. After collecting a sufficient number of online questionnaires, the data were exported from google forms to an Excel worksheet (version 2016). They were analyzed with the IMB company's SPSS Statistics package (version 26) and with Excel (version 2016) as an auxiliary tool.

36.3 Results

The sample consisted of 169 people, 80.47% female and 19.53% male. One-hundred twenty-eight of the participants were teachers with a permanent position, 34 participants were substitutes. About 55.6% had more than 16 years of experience and the majority of them were from Attica region. About 40.79% of the sample derived from primary education specialties (teachers and kindergarten teachers), while the rest involved 59.21%-included secondary general, special, and vocational education. About 92.31% ($N = 156$) had a university degree and only 7.69% ($N = 13$) graduated pedagogical academy. About 59.17% had a master's degree, while 18.93% had a second degree. Regarding their age about 34.91% ($N = 59$) of the participants were up to 40 years old, 36.7% ($N = 62$) were 41–50 years old, 27.2% ($N = 46$) were 51–60 years old and 1.2% only 2 participants were over 60 years old (Fig. 36.1). With reference to the DASS scale (depression, anxiety, stress), the average of the total score was 17.25 with a standard deviation of 14.55. The percentage of the depression scale was 5.75%, on the stress scale the percentage was 7.49% whereas on the anxiety scale the percentage was 4.01%. In particular, it was concluded that women reached a higher score. As about the age factor, various age groups did not present any specific differentiations neither in the overall score nor in the individual scales (Fig. 36.1).

Regarding the professional status of the participants permanent teachers, high scores were noted both in total and in individual scales. Teachers occupied in the Greek educational system from 6 to 15 years or up to 26 mark high scores as well. Both primary and secondary school teachers reach high scores in all scales,

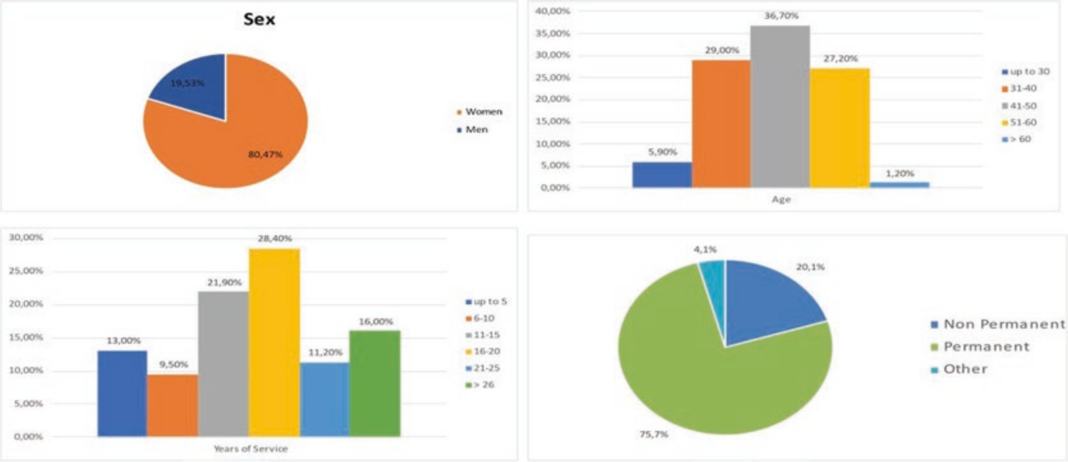

Fig. 36.1 Sample characteristics

Fig. 36.2 Associations of demographics with DASS scale

primary education teachers and literature teachers in particular. The results of their scores were similar in all scales whether or not the participants had previous experience in distant education (Fig. 36.2).

The average percentage of the subjects who mentioned emotional exhaustion was 21.66%, the 4.11% experienced depersonalization and 30.69% personal achievement. Women noted a slightly higher score at emotional exhaustion, while the results in the other two scales were not differentiated in terms of gender. In the other categories, an increased score was observed in the age group of 51–60 years olds in the scale of personal achievement, while at the same time, low scores were noted in all three scales within the age group of 31–40 year olds. Regarding the professional status of the participants, an increased score on the subscales of personal accomplishment and emotional exhaustion was found in the category of permanent teachers compared to their substitute colleagues. In the field of years of service, teachers with 16–20 and 26 or more years of service had high scores on the personal achievement subscale. On the other hand, teachers with 16–20 and 21–25 years of service noted high scores in the emotional exhaustion subscale. In relation to the educational grade, high school teachers reached high scores in the subscales of emotional exhaustion and depersonalization. Primary school teachers, literature and English teachers reached high scores in the emotional exhaustion scale as well. Mathematicians, however, presented low scores in all subscales. The results show a slight variation in the personal achievement subscale as teachers who have previous experience in distance education score higher (Fig. 36.3).

Regarding individual scales of teaching effectiveness in live versus distance conditions, the average scores of all participants were 44.13 concerning teaching strategies, 36.73 about classroom management and 46.21 about student engagement in face-to-face educational conditions and 33.09, 28.09, and 28.09 accordingly in terms of distant education. There were no particular gender-related differences in any of the individual scales. However, there are remarkable differences concerning the same sex in scores comparing face-to-face and distant education. All age groups of the sample, especially the 60-year-old, followed the initial trend, showing higher scores in live teaching conditions rather than in distant learning conditions. In all three scales of self-efficacy, permanent teachers showed an increased score compared to their substitute colleagues, while at the same time, the scores are clearly lower in distant teaching conditions compared to the live ones. Regarding years of service, the highest scores in all three scales were obtained by participants who had 11–15 and 16–20 years of service. At the same time, the 11–15 years of service category noted the biggest difference in scores comparing live and remote education (Figs. 36.4 and 36.5).

36.4 Discussion

Many researches had conducted distance learning [3, 4] in the past in the general population. The pandemic condition extended the use of this model of teaching to underage students. Thus, distance learning was applied for the first time due to the COVID-19 pandemic. The importance of defining the role of distant education while replacing face-to-face teaching is vital in this research. A significant effort was made to highlight the emotional factor, work-related stress, and burnout for primary and secondary grade educators.

The results of our research depict how the factors of gender, work experience, and work field affect in terms of burnout the teachers who participated in this research. The first noticeable observation on the table showing anxiety-stress-

Fig. 36.3 Associations of demographics with burnout

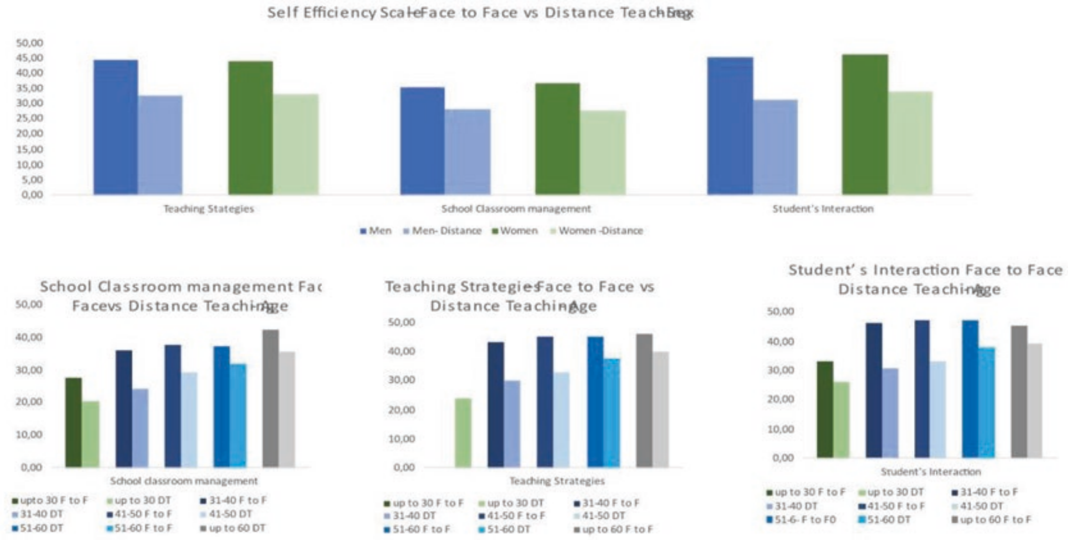

Fig. 36.4 Associations of demographics (sex, age) with face-to-face and distance teaching

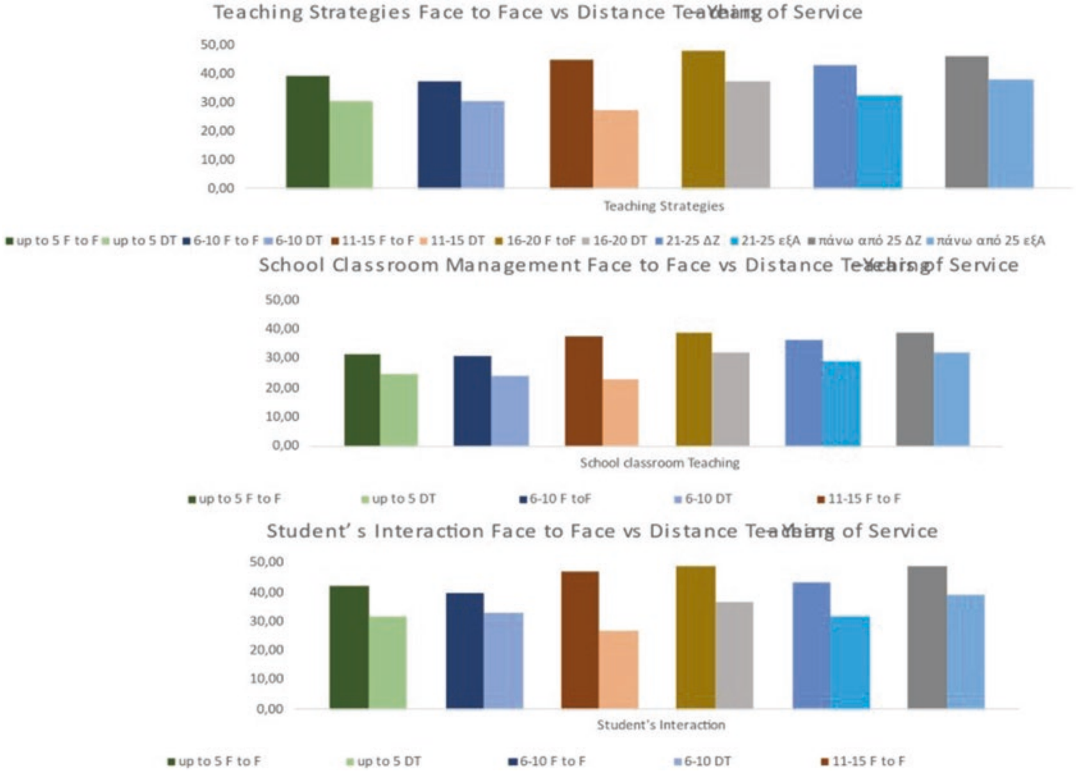

Fig. 36.5 Associations of demographics (years of service) with face-to-face vs. distance teaching

depression scales is the gender factor, as women seem to be more affected than men. The analysis of correlation of teachers' gender with factors yet to be investigated results in differences. Men experienced lower burnout and stress levels compared to their female colleagues in managing the difficulties of distance learning according to the average rates. These results are in line with the findings of other surveys conducted in China [25] during the pandemic, where high levels of anxiety were noted among teachers and female teachers appeared to be more anxious than male teachers. Another study shows large differences in stress and anxiety rates related to gender, highlighting higher rates for female teachers. Moreover, according to other researches on live education, emotional burnout has been related with gender [17].

Age seemed to be another important influencer, as the age group (31–40) showed increased rates in contrast to age groups (41–50) and (51–60) despite their long experience. Furthermore, there is an apparent difference among permanent and substitute teachers. Teachers with a permanent position and several years of service (11–20) tend to experience more symptoms of anxiety, stress, and depression rather than substitute teachers. In terms of the parameters of school context and teachers' specialty, high rates of anxiety were noted by kindergarten teachers; however, the sample is small and the result is not statistically important and thus a safe conclusion cannot be drawn. In addition, junior high school teachers were more influenced than teachers of other educational structures such as general senior high schools, special education institutions, and technical vocational high schools. Increased professional stress may also be associated with the lack of interest and attendance of students in the virtual classroom and this may be a conclusion drawn by the emphasis given on students' motives. In general, the lack of interest results in negative feedback and a sense of frustration, which is something that predefines negative learning outcomes and reduced efficiency in academic success of students [6, 17]. In addition, it is worth considering that in-person education moderates professional stress levels according to research conducted at different periods of time in Greece and internationally as well [3, 14].

Past research results on burnout in face-to-face teaching conditions carried out in Greece are ambiguous. In some surveys, the degree of burnout was low based on American norms [12] in contrast to other surveys conducted on special education teachers where the degree of burnout ranged from moderate to high levels [3]. This declination can be explained only when taking into consideration the multifactorial phenomenon and its correlation to the different cultural data, the country's different educational systems, the different periods when the surveys took place and finally the different educational grades. Based on these specific results of our research on the burnout scale, women again seem to be in the first place in comparison to men in terms of emotional exhaustion. High rates were also noticed on permanent teachers in terms of personal achievement and emotional exhaustion compared to substitute teachers due to their years of previous service. In addition, in terms of personal achievement high rates were also recorded. Probably teachers with prior knowledge on distant education set higher goals being aware of the difficulty of this particular model, thus feeling more stressed than the teachers who did not know it at all.

Regarding teaching effectiveness in face-to-face or distant teaching, there seemed to be no particular differences regarding the teachers' gender. Both male and female teachers agreed on the effectiveness of face-to-face education in comparison to distant learning in terms of teaching strategies, classroom management, as well as the involvement of students Additionally, high rates were observed in the age groups over 60, who believed that classroom management as well as teaching strategies can be effectively applied to face-to face education only. Taking into consideration their years of service, both permanent and substitute teachers believe that face-to-face teaching and education cannot be replaced by distant learning. Symptoms of burnout are mainly experienced by teachers serving in vocational high schools and Kindergartens as classroom management from a distance and tele communication resulted in increased mental and physical fatigue. Also, the participation of children in online educational meetings was limited or zero due to the fact that during working and school hours children were at home with elderly guardians. Based on these data, it makes sense that young students abstained from the educational process. On the other hand, teachers at vocational high schools were very preoccupied and stressed before the e-learning process as they had to face a special group of students, who were mostly absent and involved in various arguments and fights during face-to-face teaching. The teachers' anxiety about their students' participation as well as the management of the virtual classroom was increased due to the rise in students' absences. Still, concerning teachers' specialty, it becomes clear that burnout affects mostly primary school teachers and English teachers and less science teachers who feel more familiar with technology.

36.5 Conclusions

In conclusion, the dominant trend regarding teaching effectiveness is clearly in favor of face-to-face teaching, regardless of teachers' gender or age, with the exception of experienced in distance learning programs teachers. Teachers do not feel ready and sufficiently skilled to implement distant learning in their work, in terms of classroom management and students' involvement. Despite the limitations, this research offers important evidence on the effects of e-learning on teachers' mental and emotional health and it aims at building positive emotions and developing strategies in order to deal with professional stress of the teachers involved. During eras of educational changes, it is of vital importance that educators' emotions should be taken into consideration as this is the only way that their mental health can be ensured. A further research concerning teachers' anxiety management during distant teaching and learning would be recommended because of rapid training by the Ministry of Education.

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Nursing Students' Computer Anxiety and Attitudes Before and During the COVID-19 Pandemic

Ioanna V. Papathanasiou, Dimitrios Mantzaris,
Evangelos C. Fradelos, Nikolaos G. Christodoulou,
Ka Yiu Lee, Areti Tsaloglidou, Eleni Albani,
Foteini Malli, and Konstantinos I. Gourgoulianis

Abstract

Purpose of this research was to investigate how the COVID-19 pandemic affected the level of computer anxiety of nursing students and also their attitude related to computer use. A cross-sectional study was conducted in two periods, one before the COVID-19 pandemic (1st period) and the second during the COVID-19 pandemic (2nd period). The research instrument consisted of three parts, a questionnaire with questions about demographic and educational characteristics such as gender and semester of study, the Computer Anxiety Rating Scale (CARS), that used to assess the nursing students' levels of computer anxiety and the Computer Attitude Scale (CAS) that used to measure nursing students' positive and negative attitudes towards computers. Data from 957 undergraduate nursing students were obtained. Specifically, in the 1st period, 370 nursing students participated (38.66%), while in the 2nd period 587 (61.34%) undergraduates participated. The anxiety of participants during COVID-19 pandemic period was reduced compared to that of participants before the COVID-19 period. Respondents during the COVID-19 pandemic have fewer negative feelings towards computers, based on their answers in contrast to the participants in the study before the COVID-19 pandemic. Computer anxiety and attitudes have change among nursing students among COVID-19 pandemic. Nursing students after the implementation of online training are

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I. V. Papathanasiou (✉) · E. C. Fradelos
Community Nursing Lab, Nursing Department, University of Thessaly, Larissa, Greece

D. Mantzaris
Computational Intelligence and Health Informatics Lab, Nursing Department, University of Thessaly, Larissa, Greece

N. G. Christodoulou
Department of Psychiatry, Faculty of Medicine, University of Thessaly, Larissa, Greece

K. Y. Lee
Swedish Winter Sports Research Centre, Department of Health Sciences, Mid Sweden University, Östersund, Sweden

A. Tsaloglidou
Nursing Department, International Hellenic University, Thessaloniki, Greece

E. Albani
Nursing Department, University of Patras, Patra, Greece

F. Malli
Respiratory Disorders Lab, Nursing Department, University of Thessaly, Larissa, Greece

K. I. Gourgoulianis
Respiratory Medicine Department, Faculty of Medicine, University of Thessaly, Larissa, Greece

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reporting positive feeling towards computer use and are more confident for their ICT skills.

Keywords

Computer anxiety · Computer use · Nursing students · COVID-19

37.1 Introduction

The first century of the new millennium, which is already two decades old, has been characterized as the age of the digital revolution. The computer penetration in almost every aspect of everyday life is staggering. Human transactions, communication, comfort, entertainment, and especially employment are primarily based on the digital communication web maze and the numerous software applications [1]. In the last 2 years, the emergence of the COVID-19 pandemic in the form of a health and social crisis set an unusual challenge not only to the healthcare systems of each country but also to the individual themselves. Never-before-seen containment measures were imposed on people with social and economic consequences, fines, and changes in working and communication patterns affecting their personal lives and psychology [2].

The role of digital technology and computers in this period was crucial. Much of both work and education was launched through digital pathways [3]. In the education sector, where physical presence for teaching and exams was usually mandatory, it has become “virtual” [4]. Participation in undergraduate or postgraduate courses now requires a good internet connection and a modern PC or cell phone [5].

Moreover, a consequence of the economic crisis, prior to the pandemic was the shift of employees to distance learning as the only way to improve their qualifications and skills, alongside with their jobs and families, in order to build a better job profile that would eventually lead to better job and better financial rewards [6]. In this way, technology was at a point where it could easily meet the challenge of the pandemic and provide a path to the new way of life, which was imposed almost literally overnight. Particularly in the field of education, the good Internet infrastructure, at high speeds in the majority of cases, and the existence of many network communication applications, provided the immediate solution for the uninterrupted continuation of studies [2]. Digital teaching and examinations should be considered from different perspectives in order to highlight the positive and negative effects. A key factor to be analyzed, which is already a field of study in the scientific community, is the ability of teachers to cope with the new way of teaching requiring new skills, including the use of digital technology [2].

As is already known, under normal circumstances, academic stress is associated with physical and psychological symptoms such as reduced appetite, sleep disturbances, headaches, and increased heart rate [7]. Several studies have also identified unexpected behaviors in the use of ICT (information and education technologies) that can put stress on a person’s physiological well-being (e.g., computer malfunctions lead to high levels of adrenaline secretion and mental fatigue) [8]. This is currently compounded by the stress associated with COVID-19, which leads to additional negative mental health consequences such as substance abuse, feelings of despair, and suicidal ideation [9, 10]. Feelings of isolation, loneliness, and lack of peer support are known to be negative aspects involved in distance e-learning [11] and may contribute to students‘poor mental health during the pandemic [12, 13]. Female students and especially nursing students are particularly vulnerable to negative mental health issues [12, 14]. It is acknowledged that clinical training taking place during nursing education, heavy course loads, complex interpersonal relationships, caring for chronic and terminally ill patients are some of the factors resulting in greater anxiety among nursing students than among students from other disciplines. During this public crisis, nursing students are exposed to additional stressful factors, such as fear of being infected [14, 15].

Particularly in the field of examinations, the distance process is characterized by innovation but also by the possible correlation with pre-existing factors of the examination process and are likely to change, such as the effect of stress. The presence of stress and its increase during examinations is a natural consequence of anxiety and fear of the unknown, of success or failure experienced by the individual [16]. The mediation of the digital device between the student and the examination is an additional factor that influences anxiety. The concern about a range of problems that may arise during the examination is real [17]. Uninterrupted online connection is a key determinant. Uninterrupted computer operation is mandatory, while the examination is in progress. Uninterrupted and seamless operation of the software application (platform) at the time of the examination is also crucial [18]. The student's familiarity and comfort with the technology and fear of new technology exacerbate or alleviate the presence of anxiety [19]. Therefore, the examinee is no longer concerned only about the competency of his/her knowledge, the correctness of his/her answers, and the time remaining during the examination, but also about other exogenous factors distracting him/her [20].

Furthermore, digital stress can be negative and affect outcome variables directly related to information systems and success (e.g., user intention to use or user satisfaction) [21], individual performance (e.g., technology-supported performance) [22], or emotional exhaustion [23]. For these reasons, a phenomenon of "intolerance" and dislike towards digital systems and their rapid development often occurs [24]. Students' digital stress has severely increased during the pandemic COVID-19 and should be closely monitored and supported alongside their formal education. The key element in supporting students during this period is to keep in touch with them beyond the e-learning.

Based on the above, the purpose of this research was to investigate how the COVID-19 pandemic affected the level of computer anxiety of nursing students and also their attitude related to computer use.

37.2 Methods

37.2.1 Study Design and Sample

A cross-sectional study was conducted in two periods, one before the COVID-19 pandemic (1st period) and the second during the COVID-19 pandemic (2nd period). The participants were undergraduate students of the Nursing Departments of the Technological Educational Institute of Thessaly, the University of Thessaly, the University of Patras, and the International University of Greece. The sampling method applied was that of convenience sampling, and a total of 957 questionnaires were distributed.

37.2.2 Instrument

The research instrument consisted of three parts:

A. A questionnaire with questions about demographic and educational characteristics such as gender, semester of study, successful attendance of the informatics courses and with questions about computer and Internet use.
B. The Computer Anxiety Rating Scale (CARS) by Heinssen et al. [25] was used to assess the nursing students' levels of computer anxiety. The CARS is a self-reported inventory that assess individuals' levels of computer anxiety with the use of 19 questions, while the answers are given on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree. In the present study, the Factor Analysis of CARS by Harrison and Rainer [26] was used. The questions of CARS were divided into two groups. The first group, labelled as CARS1, consists of 10 questions and represents the high anxiety toward computer use. The lower the score, the greater the stress. The second group of the anxiety rating scale questions, labelled as CARS2, includes nine questions and represents confidence, enthusiasm, and/or anticipation toward computer use. In CARS2 the lower the score, the lower the enthusiasm.

C. The Computer Attitude Scale (CAS) by Nickel and Pinto [27] was used to measure nursing students' positive and negative attitudes towards computers. The CAS is also a self-reported inventory of 20 five-point Likert items. In the present study, the Factor Analysis of CAS by Harrison and Rainer [26] was used. The questions of CAS were divided into three factors. The CAS1 factor represents the negative emotions towards computers and consists of nine questions, the CAS2 factor represents positive emotions towards computers and consists of seven questions, and the CAS3 factor represents the lack of understanding of and consists of four questions. Low scores of CAS1 and CAS2 express negative emotions and low scores of CAS3 mean greater lack of comprehension of computers.

37.2.3 Data Analysis

Statistical analysis was performed using the software package SPSS 22.0 for Windows using the methods of descriptive and inferential statistics. Specifically, the descriptive analysis included the frequency distribution of the variables (absolute and relative (%) frequency) as well as estimates of the location and dispersion parameters of the quantitative variables (mean, standard deviation, median, maximum and minimum). Pearson's correlation coefficient (r) was used to measure linear correlations between two variables and t-test was used to examine whether there are significant differences between two groups means. The statistical significance level was set at 5% (p value <0.05).

37.2.4 Ethics

The research was conducted in accordance with the ethical standards of the Helsinki Declaration. Data were collected using an anonymous, fully structured and self-administered questionnaire. Participants were given oral information about the aim of the study, and how to complete the questionnaire. Nursing students voluntarily agreed to participate in the study ensuring that the appropriate research ethical standards are being followed.

37.3 Results

The demographics of the participants in this study are presented in the Table 37.1. Data from 957 undergraduate nursing students were obtained. Specifically, in the 1st period, 370 nursing students participated (38.66%), while in the 2nd period 587 (61.34%) undergraduates participated. The women were the 85.48% of the sample and the 14.52% were men. The aforementioned percentages are maintained in both individual subsets in the 1st and the 2nd period of the study.

The majority of the participants answered the survey studied on 2nd and 4th semester (67.83%) for the period before the COVID-19 pandemic, while 1st, 5th and other semesters (80.92%) were the responders during the COVID-19 pandemic period. Of the 370 students who participated in the research before the COVID-19 pandemic, 59.19% had successfully attended the laboratory and the 42.43% the theory of the informatics course. The corresponding percentages were 70.36 and 72.40% for the 587 undergraduate students participated in the research during the COVID-19 pandemic. It is a remarkable difference regarding the successful attendance of the laboratory (approximately 10%) as well as the theory (approximately 30%).

Although PC rates at home are similar before and during the COVID-19 pandemic, the number of Internet connections has increased significantly (15%) during the pandemic. The participants before the COVID-19 pandemic had used personal computer on average age of 12.87 years old, while the students answered the questionnaire during the pandemic had first computer use a year earlier at 11.64 years. The undergraduate students in the 1st period, had accessed first time the Internet at the age of 14.41 years old, in contrast to those of the 2nd period where the average age is 12.68 years. There is a similar difference on their first computer and Internet use. It is note-

Table 37.1 Demographic data. Profile of responders

		Participants before COVID-19 pandemic period	Participants during COVID-19 pandemic period	Total
		370 (38.66%)	587 (61.34%)	957
Gender				
	Male	49 (13.24%)	90 (15.33%)	139 (14.52%)
	Female	321 (86.76%)	497 (84.67%)	818 (84.48%)
Studies semester				
	1st	2 (0.54%)	158 (26.92%)	160 (16.72%)
	2nd	146 (39.46%)	2 (0.34%)	148 (15.47%)
	3rd	0 (0.0%)	25 (4.26%)	25 (2.61%)
	4th	105 (28.38%)	1 (0.17%)	106 (11.08%)
	5th	31 (8.38%)	192 (32.71%)	223 (23.30%)
	6th	21 (5.68%)	5 (0.85%)	26 (2.72%)
	7th	49 (13.24%)	61 (10.39%)	110 (11.49%)
	8th	10 (2.70%)	18 (3.07%)	28 (2.92%)
	Other	6 (1.62%)	125 (21.29%)	131 (13.69%)
English certification				
	None	9 (2.43%)	6 (1.02%)	15 (1.57%)
	Poor	86 (23.24%)	54(9.20%)	140 (14.63%)
	Lower	210 (56.76%)	272 (46.34%)	482 (50.37%)
	Advanced	23 (6.22%)	51 (8.69%)	74 (7.73%)
	Proficiency	42 (11.35%)	204 (34.75%)	246 (25.70%)
Successful attendance of the laboratory of the informatics course				
	No	151 (40.81%)	174 (29.64%)	325 (33.96%)
	Yes	219 (59.19%)	413 (70.36%)	632 (66.04%)
Successful attendance of the theory of the informatics course				
	No	213 (57.57%)	162 (27.60%)	375 (39.19%)
	Yes	157 (42.43%)	425 (72.40%)	582 (60.81%)
Certified computer skills				
	No	277 (74.86%)	406 (69.17%)	683 (71.37%)
	Yes	93 (25.14%)	181 (30.83%)	274 (28.63%)

(continued)

Table 37.1 (continued)

		Participants before COVID-19 pandemic period	Participants during COVID-19 pandemic period	Total
		370 (38.66%)	587 (61.34%)	957
Computer at home				
	No	17 (4.59%)	9 (1.53%)	26 (2.72%)
	Yes	353 (95.41%)	578 (98.47%)	931 (97.28%)
Internet connections at home				
	No	61 (16.49%)	10 (1.70%)	71 (7.42%)
	Yes	309 (83.51%)	577 (98.30%)	886 (92.58%)
Age of first computer use				
	Until 7	10 (2.70%)	58 (9.88%)	68 (7.11%)
	7–12	99 (26.76%)	280 (47.70%)	379 (39.60%)
	12–15	168 (45.41%)	158 (26.92%)	326 (34.06%)
	15–18	74 (20.00%)	42 (7.16%)	116 (12.12%)
	18–22	12 (3.24%)	18 (3.07%)	30 (3.14%)
	More than 22	7 (1.89%)	31 (5.28%)	38 (3.97%)
Age of first internet use				
	Until 7	3 (0.81%)	22 (3.75%)	25 (2.60%)
	7–12	43 (11.63%)	252 (42.93%)	295 (30.83%)
	12–15	160 (43.24%)	203 (34.58%)	363 (37.93%)
	15–18	126 (34.05%)	52 (8.85%)	178 (18.61%)
	18–22	29 (7.84%)	15 (2.56%)	44 (4.60%)
	More than 22	9 (2.43%)	43 (7.33%)	52 (5.43%)
Use of internet (Average hours per day)	3.62		6.25	

worthy the difference in the average hours of Internet use per day. The respondents of the 1st period used Internet about 3.62 h a day, while ones of the 2nd period about 6.25 h per day, time almost doubled.

In the present study, the level of English language proficiency was included in the questionnaire. The students who answered before the COVID-19 pandemic, in a percentage of 56.76%, were at good level of English knowledge (lower), while those who participated in the 2nd period, were at good knowledge of English in 46.34% and 34.75% participants were at excellent knowledge.

The findings of the research present that the existence of the COVID-19 pandemic led to the supply of computers by undergraduate students ($p = 0.005$), and increased the number of Internet connections ($p < 0.001$) and the hours spent on the Internet ($p < 0.001$).

For assessing the anxiety caused by computer use, the Computer Anxiety Rating Scale [25] was used and stress factors divided into two groups of questions [26]. The first group consists of 10 questions and represents the high anxiety toward computer use (Table 37.2) and labelled CARS1. The lower the score of this team, the greater the stress. The second group of questions of the Computer Anxiety Rating Scale includes nine questions and represents confidence, enthusiasm and/or anticipation toward computer use (Table 37.2) and labelled CARS2. The lower the score, the lower the enthusiasm.

The CARS1 factor represents high anxiety toward computer use. According the obtained results of the Table 37.2, the anxiety of participants during COVID-19 pandemic period was reduced compared to that of participants before the COVID-19 period.

The results of Table 37.2 regarding CARS2 factor show that the undergraduate students who answered the survey during the COVID-19 period had greater confidence, enthusiasm, and/or anticipation towards computer use compared to the participants who answered the questionnaire before COVID-19 period. It is explained by the completion of the theory and the laboratory of the Informatics course as well as by the fact that the computer and Internet connection were the only communication approaches between students, between students and teachers, and with the rest of the people.

Table 37.3 summarizes the results for the two factors CARS1 and CARS2 of Computer Anxiety Rating Scale before and during the COVID-19 pandemic. The minimum and the average scores are higher before the COVID-19 pandemic period compared to that were recorded during it, regarding the questions of the 1st group (CARS1). On the other hand, the maximum score is the same for the participants in the survey in both periods.

Regarding the questions of the 2nd group (CARS2) of Computer Anxiety Rating Scale, the minimum score is lower before the COVID-19 pandemic compared to that was recorded during it. This indicates that before the COVID-19 pandemic there was less confidence, enthusiasm, and anticipation for computer use. Comparing the median values before and during the pandemic, it is observed that the value before the pandemic COVID-19 is higher.

In the present study, the attitude of students towards computers was also measured with the use of the Computer Attitude Scale (CAS), where the factors examined can be divided into three groups [26, 27]. The first group consists of nine questions, represents negative emotions towards computers (Table 37.4) and labelled CAS1. If the score is low, it expresses negative emotions. The second group includes seven questions and represents positive emotions towards computers (Table 37.4) and labelled CAS2. If the score is low, it expresses negative emotions. And finally, the third group consists of four questions and represents the lack of understanding of computers (Table 37.4) and labelled CAS3. The lower the score, the greater the lack of comprehension of computers.

According to the results of Table 37.4, the CAS1 factor representing negative feelings towards computers shows that respondents during the COVID-19 pandemic have less negative feelings towards computers, based on their answers in contrast to the participants in the study before the COVID-19 pandemic.

The CAS2 factor represents positive feelings toward computers. The respondents' answers show that the students who participated in the study during the COVID-19 pandemic had less positive feelings about computers as opposed to the undergraduate students before the COVID-19 pandemic. This attitude may be not only due to the excessive preoccupation of computers but also their use by people who are phobic about technology.

The results of Table 37.4, of the CAS3 factor, on the lack of comprehension of computers present that the answers of the undergraduate students before the COVID-19 pandemic show that the lack of comprehension of the computers was less compared to the answers of the respondents during of the COVID-19 pandemic.

Table 37.5 summarizes the results of the three factors (CAS1, CAS2, and CAS3) regarding attitudes towards computers, before and during the COVID-19 pandemic. Table 37.5 shows

Table 37.2 Computer anxiety rating scale

	Participants before COVID-19 pandemic period			Participants during COVID-19 pandemic period		
CARS1 ***represents high anxiety toward computer use***	***Strongly disagree & disagree***	***Neither agree or disagree***	***Agree & strongly agree***	***Strongly disagree & disagree***	***Neither agree or disagree***	***Agree & strongly agree***
B1. I feel insecure about my abilityto interpret a computer printout	162 (43.78%)	119 (32.16%)	89 (24.06%)	229 (39.01%)	199 (33.90%)	159 (27.09%)
B3. I don't think I would be able to learn a computer programming language	208 (56.21%)	81 (21.89%)	80 (21.63%)	311 (52.98%)	155 (26.41%)	121 (20.61%)
B8. I am afraid that if I begin to use computers I will become dependent upon them and lose some of my reasoning skills	197 (53.24%)	107 (28.92%)	64 (17.29%)	418 (71.21%)	109 (18.57%)	60 (10.22%)
B11. I dislike working with machines that are smarter than I am	252 (68.11%)	75 (20.27%)	41 (11.08%)	449 (76.49%)	108 (18.40%)	30 (5.11%)
B12. I feel apprehensive about using computers	198 (53.52%)	96 (25.95%)	71 (19.19%)	319 (54.35%)	154 (26.24%)	114 (19.42%)
B13. I have difficulty in understanding the technical aspects of computers	154 (41.62%)	101 (27.30%)	113 (30.35%)	219 (37.31%)	190 (32.37%)	178 (30.33%)
B14. It scares me to think that I could cause the computer to destroy a large amount of information by hitting the wrong key	128 (34.59%)	85 (22.97%)	155 (41.89%)	246 (41.91%)	123 (20.95%)	218 (37.14%)
B15. I hesitate to use a computer for fear of making mistakes that I cannot correct	237 (64.06%)	76 (20.54%)	54 (14.59%)	413 (70.36%)	97 (16.52%)	77 (13.11%)
B16. You have to be a genius to understand all the special keys contained on most computer terminals	227 (61.35%)	94 (25.41%)	46 (12.43%)	430 (73.25%)	121 (20.61%)	36 (6.13%)
B18. I have avoided computers because they are unfamiliar and somewhat intimidating to me	306 (82.70%)	37 (10.00%)	24 (6.49%)	521 (88.75%)	48 (8.18%)	18 (3.07%)
CARS2 ***represents confidence, enthusiasm, and/or anticipation toward computer use***	***Strongly disagree & disagree***	***Neither agree or disagree***	***Agree & strongly agree***	***Strongly disagree & disagree***	***Neither agree or disagree***	***Agree &strongly agree***
B2. I look forward to using a computer on my job	63 (17.03%)	155 (41.89%)	151 (40.81%)	75 (12.77%)	268 (45.66%)	244 (41.56%)
B4. The challenge of learning about computers is exciting	42 (11.35%)	103 (27.84%)	223 (60.27%)	74 (12.61%)	178 (30.32%)	335 (57.07%)
B5. I am confident that I can learn computer skills	12 (3.24%)	52 (14.05%)	297 (80.27%)	20 (3.41%)	71 (12.10%)	496 (84.50%)
B6. Anyone can learn to use a computer if they are patient and motivated	19 (5.13%)	38 (10.27%)	308 (83.24%)	21 (3.58%)	44 (7.50%)	522 88.92%)

(continued)

Table 37.2 (continued)

	Participants before COVID-19 pandemic period			Participants during COVID-19 pandemic period		
B7. Learning to operate computers is like learning any new skill-the more you practice, the better you become	13 (3.51%)	37 (10.00%)	321 (86.75%)	9 (1.53%)	31 (5.28%)	547 (93.18%)
B9. I am sure that with time and practice I will be as comfortable working with computers as I am in working with a typewriter	26 (7.03%)	89 (24.05%)	255 (68.92%)	41 (6.98%)	135 (23.00%)	411 (70.02%)
B10. I feel that I will be able to keep up with the advances happening in the computer field	51 (13.78%)	104 (28.11%)	212 (57.30%)	53 (9.03%)	149 (25.38%)	385 (65.59%)
B17. If given the opportunity, I would like to learn about and use computers	26 (7.03%)	61 (16.49%)	278 (75.14%)	23 (3.92%)	75 (12.78%)	489 (83.30%)
B19. I feel computers are necessary tools in both educational and work settings	21 (5.67%)	48 (12.97%)	301 (81.35%)	18 (3.07%)	47 (8.01%)	522 (88.93%)

Table 37.3 Computer anxiety rating scale: summarized results

		Participants before COVID-19 pandemic period	Participants during COVID-19 pandemic period
CARS1 *represents high anxiety toward computer use*	Minimum score	16	14
	Maximum score	50	50
	Average	35.17	35.80
	Standard deviation	6.76	5.87
	Median value	36	36
CARS2 *represents confidence, enthusiasm, and/or anticipation toward computers*	Minimum score	19	21
	Maximum score	45	45
	Average	35.23	35.49
	Standard deviation	5.25	4.21
	Median value	36	35

that the minimum, the maximum score, the average and the median value are lower before the COVID-19 pandemic compared to that was recorded during it, for CAS1. This means that the negative emotions that were created towards the computers before the pandemic period have decreased during the COVID-19 pandemic, while the participants use the computers much more time.

Regarding the factor CAS2, the minimum score is much higher during the COVID-19 pandemic compared to the previous period. This shows that the feelings of the participants of the COVID-19 period towards computers are posi-

Table 37.4 Computer attitude scale

	Participants before COVID-19 pandemic period			Participants during COVID-19 pandemic period		
CAS1 ***represents negative feel- ings toward computers***	***Strongly disa- gree & disagree***	***Neither agree or disagree***	***Agree & strongly agree***	***Strongly disa- gree & disagree***	***Neither agree or disagree***	***Agree & strongly agree***
C1. Computers will never replace human life	65 (17.57%)	0 (0.0%)	303 (81.89%)	35 (5.96%)	109 (18.57%)	443 (75.47%)
C3. People are becoming slaves to computers	105 (28.37%)	0 (0.0%)	260 (70.27%)	117 (19.94%)	198 (33.73%)	272 (46.34%)
C5. Soon our lives will be controlled by computers	143 (38.65%)	0 (0.0%)	224 (60.54%)	156 (26.57%)	222 (37.82%)	209 (35.61%)
C8. The overuse of computers may be harmful and damaging to humans	37 (10.00%)	0 (0.0%)	331 (89.46%)	23 (3.92%)	76 (12.95%)	488 (83.14%)
C9. Computers are dehumanizing to society	178 (48.11%)	0 (0.0%)	186 (50.27%)	213 (36.28%)	241 (41.06%)	133 (22.65%)
C12. Computers turn people into just another number	204 (55.13%)	0 (0.0%)	162 (43.78%)	228 (38.85%)	213 (36.29%)	146 (24.87%)
C13. Computers are lessening the importance of too many jobs now done by humans	77 (20.81%)	0 (0.0%)	288 (77.84%)	78 (13.28%)	95 (16.18%)	414 (70.53%)
C16. Computers will replace the need for working human beings.	120 (32.44%)	0 (0.0%)	245 (66.22%)	130 (22.15%)	179 (30.49%)	278 (47.36%)
C18. Soon our world will be completely run by computers	138 (37.30%)	0 (0.0%)	229 (61.89%)	192 (32.71%)	187 (31.86%)	208 (35.43%)
CAS2 ***represents positive feelings toward computers***	***Strongly disa- gree & disagree***	***Neither agree or disagree***	***Agree & strongly agree***	***Strongly disa- gree & disagree***	***Neither agree or disagree***	***Agree & strongly agree***
C4. Computers are responsible for many of the good things we enjoy	64 (17.30%)	0 (0.00%)	299 (80.81%)	19 (3,24%)	56 (9.54%)	512 (87.23%)
C7. There are unlimited possibilities of computer applications that haven't even been thought of yet	35 (9.46%)	0 (0.00%)	329 (88.92%)	14 (2,39%)	63 (10.73%)	510 (86.88%)
C10. Computers can eliminate a lot of tedious work for people	66 (17.83%)	0 (0.00%)	298 (80.54%)	65 (11,08%)	106 (18.06%)	416 (70.87%)
C11. The use of computers is enhancing our standard of living	107 (28.92%)	0 (0.00%)	260 (70.27%)	47 (8,00%)	156 (26.58%)	384 (65.42%)
C14. Computers are a fast and efficient means of getting information	23 (6.21%)	0 (0.00%)	343 (92.70%)	1 (0,17%)	19 (3.24%)	567 (96.59%)
C17. Computers are bringing us into a bright new era	119 (32.16%)	0 (0.00%)	247 (66.75%)	32 (5.45%)	216 (36.80%)	339 (57.75%)
C19. Life will be easier and faster with comput- ers	54 (14.59%)	0 (0.00%)	313 (84.59%)	23 (3.92%)	120 (20.44%)	444 (75.64%)

(continued)

Table 37.4 (continued)

	Participants before COVID-19 pandemic period			Participants during COVID-19 pandemic period		
CAS3 *represents a lack of under- standing computers*	***Strongly disa- gree & disagree***	***Neither agree or disagree***	***Agree & strongly agree***	***Strongly disa- gree & disagree***	***Neither agree or disagree***	***Agree & strongly agree***
C2. Computers make me uncomfortable because I don't understand them	313 (84.59%)	0 (0.00%)	54 (14.59%)	458 (78.02%)	86 (14.65)	43 (7.32%)
C6. I feel intimidated by computers	302 (81.62%)	0 (0.00%)	61 (16.48%)	451 (76.83%)	110 (18.74%)	26 (4.43%)
C15. Computers intimidate me because they seem so complex	301 (81.35%)	0 (0.00%)	65 17.56%)	432 (73.59%)	113 (19.25%)	42 (7.15%)
C20. Computers are difficult to understand and frustrating to work with	303 (81.89%)	0 (0.00%)	64 (17.29%)	416 (70.87%)	139 (23.68%)	32 (5.41%)

Table 37.5 Computer attitude scale: summarized results

		Participants before COVID-19 pandemic period	Participants during COVID-19 pandemic period
CAS1 *represents negative feelings toward computers*	Minimum score	0	11
	Maximum score	34	39
	Average	21.31	25.73
	Standard deviation	4.49	4.94
	Median value	22	26
CAS2 *represents positive feelings toward computers*	Minimum score	0	13
	Maximum score	35	35
	Average	27.02	27.61
	Standard deviation	4.82	3.20
CAS3 *represents a lack of understanding of computers*	Median value	28	28
	Minimum score	0	20
	Maximum score	16	20
	Average	12.34	15.60
	Standard deviation	2.58	2.73
	Median value	12	16

tive. However, in both periods, there were participants with positive feelings towards computers (same maximum score) while the median value is also the same.

According to the results for the factor CAS3, the minimum and the maximum score, the average and the median value are higher during the COVID-19 period, evidence that the specific undergraduate students understand better the computers.

In this study examining the anxiety-induced use of computers as well as the attitude of participants towards computers, there are some important factors that emerged from the analysis of the data. The obtained results show that the gender is a factor for anxiety by computer use (CARS1, $p = 0.016$) and the lack of comprehension of computers (CAS3, $p = 0.051$). Furthermore, the age of the first use of computer is associated with anxiety by computers ($p < 0.001$), the hours spent on the Internet affect negative emotions (CAS1, $p < 0.001$), and the lack of understanding of computers (CAS3, $p < 0.001$).

37.4 Discussion

The purpose of this cross-sectional study was to investigate the levels of computer anxiety before and during the COVID-19 pandemic, as well as the computer attitudes, of nursing students. We also examined the relationships between demographic and educational characteristic with computer anxiety and attitudes, and the relationships between computers' use and computer anxiety and attitudes.

First, the results show that the number of Internet connections has increased significantly (15%) during the pandemic, and the average hours of Internet use per day almost doubled (3.62 h per day before pandemic and 6.25 h per day during pandemic). The existence of the COVID-19 pandemic led to the use of computers by undergraduate students ($p = 0.005$), increased the number of Internet connections ($p < 0.001$) and the hours spent on the Internet ($p < 0.001$). The increased computer and Internet use among students and young people is an increasing trend worldwide. In a recent multicounty cross-sectional study in which young people participated, problematic Internet use among young people aged 16–25 years was reported. Among the main Internet activities social media use was reported from all countries. This study also reported that high levels of emotional and psychological distress are associated with the increased computer use [28]. In another study that conducted in Spain in which computer and Internet use patterns before and during pandemic were assessed, the results are similar with the results of the current study. In that study even though the activities that participants were engaged still remained the same as before the pandemic, an increased used was reported. Those results are depicting the behavioral changes that COVID-19 pandemic lead the population [29]. However, the increased computer use is also linked to the shift from face-to-face to online teaching that the pandemic and aforementioned restrictive measures forged in universities [30]. According to Besalti et al., this shift to online education has increased the time students spend on online activities in general and for educational purposes only [31].

In addition, the study results show that levels of high anxiety towards computer use (CARS1) during the COVID-19 pandemic decreased compared to levels before the COVID-19 period. Studies have shown that computer anxiety is common among students in higher education [32]. In higher educational institutes many learning activities are based in interaction with computers and in Internet-related technology [33]. Pre-pandemic studies have shown that computer use can create strong negative emotions in college students, not only during the time of interaction, but also before and this can lead to the development of a negative perception of computer and technology use [34]. During the COVID-19 pandemic, students were forced to the use of online learning platforms due to the fact that universities were closed for a long period of time.

According to our results, undergraduate students who responded to the survey during the COVID-19 period had greater confidence, enthusiasm, and/or anticipation for computer use compared to the participants who responded the questionnaire before the COVID-19 period. Moreover, the lack of understanding of computers shows that the responses of undergraduate students before the COVID-19 pandemic show that the lack of understanding of computers was less compared to the answers of the respondents during of the COVID-19 pandemic. In addition, we observe that the factor positive feeling remained stable before and during the pandemic. This result is in agreement with the international literature or the use of ICT and computer in higher education. A recent cross-sectional study between athletic and physical education students reaches similar results. Sports and physical education students report being very confident in their ICT skills after implementing online education [35]. Furthermore, this study revealed that students during the COVID-19 pandemic have fewer negative feelings about computers, based on their responses in contrast to study participants before the COVID-19 pandemic. It is a fact that the shift to online education during the pandemic improved attitudes towards the use of computers and ICT in general not only for students but also for teachers and faculty members [36, 37]. These results can be partly explained by the fact that the completion of the theory and laboratory of the computer science course helps a lot as well as by the fact that the computer and Internet connection were the only approaches for communication between students, between students and teachers, and with the rest of the people.

In this study examining the anxiety-induced computer use as well as the participants' attitudes towards computers, there are some important factors that emerged from the analysis of the data. The obtained results show that gender is a factor for stress from computer use (CARS1, $p = 0.016$) and lack of comprehension of computers (CAS3, p 0.051). In addition, age of first computer use is associated with stress by computers ($p < 0.001$) and hours spent on the Internet affect negative emotions (CAS1, $p < 0.001$) and the lack of computer understanding (CAS3, $p < 0.001$). These results opposed with recent studies among university students' population. A cross-sectional study among 399 students in Malaysia that assessed factors associated with online education, stress, and computer use reported that age and gender did not influence online training and student satisfaction [38]. Similar results were also reported by Teo et al., in their study among Macau students, where the main purpose was to search for the factors influencing the acceptance of online education. Several factors such as usefulness, attitude, and perceived behavioral control were found to be important determinants of students' behavioral intentions but age and gender were not among them [39]. These differences could be explained by the cultural difference and also by the field of study. Nursing education requires a lot of field training, clinical placement, and laboratory skill training that are very difficult to be delivered online.

37.4.1 Limitations of the Study

The study was conducted among nursing students. Nursing education is a very demanding training that requires very specific conditions and is difficult to be delivered online. Furthermore, the study population before and during pandemic is different; thus, no exact comparison can be made.

37.5 Conclusion

The pandemic has affected the frequency and purpose of computer and Internet use not only among students but also among the general population, leading to an increase in usage worldwide. Computer anxiety and attitudes have changed among nursing students in the COVID-19 pandemic. Nursing students after implementing online education report positive feelings about computer use and are more confident for their ICT skills.

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COVID-19 Pandemic and Health and Social Inequalities Worldwide: Impact and Response Measures in Greece

Maria Malliarou, Athanasia Gagamanou, Axilleas Bouletis, Vasileios Tzenetidis, Iokasti Papathanasiou, Maria Theodoropoulou, Theodora-Paisia Apostolidi, Vaios Grammatis, Anna Patsopoulou, and Pavlos Sarafis

Abstract

Objectives: The pandemic has exacerbated pre-existing health and socioeconomic inequalities around the globe. In order to mitigate the effects of extreme isolation and containment measures, governments have taken steps to protect the health, the economy, employment, and socially vulnerable groups. The health crisis should be treated as a pretext in order to ensure universal access to health and socioeconomics.

The aim of this review was the presentation of the way the pandemic contributed to the worldwide deterioration of health inequities affecting in parallel the social protection in the health, economic and educational sector along with other factors, the effects and the measures taken, in order to face the consequences of a pandemic on the social protection in Greece in comparison with other countries of Europe.

Methods: A cross-sectional bibliographic study was undertaken using keywords and phrases such as "COVID-19," "Health inequities," "Social protection," and "Social identifiers." The search was done through the search engines google scholar, PubMed, Health link, and Elsevier using either the Greek or English language. The total number of evaluated read-used articles was 30. Inclusion criteria were free full-text meta-analyses, reviews, and systematic reviews.

Results: The socially disadvantaged groups in the United States were found to have a lower life expectancy and higher morbidity rates than privileged social groups, as economic, health, and sociocultural precariousness are major causes of death. Patients with underlying diseases are vulnerable groups and increase the risk of coronavirus infection and quite often lead to loss of life due to complications of the disease. Greece is ranked in the 4th worst position with 61.10% in employment in all European Union (EU) countries.

M. Malliarou (✉) · V. Tzenetidis (✉) ·
I. Papathanasiou · T.-P. Apostolidi · A. Patsopoulou
Laboratory of Education and Research of Trauma
Care and patient safety, Nursing Department,
University of Thessaly, Larissa, Greece
e-mail: malliarou@uth.gr

A. Gagamanou · M. Theodoropoulou · V. Grammatis
Hellenic Open University, Patras, Greece

A. Bouletis
404 General Military Hospital, Larissa, Greece

P. Sarafis
University of Thessaly, Larissa, Greece

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There is a significant increase in deaths with a percentage change from 2018 to date of 17.50%. It also holds the 3rd worst position among EU countries in the field of unemployment, while women hold the 2nd worst with a rate of 13.50%. Overworked and overindebted households due to extreme measures due to the pandemic (reduction of working time, quarantine) led to unemployment, loss of income, poverty, widening social inequalities, and deteriorating care for people with disabilities. Children due to the closure of schools and the loss of school meals are led to food insecurity. The pandemic also left many children orphaned after the death of their parents by COVID-19, with psychosocial problems exacerbated by school closures.

Conclusions: The pandemic has exacerbated long-standing health and socioeconomic inequalities, stressing to governments the need to adopt political strategies that will help address them. Measures have been taken in Greece for labor protection, and unemployment benefits, such as the two-month extension of the subsidy period for the unemployed and the long-term unemployed. Minimum insurance days have also been reduced so that citizens employed in tourism, catering, and other seasonal occupations can receive unemployment benefits.

Keywords

COVID-19 · Health inequities · Welfare State · Economic inequality · Determinants of health

38.1 All authors contributed equally to this chapter.Introduction

It is historically recorded that after wars, big crises and economic collapse the character of the socioeconomic systems proves to be positive, forcing modernization and political change. Inequities in the domain of health existed many decades before inducing negative coincidences, such as morbidity and mortality. During the pandemic, the already existing inequity among the population groups was revealed and widened, deteriorating at the same time the risk factors [1, 2].

After a long fight with the COVID-19 pandemic, the worldwide community found itself unprepared to face the health crisis and moreover to protect people of vulnerable and high-risk groups due to inequities. The binary character of inequities in health domain is divided as follows: a)The inequities of health level, namely the absence of systematic differences among persons or groups according to social economic, ethnic racial, or other characteristics. b) The inequity of health care, namely the absence of equal access to and equal rights with in the available health services, the equal use and need of health services provision and equal quality of the services to all [3].

The aim of this review is the presentation of the way the pandemic contributed to the worldwide deterioration of health inequities affecting in parallel the social protection in the health, economic, and educational sectors, the effects and the measures taken, in order to face the consequences of pandemic on the social protection in Greece in comparison with other countries of Europe.

38.2 Material and Methods

A cross-sectional bibliographic study was undertaken using keywords and phrases such as “COVID-19,” “Health inequities,” “Social protection,” and “Social identifiers.” The search was done through the search engines Google Scholar, PubMed, Health link, and Elsevier using either the Greek or English language. The total number of evaluated read used articles was 30. Inclusion criteria were free full text meta-analyses, reviews, and systematic reviews.

38.3 Results

38.3.1 Health: Social Iniquities Due to Pandemic COVID-19

COVID-19 compared to previous pandemics, such as Ebola and Aids, affected negatively the worldwide community by bringing negative effects, increasing the health and socioeconomic inequities [1]. Exposure to COVID-19 infection was found to increase risks for the social vulnerable groups who live in precarious and unhealthy residences with high humidity density and low access to basic and vital importance essentials. Also, the positive cases in gypsies and refugees camps alongside unhealthy living reveal the vulnerability of specific population [4, 5]. Health protection, health, and prosperity are connected with the goods quality related to health, residence, food, and fuel [6]. The homeless people face various consequences due to COVID-19, since their living in the shelters, partially collapsed and abandoned houses, brings adverse impacts on their health and ease of virus spread. Such social groups have difficulty in keeping the measures, such as the social distance, hand hygiene, and using health care services, widening the health inequality [2].

The social weaker groups of population in United Nations and United States of America (U.S.A.) have lower life expectancy and higher morbidity percentage compared to privileged social groups, since the economical, health, and sociopolitical precariousness comprises a basic factor of mortality. Patients with subject diseases constitute vulnerable groups and increase the COVID-19 coronavirus contamination risk and increase life loss due to disease complications [4, 7–9]. In terms of access to health services, adequate hygiene and social protection social groups of rural areas lag behind dramatically [10].

38.3.2 Implications and Measures of Addressing the Pandemic Consequences

The impacts of the pandemic are many due to the severe measures of restriction and the social distancing, employees in work suspension. Also, the burdened and overcharged households have been driven to unemployment, income loss, poverty (widening of social inequalities), and handicapped persons care deterioration due to extreme up taken measures due to pandemic [1, 4].

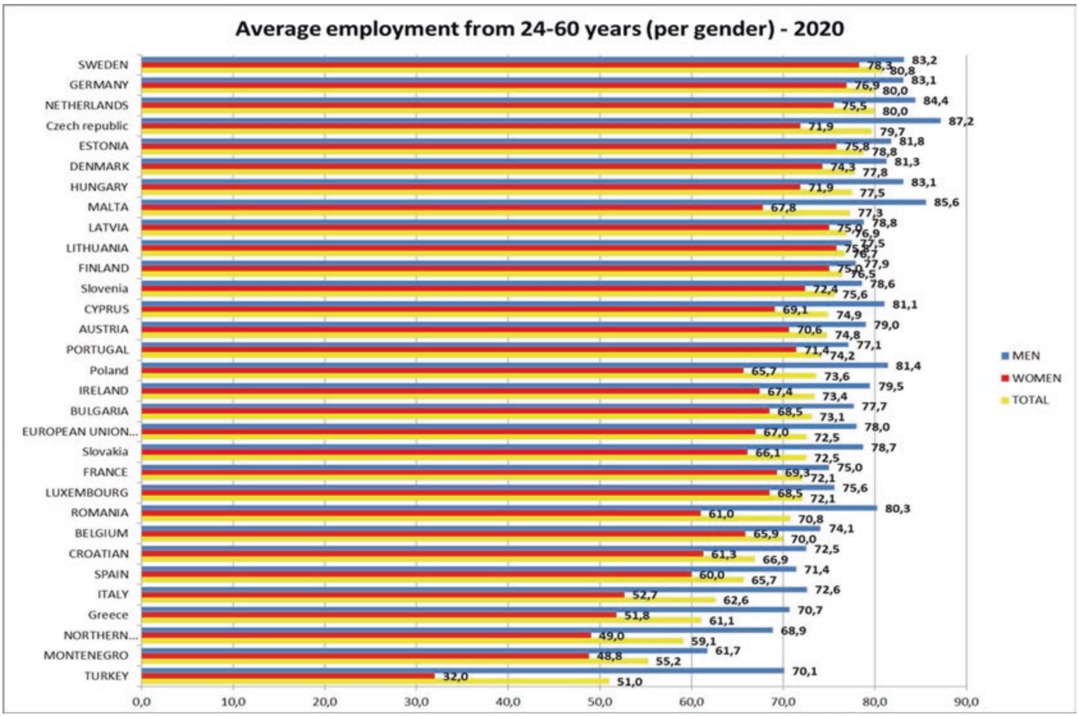
Children face lack of access to health care. Due to the school closure and lack of school meal lack, they are driven to the nutritional precariousness. Intensifying the restriction measures, it is intensely observed that child abuse is increasing. Even more due to pandemic, many children have become orphans after their parents death by COVID-19 showing psychosocial symptoms, which are being deteriorated with the school closure [11, 12]. Further phenomena of family violence are being observed [13, 14]. The health crisis brought also economic crisis with the income loss, the increase in unemployment, and job losses caused by firms' closure [15] (Graph 38.1).

Greece ranks in the fourth worse position in employment percentage 61.1%, with regard to other countries and lower than the average of the European Union (EU) countries. Women hold the less employment percentage that is 51.8% compared to men, which is 70.7% of population (Graph 38.2).

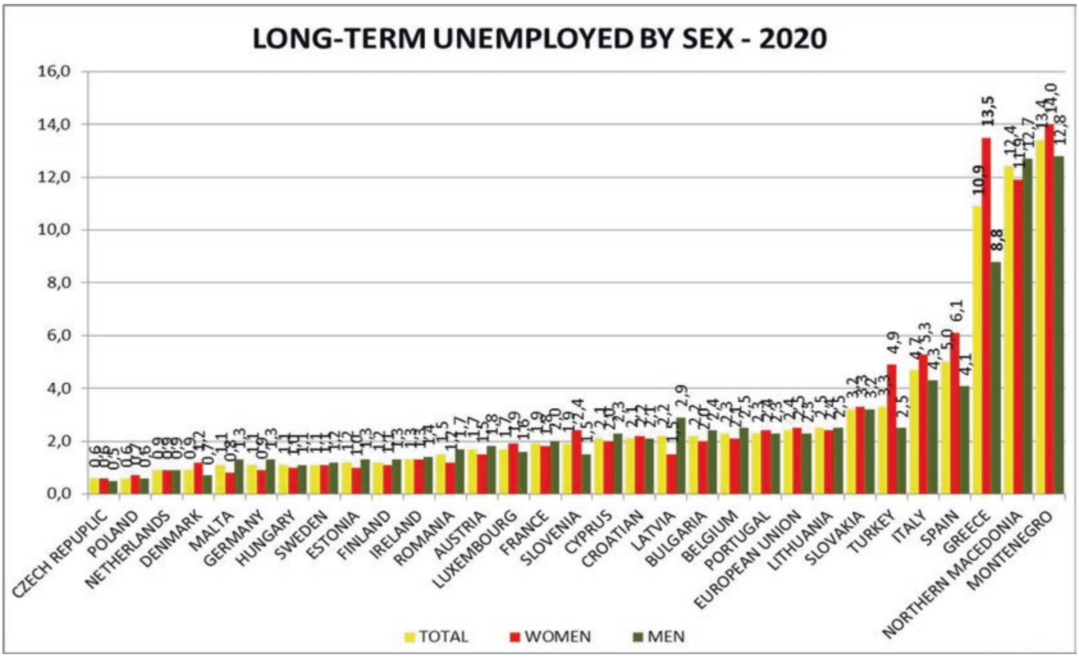
Greece holds the third worse position on the unemployment field, showing the negative situation of the country and emphasizing the inequality with women taking over the second worse position with a percentage 13.5%.

The pandemic directed the attention of society to public health and revealed the critical gaps in the social protection domain. It proved that social care must take measures, which will aim at the whole access to health services, a minimal guaranteed income, and decent life. In that way, by setting priority at a national and worldwide level, the increase of inequality and poverty due to Covid 19, will be avoided [4].

Several governments took measures of dealing with the consequences of pandemic in the social protection domain. Sweden decided to provide an allowance as sick pay not only to the workers who were ill by COVID-19, given from the first day of absence but also to the dependent member caregivers. France gave it even more to



Graph 38.1 Employment average of European Union countries (EU)—2020. (Source: Eurostat, 2021—https://ec.europa.eu/eurostat/web/lfs/data/main-tables?etrans=el)



Graph 38.2 Long-term unemployed per sex in EU countries in 2020. (Source: Eurostat, 2021 — https://ec.europa.eu/eurostat/web/lfs/data/main-tables?etrans=el)

child caregivers or those who were in quarantine. Also, Portugal provided social allowance to employees and self-employed who are absent from their work in order to take care of their children. Furthermore, Portugal expedited the legalization procedure of immigrants, allowing them to have the right to social protection benefits. In Germany, the government started an urgent economic help plan for employees, employers, and self-employed. According to legislation, German government disbursed short-term benefits to limited time contract employees, foreigners and season workers with precarious employment contracts and loosing of prepaid taxes. An economic support lump sum was given to self-employed in Italy [6].

Measures regarding unemployment benefits were taken in Greece, such as the two-month lengthening of subsidy for unemployed and long-term unemployed. In order to avoid the spread of the virus, a webpage of electronic services of Greek Manpower Employment Organization was established, which can be used by the unemployed citizen and employers in order to submit their application. Also, the number of days regarded as credited for determining the minimum contribution period was reduced so that citizens who were working on tourism, catering, and other occupations of seasonal nature could take the unemployment allowance [16].

Measures were also taken for the work protection, which is accomplished by supporting employers—employees—self-employed. Specifically, special purpose compensation was given to employees who have been suspended from work due to business shutdown. Occupation in the form of short-term work programming which is addressed to businesses with a 20% fall on turnover was subsidized. Employers' social security contributions for employees, who are employed in businesses of seasonal nature in the sector of tourism and transport, were funded by the government budget. The time limit of social security contribution for businesses was extended on the condition that jobs will be maintained. Deferred payment of VAT and other relieves are taken and work contracts denunciations were temporarily forbidden [16].

The Greek Government licensed the workers at the public-private sector aiming to support those who have children ill by COVID-19. At the health insurance sector, measures were taken for prevention assurance of adequate accommodation and workforce in the sector maintaining basic services. A helpline of psychosocial services was opened [16].

There was financial aid for scientists and freelancers. One time economic boost was given to non-subsidized unemployment and special restitution was provided to seasonal workers with the least guaranteed income. Measures also were taken regarding the housing support through rent reduction and a loan subsidizing plan called "Bridge" to vulnerable debtors [16].

Measures were taken also for parents whose children had attended distance lessons, who were given special purpose license and a part time case. Even more, a program of 100.000 subsidized unemployed jobs and distance working was implemented [16].

The social disadvantaged groups in United States were found to have lower life expectancy and higher morbidity percentage in comparison with privileged social groups, since economy, health, and social-cultural precariousness constitute the main cause of death. Patients with subject diseases are vulnerable groups with increased risk of Covid 19 contamination, which leads to life loss due to complication of disease.

Greece is ranked in the fourth worse place with 61.10% of employment in all European countries. Important increase is observed regarding the deaths rate with a 17.50% variation from 2018 to this day. It is ranked in the third worse place among European Union countries on the sector of unemployment, while women are ranked in the 2nd worse with a percentage of 13.50%.

Due to extreme measures because of the pandemic (decrease in work time, quarantine), many people became unemployed, lost income something that created social inequalities and healthcare deterioration. Due to school lockdown and school lunch loss, children are led to food insecurity. Pandemic also left behind many orphans after their parents' death by COVID-19, with psychosocial problems being deteriorated after school lock down.

38.4 Discussion: Conclusions

Health inequalities are a «plague» which is perpetuated in worldwide community, both in underdeveloped and developed countries. World Health Organisation notes the importance of achieving a provision and health care level to citizens, provided that there is equal provision of services. Health inequality as long as social and economic inequalities impose that governments should adopt strategies to deal with them.

The current health crisis due to Covid 19 pandemic highlights the importance of creating equal health services and set it as an urgent priority worldwide. On the other side, it reveals the huge difference equality aspirations on the worldwide health field and the reality which exists in health care. Covid 19 comprises an opportunity for reforms and with adequate funds and social protection strong societies and economies could be built with coherence and peace, without exclusions.

In the worldwide community, measures were taken in order to face the consequences of pandemic in the social sector, which highly but not in catalytic way contributed to the problem, since the inequalities spiked. Effective measures can be maximized only if social protection measures are aimed to macroeconomic scope, which promotes dignified and full-time occupation, poverty and unemployment extinction, and sustainable social protection systems.

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39

Quality of Life in Patients Receiving Medical Cannabis

Iliana Tsampoula, Afroditi Zartaloudi,
Evangelos Dousis, Ioannis Koutelekos,
Niki Pavlatou, Georgia Toulia, Antonia Kalogianni,
and Maria Polikandrioti

Abstract

Introduction: Medical cannabis has been used to relieve the symptoms of people with various chronic diseases. Despite of this, it has been stigmatized, even after its legalization in many countries. Aim: The purpose of this study was to investigate the quality of life of patients receiving medical cannabis. Material and method: One hundred patients receiving medical cannabis were given (a) a socio-demographic and clinical questionnaire, and (b) the SF-36 Health Survey scale for assessing quality of life. Results: The majority of our patients who received medical cannabis to treat their neurological disorders (58%) reported decrease in their symptoms (96%), better energy and vitality (68%), ability to perform their professional duties (88%), and an improvement in sleeping and appetite (79% and 71%, respectively) after receiving medical cannabis. Our participants exhibited very few restrictions in activities due to emotional difficulties, a moderate general health status as well as moderate vitality and energy. Participants, who reported a longer period of receiving medical cannabis, reported statistically significant more energy and vitality ($p = 0.000$), but also better mental ($p = 0.000$) and general health status ($p = 0.001$). Furthermore, the majority of patients have disclosed medical cannabis use to their family members (85%) and enjoyed their support (93%), but they haven't revealed their medication treatment to their social environment (81%). Conclusions: Appropriate knowledge could significantly help health professionals in the field of planning and implementation of personalized nursing care in order to achieve optimal therapeutic outcomes.

Keywords

Medical cannabis · Quality of life · SF-36

39.1 Introduction

In the past, cannabis had not only been used to induce euphoria (due to its psychotropic properties) but also in cooking, perfumery, pharmaceuticals, etc. In modern times, cannabis has been used for recreational, religious, spiritual, and medicinal purposes. The major psychoactive substance in cannabis is Δ9-tetrahydrocannabinol (THC) [1, 2]. Medical cannabis has to be followed to have a positive effect in reducing pain, nausea, vomiting, diarrhea, muscle spasticity,

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I. Tsampoula · A. Zartaloudi (✉) · E. Dousis
I. Koutelekos · N. Pavlatou · G. Toulia · A. Kalogianni
M. Polikandrioti
Department of Nursing, University of West Attica,
Athens, Greece
e-mail: azarta@uniwa.gr

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anorexia and weight loss, cachexia, migraine, insomnia symptoms, and depression of various chronic diseases and contribute to improving mental and physical health of the patients that could affect the quality of their lives [3].

The purpose of the present study was to investigate the quality of life of patients receiving medical cannabis.

39.2 Materials and Methods

The study sample included one hundred individuals being members of the association of patients in favor of using medical cannabis, which is a non-profit organization. Data was collected during the period February to March 2021, after receiving informed consent from each respondent. A total of 158 questionnaires were given to members of the above association (response rate of 63.29%). Criteria for the inclusion of patients in the study were: (a) to speak, read, and write in Greek and (b) to use medical cannabis. An exclusion criterion was to use psychotropic drugs or other substances. Participation was voluntary and anonymity was assured. Before collecting data, approval was obtained by the Scientific Council of the Association. The research was complied with the General Regulation for the Protection of Personal Data (GDPR) and the ethical standards of the Declaration of Helsinki (1989) of the World Medical Association. Participants were informed about the purpose of the study, the confidentiality of responses and data, the assurance of anonymity of their identity, the voluntary nature of their participation, and that the data would be used only for research purposes as well as their right to refuse or discontinue participation in the study.

39.2.1 Measurement Tools

Participants were administered a structured questionnaire about socio-demographic and clinical characteristics, and the “SF-36 Health Survey (SF-36)” scale which was used to assess their health-related quality of life. This scale was designed by Ware and colleagues and consisted of 36 questions to measure functional health and well-being from the patient’s point of view and, more specifically, two health component summary measures through assessing the patient’s health status using eight different dimensions: physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH) [4].

Physical Functioning This subscale assesses limitations in daily physical activities because of health problems. The highest score indicates the ability to perform all physical activities in everyday life, without limitations due to health reasons, while the lowest score indicates the existence of a significant limitation of activities due to physical health problems.

Physical Role This subscale measures role limitations due to physical health problems. A higher score indicates good physical health resulting in the absence of problems at work or other activities, while a lower score indicates a low level of physical health resulting in the presence of problems in the aforementioned areas.

Bodily Pain This subscale assesses limitations in performing daily activities due to intensity of physical pain. A higher score indicates no pain or no limitation of activities due to pain, while a lower score indicates severe pain.

General Health This subscale assesses general health perceptions. A higher score indicates personal assessment of health as excellent, while a lower score indicates poor and deteriorating health.

Vitality This subscale assesses energy and fatigue. A higher score indicates full energy, while a lower score indicates feelings of constant fatigue and burnout.

Social Functioning A higher score indicates the ability to perform usual social activities without restrictions due to physical or psychoemotional problems, while a lower score indicates limitations in social activities because of physical or emotional problems.

Emotional Role This subscale assesses role limitations due to personal or emotional problems. Higher score is indicative of the absence and lower score is indicative of the presence of problems / limitations in the workplace or in other usual role activities because of emotional problems.

Mental Health This subscale assesses general mental health (psychological distress and well-being). A higher score indicates the presence of positive emotions, such as happiness and calmness, while a lower score indicates the presence of negative emotions, such as nervousness and depression.

Respondents could answer each question on a Likert-type scale. Each subscale is scored on a scale from 0 to 100, whereby 0 points represent the greatest possible limitation of health and the worst state of health-related quality of life, while 100 points represent the absence of health restrictions and the best possible state of health-related quality of life. Lower scores indicate more disability and higher scores less disability. The SF-36 scale generates eight subscales and two summary scores. The scores are sums of the questions in each section. All eight dimensions can be summed up in two total results, the first concerning physical health and the second mental health, named PCS-36 and MCS-36, respectively. The physical health summary component comprises the physical functioning, role limits due to physical health, bodily pain, and general health scales. The mental health summary component comprises the vitality, mental health, role limits due to emotional problems, and social functioning scales. There is no single overall score for the SF-36. SF-36 Health Survey (SF-36) scale has very good reliability and validity. It has been translated and validated in Greek and has been used in a large number of studies conducted in Greece [5, 6].

39.2.2 Statistical Analysis

Socio-demographic and clinical data related to cannabis use were analyzed using descriptive statistics. Categorical data are presented in absolute and relative (%) frequencies; while continuous data are presented with median and interquartile range (IQR) and expressed as means and standard deviations. Normality was tested with the Kolmogorov-Smirnov criterion and graphically with Q-Q plots. The Kruskal-Wallis and Mann-Whitney U test were used to evaluate the correlation between the scale scores and patients' characteristics. T-test and Pearson correlation coefficient were used to estimate correlations between variables. Internal consistency for the questionnaire was evaluated with Cronbach's alpha indexes. Values ≥0.7 were indicative of good internal consistency of the items. The observed significance level of 5% was considered statistically significant. All statistical analyses were performed with the IBM Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA), version 22.0.

39.3 Results

The majority of our participants were men (65.0%), 51–60 years old (42.0%), married (54.0%), with higher education level (50.0%) and retired (29.0%) and received medical cannabis for neurological diseases (58.0%). Sociodemographic characteristics of the sample as well as characteristics more specifically related to cannabis use are presented in Table 39.1.

The majority of the participants reported that their family knew that they were taking medical cannabis (85.0%), considered their family environment as supportive (93.0%), concealed their receiving medical cannabis from their social environment (81.0%), and reported that there is insufficient information about the usefulness of medical cannabis in Greece (45.0%) (Table 39.2).

Table 39.3 shows that 96.0% of the respondents believed that their symptoms were reduced by receiving of medical cannabis, and the 95.0% would recommend it to other patients with the same health condition. The 79% of the sample noticed an improvement in sleep, the 95% weren't more aggressive; while the 68.0% of the participants felt more energetic and active but not prolonged feeling of euphoria (66.0%), not lethargy (90%), increased appetite (71.0%), no weight fluctuations (55.0%), better work performance (88.0%), after receiving medical cannabis. The 100% reported that medical cannabis changed their life for the better.

The mean value (Mean) and standard deviation (SD) of the dimensions of the SF-36 scale are shown in Table 39.4.

Tables 39.5 and 39.6 present that there has been a statistically significant difference (Sig = <0.05) between the dimensions of the SF-36 scale and the variables listed in the tables.

According to Table 39.7, there was a statistically significant correlation between age, educational level, and duration of receiving medical

Table 39.1 Sociodemographic and related to cannabis use characteristics of the sample (N = 100)

Sociodemographic characteristics		N	%
Gender	Male	65	65.0%
	Female	35	35.0%
	Total	100	100.0%
Age in years	30–45	6	6.0%
	41–50	32	32.0%
	51–60	42	42.0%
	61–70	12	12.0%
	71–80	7	7.0%
	<30	1	1.0%
	Total	100	100.0%
Marital status	Married	54	54.0%
	Single	5	5.0%
	Divorced/separated	24	24.0%
	Widowed	13	13.0%
	Cohabitation	4	4.0%
	Total	100	100.0%
Education	Primary school	1	1.0%
	Secondary education	38	38.0%
	University education	50	50.0%
	MSc – PhD degree	11	11.0%
	Total	100	100.0%
Occupation	Civil servant	16	16.0%
	Private sector employee	26	26.0%
	Freelancer	27	27.0%
	Household	2	2.0%
	Pensioner	29	29.0%
	Total	100	100.0%
Disease type	Neurological disorders	58	58.0%
	Pathological disorders	27	27.0%
	Surgical disorders	15	15.0%
	Total	100	100.0%
Duration (in months) of receiving medical cannabis	1–3	4	4.0%
	3–6	22	22.0%
	6–12	15	15.0%
	>12 months	59	59.0%
	Total	100	100.0%

Table 39.2 Perceptions of the sample related to medical cannabis use and social environment in Greece

Perceptions of the sample related to social environment		**N**	**%**
Does your family know that you are receiving medical cannabis?	Yes	85	85.0%
	No	15	15.0%
	Total	100	100.0%
Does your family support you?	Yes	93	93.0%
	No	7	7.0%
	Total	100	100.0%
Do you hide your receiving of medical cannabis from your social environment?	Yes	81	81.0%
	No	19	19.0%
	Total	100	100.0%
Perceptions of the sample related to medical cannabis use		**N**	**%**
Is it difficult to get medical cannabis in Greece?	Yes	31	31.0%
	No	69	69.0%
	Total	100	100.0%
Would you like medical cannabis to be prescribed like all other drugs?	Yes	100	100.0%
	Total	100	100.0%
Do you think that there is insufficient information about the usefulness of medical cannabis in Greece?	Yes	45	45.0%
	No	55	55.0%
	Total	100	100.0%
Is medical cannabis more economical than common drugs?	Yes	17	17.0%
	No	83	83.0%
	Total	100	100.0%

cannabis with the reported dimensions of the SF-36 scale

39.4 Discussion

The majority of our patients (58%) received medical cannabis to treat their neurological disorders, which is compatible with other studies [3, 7], and the 96% of the respondents reported decrease in their symptoms; while the 100% believed that medical cannabis had changed their lives for the better and that they would like to be able to prescribe this treatment as any other medication. Medical cannabis has contributed to improving patients' quality of life [8–10]. The majority of the participants (79%) have noticed an improvement in sleep after receiving medical cannabis. Study participants, who reported more physical pain, worse general health, and greater limitation in their daily activities, experienced a statistically significant improvement in their sleep after taking medical cannabis. This finding is consistent with other studies that found an improvement in sleep quality 6-12 months after starting treatment with medical cannabis. Treating insomnia and enhancing relaxation were among the most common reasons for taking medical cannabis [11]. The 71% of the participants noted an increased appetite after treatment and 45% had gained weight; while 45% had experienced weight fluctuations. The use of medical cannabis has improved decreased appetite and weight loss in patients [12, 13]. The fluctuations in the patients' weight seem to be related to poor mental health status and restricted physical functionality. Our participants who reported better psychological state, less pain, and less restrictions of their daily activities had no weight fluctuations. Changes in people's mood are associated with weight fluctuations, while better psychological mood is associated with maintaining a stable body weight [14]. The 95% of the participants reported no aggressiveness after receiving medical cannabis. Especially, participants, who reported better psychological state and less reduction in activities, reported statistically significant less aggressiveness. These results are similar with Lavie-Ajayi and Shvartzman's [15] qualitative study, in which the patients also seemed to be calmer and have improved functionality.

Considering the mean values of the subscales of the SF-36 total scale, our participants exhibited very few restrictions in activities due to emotional difficulties, a moderate general health status as well as moderate vitality and energy. 68% of our participants reported high rates of energy after receiving medical cannabis, which is compatible with the results of Bradford and Bradford [16]. Participants, who reported a longer period of receiving medical cannabis, reported statistically significant more energy and vitality, but also better mental and general health status. Pedersen and Sandberg [17] concluded that the longer the patients used medical cannabis, the better their quality of life was, and mainly without any disease related pain. The symptoms of the disease have been reduced due to medical cannabis treatment, resulting in a better physical,

Table 39.3 Participants' health-related outcome after receiving medical cannabis

Health-related outcome after receiving medical cannabis		N	%
Have your symptoms been reduced by receiving medical cannabis?	Yes	96	96.0%
	No	1	1.0%
	Don't know yet	3	3.0%
	Total	100	100.0%
Would you recommend cannabis to patients with the same health condition;	Yes	95	95.0%
	Not sure	5	5.0%
	Total	100	100.0%
Have you noticed an improvement in sleep after receiving medical cannabis?	Yes	79	79.0%
	No	21	21.0%
	Total	100	100.0%
Have you noticed becoming more aggressive after receiving medical cannabis?	Yes	5	5.0%
	No	95	95.0%
	Total	100	100.0%
Have you noticed feeling more energetic and active after receiving medical cannabis?	Yes	68	68.0%
	No	32	32.0%
	Total	100	100.0%
Have you felt a prolonged feeling of euphoria after receiving medical cannabis?	Yes	34	34.0%
	No	66	66.0%
	Total	100	100.0%
Have you felt lethargic after receiving medical cannabis?	Yes	10	10.0%
	No	90	90.0%
	Total	100	100.0%
Did you have an increased appetite after receiving medical cannabis?	Yes	71	71.0%
	No	29	29.0%
	Total	100	100.0%
Did you have weight fluctuations?	Yes	45	45.0%
	No	55	55.0%
	Total	100	100.0%
Had medical cannabis changed your life for the better?	Yes	100	100.0%
	Total	100	100.0%
Could you perform your professional duties by receiving medical cannabis?	Yes	88	88.0%
	No	12	12.0%
	Total	100	100.0%

Table 39.4 Mean and standard deviation (SD) of SF-36 scale

	Min	Mean	SD	Max
Physical functioning (SF36-PF)	10.00	76.40	23.17	100.00
Physical role (SF36-RP)	0.00	71.08	35.95	100.00
Emotional role (SF36-RE)	0.00	82.00	22.43	100.00
Vitality (SF36-VT)	20.00	46.30	9.79	75.00
Mental health (SF36-MH)	36.00	63.28	8.76	88.00
Social functioning (SF-SF36)	37.50	56.63	17.27	87.50
Bodily pain (BP-SF36)	25.00	75.00	16.76	100.00
General health (GH-SF36)	12.50	44.63	12.53	75.00
Physical health summary component (PCS-SF36)	25.42	66.78	16.29	90.63
Mental health summary component (MCS-SF36)	35.50	62.05	7.30	78.63

Table 39.5 Correlation between SF-36 scale and variables regarding perceptions of the sample related to medical cannabis use and social environment in Greece

Variables			N	Mean	SD	*t*	df	Sig.
Gender	Social functioning (SF-SF36)	Male	65	52.9	13.8	−3.076	98	0.003
		Female	35	63.6	20.9			
Does your family know that you are receiving medical cannabis?	Emotional role (SF36-RE)	Yes	85	85.1	18.9	3.465	98	0.001
		No	15	64.4	32.0			
	Vitality (SF36-VT)	Yes	85	47.6	9.4	3.285	98	0.001
		No	15	39.0	8.9			
	Mental health summary component (MCS-SF36)	Yes	85	63.5	6.0	5.120	98	0.000
		No	15	54.1	8.8			
Does your family support you?	Mental health (SF36-MH)	Yes	93	62.8	8.6	−2.238	98	0.027
		No	7	70.3	8.9			
Do you hide your receiving of medical cannabis from your social environment?	Physical functioning (SF36-PF)	Yes	81	73.9	24.2	−2.288	98	0.024
		No	19	87.1	14.0			
	Physical role (SF36-RP)	Yes	81	67.1	37.2	−2.352	98	0.021
		No	19	88.2	24.1			
	Social functioning (SF-SF36)	Yes	81	59.1	17.5	3.091	98	0.003
		No	19	46.1	11.8			
	Bodily pain (BP-SF36)	Yes	81	73.1	17.4	−2.332	98	0.022
		No	19	82.9	11.2			
	General health (GH-SF36)	Yes	81	42.6	11.4	−3.440	98	0.001
		No	19	53.1	13.7			
	Physical health summary component (PCS-SF36)	Yes	81	64.2	16.2	−3.458	98	0.001
		No	19	77.8	11.8			
Is it difficult to get medical cannabis in Greece?	Social functioning (SF-SF36)	Yes	31	49.6	8.8	−2.823	98	0.006
		No	69	59.8	19.2			
	General health (GH-SF36)	Yes	31	49.2	14.7	2.509	98	0.014
		No	69	42.6	10.9			
	Mental health summary component (MCS-SF36)	Yes	31	58.7	8.5	−3.237	98	0.002
		No	69	63.6	6.2			

(continued)

Table 39.5 (continued)

Variables			N	Mean	SD	*t*	df	Sig.
Do you think that there is insufficient information about the usefulness of medical cannabis in Greece?	Physical functioning (SF36-PF)	Yes	45	82.0	17.1	2.226	98	0.028
		No	55	71.8	26.5			
	Vitality (SF36-VT)	Yes	45	42.2	11.1	−4.052	98	0.000
		No	55	49.6	7.1			
	Mental health summary component (MCS-SF36)	Yes	45	59.9	7.7	−2.744	98	0.007
		No	55	63.8	6.5			
Is medical cannabis more economical than common drugs?	Physical functioning (SF36-PF)	Yes	17	89.1	20.3	2.552	98	0.012
		No	83	73.8	23.0			
	Physical role (SF36-RP)	Yes	17	89.7	29.4	2.400	98	0.018
		No	83	67.3	36.1			
	Emotional role (SF36-RE)	Yes	17	92.2	25.1	2.083	98	0.040
		No	83	79.9	21.4			
	General health (GH-SF36)	Yes	17	51.2	11.1	2.444	98	0.016
		No	83	43.3	12.4			
	Physical health summary component (PCS-SF36)	Yes	17	75.5	9.6	2.495	98	0.014
		No	83	65.0	16.8			

Table 39.6 Correlations between SF-36 scale and variables related to participants' health-related outcome after receiving medical cannabis

Variables			N	Mean	SD	*t*	df	Sig.
Have you noticed an improvement in sleep after receiving medical cannabis?	Physical functioning (SF36-PF)	Yes	79	73.2	24.0	−2.787	98	0.006
		No	21	88.5	14.4			
	Physical role (SF36-RP)	Yes	79	65.3	36.7	−3.272	98	0.001
		No	21	92.9	22.6			
	Emotional role (SF36-RE)	Yes	79	78.9	21.5	−2.766	98	0.007
		No	21	93.7	22.7			
	Bodily pain (BP-SF36)	Yes	79	77.5	16.4	3.050	98	0.003
		No	21	65.5	14.7			
	Physical health summary component (PCS-SF36)	Yes	79	64.9	16.9	−2.258	98	0.026
		No	21	73.8	11,7			
Have you noticed becoming more aggressive after receiving medical cannabis?	Emotional role (SF36-RE)	Yes	5	40.0	43.5	−4.738	98	0.000
		No	95	84.2	18.7			
	Mental health summary component (MCS-SF36)	Yes	5	51.4	12.7	−3.538	98	0.001
		No	95	62.6	6.5			
Have you noticed feeling more energetic and active after receiving medical cannabis?	Physical functioning (SF36-PF)	Yes	68	72.3	25.2	−2.659	98	0.009
		No	32	85.1	15.1			
	Vitality (SF36-VT)	Yes	68	49.9	9.1	6.218	98	0.000
		No	32	38.8	6.5			
	Social functioning (SF-SF36)	Yes	68	59.4	18.9	2.375	98	0.019
		No	32	50.8	11.4			
	Bodily pain (BP-SF36)	Yes	68	79.6	13.1	4.342	98	0.000
		No	32	65.2	19.5			
	Mental health summary component (MCS-SF36)	Yes	68	63.1	7.1	2.187	98	0.031
		No	32	59.8	7.3			

(continued)

Table 39.6 (continued)

Variables			N	Mean	SD	*t*	df	Sig.
Have you felt a prolonged feeling of euphoria after receiving medical cannabis?	Physical functioning (SF36-PF)	Yes	34	62.0	32.7	−4.948	98	0.000
		No	66	83.8	10.6			
	Physical role (SF36-RP)	Yes	34	51.5	40.3	−4.237	98	0.000
		No	66	81.2	29.0			
	Emotional role (SF36-RE)	Yes	34	75.5	29.9	−2.119	98	0.037
		No	66	85.4	16.7			
	Mental health (SF36-MH)	Yes	34	66.1	9.5	2.379	98	0.019
		No	66	61.8	8.0			
	Physical health summary component (PCS-SF36)	Yes	34	57.3	21.4	−4.561	98	0.000
		No	66	71.6	10.0			
Have you felt lethargic after receiving medical cannabis?	General health (GH-SF36)	Yes	10	52.1	7.4	2.015	98	0.047
		No	90	43.8	12.7			
Did you have an increased appetite after receiving medical cannabis?	Mental health summary component (MCS-SF36)	Yes	71	60.9	7.6	−2.537	98	0.013
		No	29	64.9	5.7			
Did you have weight fluctuations?	Physical functioning (SF36-PF)	Yes	45	68.0	30.0	−3.474	98	0.001
		No	55	83.3	11.9			
	Physical role (SF36-RP)	Yes	45	61.5	39.0	−2.478	98	0.015
		No	55	78.9	31.5			
	Mental health (SF36-MH)	Yes	45	59.7	8.8	−3.919	98	0.000
		No	55	66.2	7.7			
	Bodily pain (BP-SF36)	Yes	45	69.2	19.7	−3.302	98	0.001
		No	55	79.8	12.1			

Could you perform your professional duties by receiving medical cannabis?	General health (GH-SF36)	Yes	45	41.1	9.7	−2.611	98	0.010
		No	55	47.5	13.9			
	Physical health summary component (PCS-SF36)	Yes	45	59.9	18.2	−4.095	98	0.000
		No	55	72.4	12.0			
	Emotional Role (SF36-RE)	Yes	88	84.8	19.5	3.646	98	0.000
		No	12	61.1	31.2			
	Vitality (SF36-VT)	Yes	88	47.6	9.3	3.885	98	0.000
		No	12	36.7	7.8			
	General Health (GH-SF36)	Yes	88	45.9	12.4	2.923	98	0.004
		No	12	35.1	9.5			
	Mental Health Summary Component (MCS-SF36)	Yes	88	63.4	6.2	5.623	98	0.000
		No	12	52.3	7.7			

Table 39.7 Correlation between SF-36 scale and study variables

SF-36 subscales/dimensions		**Age**
Physical functioning (SF36-PF)	Correlation coefficient	−0.238*
	Sig.	**0.017**
	N	100
General health (GH-SF36)	Correlation coefficient	−0.312**
	Sig.	**0.002**
	N	100
SF-36 subscales/dimensions		**Educational level**
Social functioning (SR-SF36)	Correlation coefficient	0.205*
	Sig.	**0.041**
	N	100
General health (GH-SF36)	Correlation coefficient	−0.224*
	Sig.	**0.025**
	N	100
Mental health summary component (MCS-SF36)	Correlation coefficient	0.282**
	Sig.	**0.004**
	N	100
SF-36 subscales/dimensions		**Duration of receiving medical cannabis**
Vitality (SF36-VT)	Correlation coefficient	0.486**
	Sig.	**0.000**
	N	100
Mental health (SF36-MH)	Correlation coefficient	0.460**
	Sig.	**0.000**
	N	100
General health (GH-SF36)	Correlation coefficient	0.322**
	Sig.	**0.001**
	N	100
Mental health summary component (MCS-SF36)	Correlation coefficient	0.382**
	Sig.	**0.000**
	N	100

* $p < 0.05$
** $p < 0.01$

emotional and mental state of patients and an improvement in their quality of life.

Participants who reported more physical pain experienced statistically significant more weight gain and less vitality. On the contrary, participants who reported less physical pain had statistically significant better sleep quality, more energy and vitality and more stable body weight. Participants, who maintained a good quality of sleep and did not have fluctuations in their weight, showed a statistically significant better level of physical health. Improvements in pain appeared to be associated with positive effects on parameters affecting patients' quality of life, according to the SF-36 scale. For people living with chronic conditions, symptoms that affect health-related quality of life, such as pain, insomnia, loss of appetite, often interact and reinforce each other. Chronic daily pain affects mental and physical health and consequently negatively affects quality of life. There is evidence that medical cannabis may be effective in improving such symptoms and improving health-related quality of life [18–21].

The majority (65%) of the sample, receiving medical cannabis, were male. This finding is consistent with other results [22], although the number of women using cannabis seems to be increasing [23]. Women adopt complementary or alternative therapies more often than men [24] and could possibly perceive cannabis use as more harmful and/or prefer other alternative or complementary therapies for their condition [25]. Men exhibited statistically significant more limitations in their social activities due to psychosomatic problems compared to women. Women were more likely to seek help [26], or adopt preventive behaviors than men [27]. As a result, it is possible that women have faced their psychosomatic problems earlier than men, before those problems become so serious that prevent women from their social activities.

In the present study, the majority (61%) receiving medical cannabis were highly educated. The result is in line with Konstantopoulos [28] and Cortellini et al [29]. Patients with a high level of education are more likely to request and receive appropriate and well-documented information about the use of medical cannabis, resulting in acquiring more adequate knowledge on this subject compared to patients with a low educational level. This could be a possible explanation for the fact that participants with a higher educational level showed statistically significant better mental health, greater sense of calmness and happiness, and greater engagement in social activities, while they experienced a worse general health status. The positive association between high educational level and better mental health and social functioning could be attributed to more effective strategies of managing stress and disease complications by the specific patients. Greater knowledge may contribute to an improved sense of control over the situation, which may help patients accept changes more positively and become more easily adaptive [29].

Older participants showed statistically significant worse general health status and more limitations in their daily activities. Pain management was a very common reason for taking medical cannabis in the older population [30, 31]. Given the increased number of medications commonly taken by the elderly for multiple health problems, there is a need to investigate the mechanisms of interaction of medical cannabis with other drugs [30].

Furthermore, the majority of patients have disclosed medical cannabis use to their family members (85%) and enjoyed their support (93%). Family remains the main source of care and support in Greek society. Communication with family members contribute to patients' better mental health status. As a result, patients whose family knew about them using medical cannabis reported statistically significant more energy, vitality and better mood compared to patients whose family didn't know [32].

However, 81% of our patients haven't revealed their medication treatment to their social environment. Similar results have been also reported by Satterlund et al [33]. Approximately 80% concealed they were receiving medical cannabis due to stigma related either to the use of medical cannabis or the underlying disease [33]. Our participants who concealed their use of medical cannabis reported statistically significant more physical pain and worse general health status compared to those who did not conceal it. Non-disclosure of the condition, on the one hand, may protect individuals from social stigma, but, on the other hand, it is likely to increase their isolation from social environment. Our participants who concealed their use of cannabis had more limited social activities. Additionally, related literature referred that individuals who used medical cannabis were perceived as less competent in their workplace compared to individuals receiving traditional medication treatment [33]. At this point, it is worth noting that 88% of our sample answered that they could adequately perform in their workplace by taking medical cannabis. Lahat, Lang, Ben-Horin [12] also reported that none of their patients complained of any side effect that interfered with their ability to work. In fact, there was a statistically significant improvement in patients' ability to work after treatment, possibly due to symptoms improvement.

Nearly half (45%) of the participants noted that they didn't receive sufficient information about the usefulness of medical cannabis. This finding is compatible with other studies [34–36]. At this point, it is worth noting that the legalization of medical cannabis use in Greece took place very recently, only in 2018, a fact that possibly affects the process of informing about the usefulness of medical cannabis. Despite this, most participants (69%) haven't reported much difficulty in procuring medical cannabis.

39.4.1 Limitations of the Study

The study sample (convenience sample) included members of the patients' association in favor of using medical cannabis. Thus, the findings cannot be generalized. An additional limitation is the absence of a control group as well as the use of self-report questionnaires. A future study could be extended to non-users of medical cannabis to investigate their quality of life, so that comparisons can be made between users and non-users of medical cannabis.

39.5 Conclusions

The use of research data regarding the quality of life of patients receiving medical cannabis contributes to the understanding of its therapeutic properties and safety. Cannabis use for therapeutic purposes has been stigmatized, even after its legalization in many countries. Appropriate knowledge could significantly help health professionals in the field of planning and implementation of personalized nursing care in order to achieve optimal therapeutic outcomes and ensure the best possible patients' quality of life.

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Self-Care and Compliance with Medication and Their Relationship to the Quality of Life of Patients with Heart Failure

Malliarou Maria, Kokoi Panagiota,
Tzenetidis Vasileios, Papathanasiou Iokasti,
Georgios Tsioumanis, Tzenetidis Nikolaos,
Apostolidi Nikoletta, Bouletis Axilleas,
Apostolakis Ioannis, and Sarafis Pavlos

Abstract

Introduction Heart failure is a major health problem, often accompanied by limited physical activity and severe effects in various areas of patient quality of life. Self-care, as well as compliance with medication, can further contribute to clinical stability and improved patient outcomes.

Purpose The purpose of this chapter is to assess the effect of self-care and compliance with medication, on the quality of life of patients with heart failure.

Method The research sample consisted of 67 patients diagnosed with heart failure who visited the cardiology outpatient clinic of a general hospital in the capital of Greece. The assessment of self-care behavior was performed by the scale EHFScBS and SCHFI v.6, the Morsiky Green Levine Adherence Scale (MAQ) was used for the evaluation of adherence to medical treatment, while for the evaluation of the quality of life the questionnaire MLWHFQ was used.

Results The multifactorial linear regression analysis showed that age, compliance with medication and scoring in the dimension “Self-care confidence” relates independently to the overall quality-of-life scale rating. In particular, participants over 80 had a significantly higher score, that is, worse quality of life, compared to those under the age of 70 ($p < 0.001$), while participants with low compliance with treatment had a significantly worse quality of life compared to participants with high compliance ($p < 0.001$). It has been noticed that the better self-care they had and the higher compliance with their medication, their quality of life was better.

All the authors have contributed equally to this chapter.

M. Maria (✉) · T. Vasileios (✉) · P. Iokasti
Department of Nursing, Laboratory of Education and Research of Trauma Care and Patient Safety, University of Thessaly, Larissa, Greece
e-mail: malliarou@uth.gr

K. Panagiota · A. Ioannis
Hellenic Open University, Patras, Greece

G. Tsioumanis
Department of Nursing, University of Thessaly, Larissa, Greece

T. Nikolaos
Department of Nursing, Kapodistrian University, Athens, Greece

A. Nikoletta · B. Axilleas
General University Hospital of Larissa, Larissa, Greece

S. Pavlos
University of Thessaly, Larissa, Greece

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Conclusion Self-care behavior and adherence to medical treatment of patients with heart failure are related to their quality of life. Age, educational level, and “Self-care confidence” are factors that influence self-care behavior, compliance with medication, and quality of life. In-depth patient information on the need for adherence to therapeutic guidelines may help to reduce pharmaceutical costs and maximize the therapeutic effect. For this reason, health professionals treating these patients should take into account all the factors that negatively affect their quality of life and treat them with the appropriate interventions.

Keywords

Heart failure · Quality of life · MLHFQ · Self-care · EHFScBS and SCHFI v.6

40.1 Introduction

Heart failure (HF) can be defined as a complex clinical syndrome, due to the heart failure as a blood pump to carry oxygen to the periphery, considering the requirements of peripheral tissues. Typical symptoms of heart failure are easy fatigue, shortness of breath, and fluid retention, but they do not necessarily coexist in the clinical setting [1].

Its frequency has been steadily increasing in recent years in the western world. The higher the number of patients currently surviving a heart attack combined with the increase in life expectancy, and the more effective treatments for the disease contribute to the overall increase in life expectancy in patients with heart failure [2].

The disease has a poor prognosis with a high mortality rate (30–40% of patients diagnosed with heart failure die within a year) but also affects their health and their quality of life. Heart failure is a chronic condition without definitive treatment. It usually worsens over time, although with appropriate treatment (medication, lifestyle changes) it is possible to reduce symptoms and slow the progression of the disease [3].

In recent decades, patients’ adherence to treatment has been a key factor in reducing or even preventing the complications of this clinical syndrome with positive effects on their quality of life.

Research has shown that failure to adhere to treatment leads to poor clinical outcomes, recurrent hospitalizations, complications, worsening of the disease, increased costs of health care, and even death [4–8].

The nature and duration of the disease require the development of patients’ ability to take care of themselves to monitor and manage signs and symptoms of deregulation (sudden weight gain, edema, etc.) and to modify present behaviors or to apply new ones to improve their health and prevent complications [9].

Enhancing patients’ self-care is an issue to improve their prognosis and quality of life. The purpose of this study is to investigate the effect of self-care and compliance on medication in patients with CA at the level of their quality of life. The current and projected incidence of chronic diseases and especially heart failure, means that there is a need to change the way services are provided. In recognition of this need, there is a growing focus on redesigning health care systems and appropriate patient care and support services to improve their quality of life [10].

Chronic diseases, especially those that significantly affect patients’ ability to function, such as heart failure, involve many physical and psychosocial changes, including lifestyle, which often trigger mental disorders such as anxiety and depression.

The treatment of heart failure aims at relieving the symptoms and improving the functionality in the daily life of the patients, in order to achieve the highest level in their quality of life, within the specific limitations imposed by the disease.

Patients with chronic disease become personally responsible for their own day-to-day care and are often better placed by health professionals to assess the severity of their symptoms, the effectiveness of treatment, and the necessary behavioral adjustments to reduce risk factors. Research has shown that proper self-care is associated with the prevention or early detection of health problems, better overall health and quality of life in patients with chronic diseases such as heart failure with improved clinical outcomes and reduced health care costs. Unfortunately, self-care among patients with heart failure is usually poor and patients have significant difficulties in self-care [11].

Nowadays, the active participation of patients in treatment is enhanced through detailed information and effective education. However, this requires an assessment of patients' abilities and learning abilities and feedback [9].

40.2 The Effect of Self-Care on the Quality of Life of Patients with Heart Failure

Self-care as a complex and multifaceted phenomenon requires a comprehensive examination of patients, investigation of their learning abilities, consideration of their psychological status, cultural influences, and comorbidity [12].

A non-experimental correlational study by Rockwell and Riegel (2001) [13] analyzed the prognostic factors of self-care in people with heart failure. According to the authors, the severity of symptoms, comorbidity, social support, level of education, age, socioeconomic status, and gender are factors in predicting the self-care of heart failure.

It turned out that only two of the variables examined had a strong effect on self-care factors, education level, and comorbidity. Patients with higher education were associated with compliance and healthy behavior therapy. However, they recognized that a person with a lower level of education can learn self-care, but it takes more time to learn the process. Patients with severe symptoms were found to have high self-care scores. Having experienced frequent outbreaks, these patients became specialists in recognizing severe symptoms and took an active part in self-care. In contrast, people with mild symptoms may have difficulty recognizing the symptoms and understanding the purpose of self-care.

The reviews by Jaasma et al. summarize the recent literature on self-care-related factors. Factors cited in this theory include experience and skills, motivation, habits, cultural beliefs and values, functional and cognitive abilities, trust, support, and access to care [12, 14].

Compliance is the behavior of the patient, which meets the requirements of care. This term refers to the degree to which a person's behavior in relation to medication is accompanied by a change in lifestyle and diet, which coincides with medical advice.

Compliance is a widely accepted term in the medical literature and implies obedience to the doctor's requirements by reflecting a paternalistic attitude. A better term is adherence but it remains critical. It is defined as "the agreement between doctor and patient and indicates an active process in which the patient is informed, participates in the decision-making process and consciously follows the established treatment" [15].

Low levels of compliance with the recommended treatment are a serious problem in clinical practice. In addition, the result of a negative clinical outcome as a result of low levels of compliance has a significant financial impact. About 23% of inpatient care and 10% of inpatient care in Europe and the United States are the result of low levels of compliance with medication and physician requirements. Annual expenditure on the consequences of non-compliance is estimated at hundreds of billions of euros. Estimates of hospitalization costs due to lack of compliance with medication are very high [16].

40.2.1 Aim of the Study

This study attempts to investigate the relationship between self-care and medication compliance in patients with heart failure with their quality of life.

In particular, its purpose is to investigate the degree of influence of self-care factors and adherence to pharmacotherapy at the level of their quality of life.

So, the research questions of the present research are:

Whether patients with HF who comply with the medication have a higher quality of life compared to patients who do not comply.

Whether patients with HF with self-care behaviors have a higher quality of life than patients who do not take care of themselves.

What other factors can affect their self-care behaviors, compliance with medication and consequently their quality of life.

40.2.2 Questionnaire

For the needs of the research, the questionnaire distributed to the patients is divided into five categories. The first includes questions related to patients' social and demographic characteristics as well as clinical data. The second includes the Greek version of the questionnaire for quality of life (MLHFQ). The third and fourth categories concern the measurement of self-care through the heart failure self-care index (SCHFI v.6) and the European Heart Failure Self-Care Scale (EHFScBS). Finally, the Morisky Green Levine Adherence Scale (MAQ).

40.2.3 Minnesota Living with Heart Failure Questionnaire (MLHFQ)

The MLHF questionnaire was designed to measure the effects of HF on the individual's quality of life. It consists of 21 questions which include two subscales, the emotional and the physical. Questions include issues such as lower extremity edema, sexual activity, hospital stay, costs and side effects of medication, and restrictions on work and leisure [17].

The total score of the scale is calculated by summarizing all the data, with the lowest score being 0 and the highest being 105. The highest score reflects on the worst quality of life. The MLHFQ includes the physical, emotional, social, and mental dimensions. Although the MLHFQ incorporates the relevant aspects of the key dimensions of quality of life, the questionnaire was not designed to measure any particular dimension separately. The overall score should be taken as the best measure of how heart failure and therapies affect quality of life [17]. The Greek version of the tool was provided by the company MAPI research which owns the copyright translation of the tool, and has been validated in the Greek Cypriot population with HF [18].

40.2.4 European Heart Failure Self-Care Behavior Scale (EHFScBS)

This tool is about self-care with a focus mainly on self-preservation. It is the European Heart Failure Self-Care Behavior Scale (EHFScBS), created in 2003 by Dutch and Swedish researchers [15]. It includes nine questions with a five-point Likert scale (from strongly agree to strongly disagree), which takes 5–10 min to complete and found Cronbach's alpha for a total of 0.81. The total score is calculated as the sum of the scores for each question and ranges from 9 to 45 with the highest scores showing poorer self-care behaviors. In addition to the total score, only the "consulting behaviors" sub-scale of the revised 9-item scale can be used separately.

Recently Vellone et al. proposed a revised standard score of 0–100 for the EHFScBS-9 to make the score easier to interpret and comparable to the Heart Failure Scale (SCHFI) [19].

The EHFScBS scale is used to examine three different theoretical aspects of self-care behaviors: adherence to education, seeking help and adopting self-care behaviors and was originally developed in Dutch. The questionnaire consisted of 12 topics, but was later revised to nine (EHFScBS-9), which exhibited more satisfactory psychometric properties. Data samples used in Sweden, the Netherlands, the United Kingdom, Italy, Germany and Spain showed that the 9-item EHFScBs scale has the ability to generate valid and reliable data. The reliability and validity of the Greek version of EHFScBS (Gr9-EHFScBS) have been checked [20].

40.2.5 SCHFI v.6

This scale originated in America was first published in 2000 and has since been reviewed and revised twice [21].

Its original complex structure with 65 questions has been transformed into a 15-question questionnaire, completed by the patient in 5–10 min, which are divided into three subscales. The first is related to self-preservation, the second to self-management, and the third to self-confidence. It is a tool for measuring self-preservation that is defined as a normal decision-making process that includes the selection of behaviors that maintain normal stability (maintenance) and response to symptoms when they occur [22].

This tool uses a Likert scale to self-report CA self-management success [21]. Numerical values range from 1 to 4, depending on the frequency of self-service maintenance activities.

40.2.6 Morisky Green Levine Adherence Scale (MAQ)

Morisky, Green, and Levine (1986) developed the Drug Adhesion Questionnaire (MAQ) to measure drug adherence for the treatment of hypertension, and the psychometric properties of this scale appeared to be sufficient in their initial study [23]. It is a four-item scale with a yes-no answer form.

The above researchers showed that the MAQ had good predictive power, as individuals who scored in the high-adhesion area had significantly better therapeutic outcomes than those who scored in the low-adhesion range as measured by the MAQ.

40.2.7 Sample and Data Collection

The research was carried out at the Outpatient Cardiology Clinics (Heart Failure Clinic) of a General Hospital in the capital of Greece.

The research was approved by the Scientific Council of the Hospital. The completion of the study questionnaires was done by the method of personal interview by the researcher. The sample of the study consisted of 67 patients with heart failure, who visited the Heart Failure Clinic of the Hospital. The sampling method was convenience sampling. The patients gave their oral consent for their participation in the research, after being informed about the purpose of the research and after an assurance for the observance of anonymity and that their personal data will not be made public in any way. In addition, patients were informed that their participation was voluntary and that they could withdraw from the study at any time. The criteria for inclusion of patients in the study were to be able to communicate in Greek and to suffer from heart failure. Those suffering from dementia, alcoholism, or taking psychotropic drugs were excluded.

40.2.8 Analysis

Mean values, standard deviations (SD), and median and interquartile range were used to describe the quantitative variables. Absolute (N) and relative (%) frequencies were used to describe the qualitative variables. Student's t-test was used to compare quantitative variables between two groups. Parametric dispersion analysis (ANOVA) was used to compare quantitative variables between more than two groups. To check the type I error, due to the multiple comparisons, the Bonferroni correction was used according to which the significance level is 0.05 / k (k = number of comparisons). The Pearson correlation coefficient (r) was used to control the relationship between two quantitative variables. The correlation is considered low when the correlation coefficient (r) ranges from 0.1 to 0.3, moderate when the correlation coefficient ranges from 0.31 to 0.5, and high when the coefficient is greater than 0.5. Linear regression analysis with the stepwise integration / subtraction process was used to find independent factors related to the various scales from which dependence coefficients and their standard errors (standard errors = SE) were derived). The significance levels are bilateral and the statistical significance was set at 0.05. The statistical package SPSS22.0 was used for the analysis.

40.3 Results

The sample consists of 67 people. Table 40.1 gives the demographic data of the participants. 68.2% of the participants were men. Also, 55.2% were between 71 and 80 years old. The average body mass index (BMI) of the participants was 28.5 points (SD = 2.6 points) and 80.6% of participants were overweight. 68.7% of the participants were married and 55.2% were primary school graduates. Still, 25.4% of the participants were private employees and 23.9% were unemployed. About 43.3% of participants had low compliance with the treatment, 26.9% had medium and 29.9% had high.

Table 40.1 Demographic data of the participants

		N	(%)
Gender	Men	45	(68.2)
	Women	21	(31.8)
Age	41–50	3	(4.5)
	51–60	5	(7.5)
	61–70	10	(14.9)
	71–80	37	(55.2)
	>80	12	(17.9)
BMI, mean (SD)		28.5 (2.6)	
BMI	Normal weight	4	(6.0)
	Overweight	54	(80.6)
	Obesity	9 (13.4)	
Marital status	Married	46	(68.7)
	Single	3	(4.5)
	Divorced	6	(9.0)
	Widow	12	(17.9)
Educational level	Elementary school	37	(55.2)
	High school	11	(16.4)
	Senior high school	15	(22.4)
	University	4	(6.0)
Occupation	Unemployed	16	(23.9)
	Civil servants	12	(17.9)
	Private servants	17	(25.4)
	Trained craftsmen (furniture makers, drivers, etc.)	10	(14.9)
	Partially trained (farmers, etc.)	4	(6.0)
	Unskilled (unskilled workers, etc.)	8 (11.9)	
Morisky Green Levine Adherence Scale	Low	29	(43.3)
	Medium	18	(26.9)
	High	20	(29.9)

40.3.1 Minnesota Living with Heart Failure Questionnaire

Table 40.2 gives the participants' scores on the dimensions of the quality-of-life scale.

Higher prices indicate a worse quality-of-life.

The score in the physical subscale ranged from 5 to 31 points, with an average value of 16.63 points (SD=6.38 points) while the score in the emotional scale ranged from 2 to 19 points, with an average value of 9.81 points (SD=4.29 points). The total score of MLHFQ ranged from 11 to 63 points, with an average value of 34.29 points (SD=12.54 points).

Table 40.2 Scores of participants in the dimensions of the quality-of-life scale

	Min	Max	Mean	SD
Physical subscale	5.00	31.00	16.63	6.38
Emotional subscale	2.00	19.00	9.81	4.29
MLHFQ total score	11.00	63.00	34.29	12.54

Table 40.3 below gives the overall score of the participants in the quality-of-life scale according to their demographics and their compliance with the treatment.

The overall score was found to differ significantly depending on the age of the participants. Specifically, after the Bonferroni correction, participants over the age of 80 were found to have a significantly higher score, that is, worse quality of life, compared to both participants who were under the age of 70 ($p < 0.001$) and those who were 7180 years ($p = 0.006$). Also, participants who were 71–80 years old had a significantly higher score, that is, worse quality of life, compared to participants who were under 70 years old ($p = 0.032$). Also, elementary/high school graduates had significantly worse quality of life compared to high school graduates and university graduates. Manual workers had a significantly

Table 40.3 Overall score of the participants in the quality-of-life scale according to their demographic data and their compliance with the treatment

		MLHFQ		*P*
		Total score		
		Mean	SD	Student's t-test
Gender	Men	33.45	11.94	0.304
	Women	37.11	13.47	
Age	<=70	25.07	9.97	**<0.001***
	71–80	34.03	11.44	
	>80	45.75	8.89	
Obese	No	33.56	12.21	0.226
	Yes	39.71	14.61	
Married	No	35.47	15.76	0.649
	Yes	33.81	11.16	
Educational level	Elementary/high school	37.00	12.56	**0.004**
	Senior high school/ University	26.33	8.72	**0.027***
Occupation	Unemployed	37.50	14.79	
	Civil/private servants	29.08	12.09	
	Trained craftsmen	38.10	9.51	
Morisky Green	Low	43.00	9.19	**<0.001***
Levine	Medium	30.53	12.53	
Adherence	High	24.13	6.48	

Table 40.4 Pearson correlation coefficients of the overall score with the BMI and the participants' self-care scales SCHFI v.6 and EHFScBs

		MLHFQ
		Total score
BMI	r	0.20
SCHFI v.6-self-care preservation	P	0.132
	r	−0.64
	P	**<0.001**
SCHFI v.6-self-care management	r	−0.51
SCHFI v.6-self-care confidence	P	**<0.001**
	r	−0.59
EHFScBs	P	**<0.001**
	r	−0.63
	P	**<0.001**

worse quality of life compared to public /private employees ($p = 0.044$). In addition, participants with low adherence to treatment had significantly worse quality of life compared with participants with moderate adherence ($p < 0.001$) and participants with high adherence ($p < 0.001$).

Table 40.4 shows the Pearson correlation coefficients of the overall score with the BMI and the participants' self-care scales SCHFI v.6 and EHFScBs.

There were significant negative correlations of the overall score with all participants' self-care scales. Therefore, the higher the self-care of the participants, the lower their overall score, indicating a better quality of life. Subsequently, a multifactorial linear regression took place, with the overall quality of life score as a dependent variable and the demographics of the participants, their compliance with the treatment and the self-care scales as independent. The results of Table 40.5 were found by the stepwise method.

Age, adherence to treatment, and the "Self-care confidence" score were found to be independently related to the overall score. Specifically, participants who were under 70 years old had a score of 12.72 points lower, that is, better quality of life, compared to participants who were over 80 years old. Participants who were 71–80 years old had a score of 6.65 points lower compared to participants who were over 80 years old. Participants who had moderate compliance with the treatment had an 8.28-point lower score compared to participants who had low compliance. Participants who had high compliance with the treatment had a score of 8.67 points lower com-

Table 40.5 Multifactorial linear regression between overall quality-of-life score and demographics, compliance with treatment and participants' self-care scales

		β[a]	SE[b]	*P*
Age	>80 (reference.) <=70	−12.72	3.77	**0.001**
	71–80	−6.65	3.08	**0.035**
Morisky Green	Low (reference)			
Levine	Medium	−8.28	2.98	**0.008**
Adherence	High	−8.65	4.17	**0.043**
SCHFI v.6-self-care confidence		−0.15	0.07	**0.045**

[a]Dependency factor; [b]Standard rate error

pared to participants who had low compliance. As the score increased in the "Self-care confidence" dimension, their overall score decreased, indicating an improvement in their quality of life.

40.4 Discussion

The aim of this study was the effect of self-care and compliance on the medication of patients with heart failure in their quality of life, possible factors that have a positive or negative effect on them, as well as whether the two variables (self-care, compliance) are related to dimensions of health-related quality of life, physical (physical) and mental.

Age, educational level, adherence to education, and "confidence in self-care"were found to be more correlated with the quality of life of the participants. Particularly, the statistical analysis showed that 43.3% of the participants had low compliance with the treatment, 26.9% had moderate, and 29.9% had high.

Compliance levels are relatively good in relation to studies in other countries such as Palestine and Peru, which raise low compliance rates to 50–60% [1, 4] but lag behind other developed countries such as the USA and Canada show high compliance with treatment (74.8 and 77.4%, respectively).

Also, of the factors that affect patient compliance, only educational level was found to be positively correlated as high school graduates and university graduates were 4.21 times more likely to have high compliance with education compared to elementary/high school graduates.

Education level is one of the factors, which according to studies has shown to be potentially involved with compliance levels without always providing a correlation, because it cannot be a truly independent factor [24].

In terms of self-care, only the educational level was found to be significantly related to the participants' score in all three dimensions (maintenance, management and selfcare confidence). Specifically, high school graduates and university graduates had a higher score, that is, more self-care and confidence in their self-care compared to elementary/high school graduates. The same conclusion was reached by the study of Rockwell and Riegel (2001) [13]. The higher level of education helps patients to understand the tips and guidelines related to their behavior for self-care in order to gain sufficient experience and skill.

Especially in terms of self-care management, obese people had a lower score, that is, worse self-care management, compared to non-obese participants, while manual workers had a lower score compared to public and private employees.

According to this research, self-confidence seems to be an important factor influencing the self-care of heart failure, even in patients with cognitive impairment and contributing to better emotional health. Similarly, Polykandrioti et al. (2009), Spyraki et al. (2008), Franzen et al. (2007), and Yu et al. (2004) had concluded in the same results [7, 25–27]. This finding is also consistent with a recent study by Vellone et al. [16] in which self-confidence may be more important than knowledge to influence self-care behaviors in adults with heart failure. According to them, interventions aimed at trust should be considered as a way to improve self-preservation in this population.

According to the results of the study, most patients had a relatively stressful quality of life with a mean value on the MLHFQ scale of 34.29 ± 12.54 with a range of 0–105. Our findings also confirm those of Spiraki et al. [26] who found low quality of life in patients with heart failure.

There was a significant positive correlation between all dimensions of the quality-of-life scale. So, the better their physical health, the better their emotional health and overall quality of life. Similarly, the better their emotional health, the better their physical health and overall quality of life. Jaarsma et al. [15] found, however, only a correlation between self-care behavior and the psychosocial dimension of quality of life. Age, adherence to treatment, and self-esteem scores were found to be independently related to the physical (physical) dimension of quality of life.

Specifically, participants who were under 70 years old had better physical health than those who were over 80. The higher the compliance, the better the physical health of the participants. As the score in the "selfconfidence" dimension increased, so did their score in the physical dimension, indicating an improvement in their physical health.

Age and adherence to treatment were found to be independently related to the emotional dimension of quality of life. In particular: Participants who were under 70 years old had better emotional health compared to those who were over 80. Also, those who had moderate compliance with the treatment showed better emotional health, compared to participants who had low compliance.

In terms of age, from the analysis of the data of the present study, the largest percentage of the sample (55.2%) belonged to the age group 71–80, a finding that agrees with the literature, which claims that the prevalence of the disease increases with age [28]. This finding is probably due not only to the physical problems caused by the disease, but also to other problems accompanying this age, such as emotional problems resulting from social isolation and reduced activity [29]. These findings converge with the studies of Rustoen et al. [30], Gott et al. [10], Jaarsma et al. [14], according to which the older the age, the quality of life is most negatively affected.

The importance of social isolation in the age-quality relationship is also supported by the results of the study of Asadi-Lari et al. [2] where it was found that the worst quality of life due to greater social isolation was manifested by people aged <65 years.

Regarding the educational level, as shown by other researches, the high educational level has a positive correlation with the quality of life as patients with a higher educational level understand more easily the therapeutic requirements of their disease and finally enjoy a better standard of living [16]. Therefore, the low level of education not only seems to be related to compliance with treatment, but also to the high rate of readmissions to the hospital according to the conclusions of Rustoen et al. [30], Lee et al. [24].

The study found a significant correlation between self-care behavior and medication compliance and quality of life. It has been observed that the better the self-care behavior of patients with heart failure and the higher their compliance the better their overall quality of life.

Factors affecting self-care behaviors, medication compliance and, consequently, their quality of life were also identified. The health professionals who treat these patients must take into account all the factors that negatively affect the quality of life and treat them with appropriate interventions.

The importance of the study lies in the emergence of the nurse as the ideal health professional in promoting self-care. Findings from studies show that nursing interventions through the use of appropriate training programs have the potential to improve emotional health and subsequently the overall quality of life of patients with heart failure [31].

In addition, through the detailed information of the patient about the necessity of adherence to the treatment instructions, it was possible to reduce the pharmaceutical costs, maximize the therapeutic effect, and at the same time improve the quality of life of the patients.

Compliance with treatment is considered one of the most important health policy interventions, which contributes significantly to the improvement of health outcomes and the containment of consistent health expenditures. Inadequate or non-compliance with treatment leads to an increase in the use of health services and an increase in the cost of health care consequently.

40.5 Limitations of the Study

1. The main limitation of the present study is the small sample of patients as it affects the representativeness of our population and generalization of the results.
2. The time period in which the data were collected was also relatively short.
3. Heterogeneity of the sample in terms of stage, type and etiology of Heart Failure.
4. The sample of the study includes patients from the Outpatient clinic of a single General Public Hospital and not from other Hospitals (public or private) or private cardiology clinics. These patients are usually of lower socioeconomic status than those who have the opportunity to turn to private health care providers.
5. Sampling was performed at a single given time in the course of the disease and the research would be more thorough if patients were asked at other times.

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Investigating the Needs of Patients Suffering from Chronic Diseases: A Cross-Sectional Study

Aggeliki Katsarou, George Intas,
Evgenia Polydoropoulou, Charalambos Platis,
and George Pierrakos

Abstract

Introduction Chronic diseases represent a huge challenge for the health systems globally due to the rapidly increasing number of patients and their long-term need for healthcare. The purpose of this study was to investigate the needs of patients suffering from chronic diseases.

Methodology This is a cross-sectional study. The study population consisted of 840 adults with chronic diseases. The data collection was done with an improvised needs survey questionnaire, which included 56 questions. Statistical analyses were performed using IBM SPSS Statistics for Windows, v.25.0, statistical significance being considered at $p < 0.05$.

Results The main diseases of the patients were chronic renal failure (22.6%), multiple sclerosis (19%), cancer (19%), diabetes mellitus (7.1%), dementia (6%), and chronic obstructive pulmonary disease (6%). The majority of patients (82.1%) were sick for more than 24 months. Patients seek information from health professionals (4.07 ± 1.4), feel tired (4.05 ± 1.4), have to share their feelings with other family members (4.01 ± 1.4), feel anxious about the future (3.94 ± 1.3), and feel out of control (3.80 ± 1.5).

Conclusions Patients with chronic diseases suffer from numerous physical, mental, emotional, and cognitive problems. Paying attention to the unmet needs of patients could have beneficial effects on both patients and their caregivers.

Keywords

Patients · Chronic diseases · Needs · Long-term care networks

41.1 Introduction

According to the definition of the World Health Organization (WHO), the term chronic diseases (the full term is non-communicable chronic diseases) refer to diseases that persist over a long period of time and are caused by the combined effects of genetic, physiological, environmental,

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A. Katsarou (✉) · E. Polydoropoulou (✉)
Department of Radiology, General Hospital of Nikea, Nikaia, Greece

G. Intas
Department of Nursing, General Hospital of Nikea, Nikaia, Greece

C. Platis
Greek DRG Institute SA, Athens, Greece

G. Pierrakos
Department of Business Administration and Director of Social Policy Division, Organization and Management of Primary Healthcare Services, Athens University of West Attica, Aigaleo, Greece

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and behavioral factors [1]. Innovative Care for Chronic Conditions issued by the WHO in 2005 reported that public healthcare systems that have evolved around the concept of acute conditions are unable to meet the health needs of many patients, especially those with chronic diseases, it is imperative to have different types of public health systems for effective prevention and control of chronic diseases [2].

Unmet need is a widely used indicator to assess the service capacity of a medical health system as it relates to health outcomes, financial risk protection, efficiency improvement, and responsiveness to individuals' health expectations [3]. It is beneficial for chronic disease prevention and control policymakers to set priorities by accurately identifying and measuring the unmet needs of chronic disease patients and to better target chronic disease prevention and control policies [4].

Greece has a high percentage of private spending on health. In 2008, private expenditure on health constituted 40% of total expenditure or 9.8% of GDP and in 2013 it fell to 33.5%. Expenditure on long-term care increased from 0.156% of GDP in 2009 to 0.728% of GDP in 2016, which are the lowest expenditures in the European Union [5].

The objective of the present study was to assess the needs of patients suffering from chronic diseases.

41.2 Materials and Methods

41.2.1 Study Sample and Data Collection

A cross-sectional study was performed during April–December 2021. The study received the approval of Ethic Commission of University of West Attica.

The study population consisted of 840 adult patients with chronic diseases (>6 months).

41.2.2 Instrument for Data Collection

Demographic, social, and occupational data of the patients were recorded. A questionnaire consisting of 56 questions was created by the researcher, with the answers given on a five-point Likert-type scale (I disagree a lot, I disagree a little, I neither agree nor disagree, I agree a little, I agree a lot). According to the questionnaire, 7 questions investigated the financial needs of the patients, 5 questions investigated the social needs of the patients, 23 questions investigated the psychological needs of the patients, 11 questions investigated the educational needs of the patients, and 10 questions investigated other needs of the patients. The Cronbach alpha index of the questionnaire was 0.956.

Patients were interviewed with a semi-structured interview consisted of 11 questions. Out of all the questions, 5 questions were related to the current situation, 1 question was related to the psychological support of the patients, and 5 questions were related to the detection of educational needs of patients.

41.2.3 Data Analyses

The prevalence and mean for the investigated issues were calculated, while chi^2 tests and t-tests were used in order to assess differences between patients aged <50 year vs. >50 years, and between patients with chronic diseases and patients with end stage disease. Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 25.0. (Armonk, NY, USA: IBM Corp.), with statistical significance being considered at $p < 0.05$.

41.3 Results

The study sample consisted of 840 patients, of which 61.9% were women, 33.3% were retired, 45.2% had a monthly income of up to 600 euros, 69% of patients were chronically ill, and 31% of patients were end-stage patients.

Patients seek information mainly from health professionals (4.07 ± 1.4), feel tired (4.05 ± 1.4), have to share their feelings with the rest of their family members.

(4.01 ± 1.4), feel anxious (3.98 ± 1.3), feel worried about the future due to their health problem (3.94 ± 1.3), and feel that they do not have control of the situation (3.80 ± 1.5). The means of the participants' responses are presented in Table 41.1.

Care Time

As presented in Table 41.2, the results of Chi^2 test show that, among patients with a care time of less than two years agreed to a significantly greater extent that they feel sad because of their health problem (93.9% vs. 63.1%, $p < 0.05$), they need support from social support groups (93.3% vs. 55.2%, $p < 0.05$), they have all the information they need about available resources—material supplies (93.3% vs. 66.7%, $p < 0.05$), and they feel stressed (89.3% vs. 51.2%, $p < 0.05$), fear (88.1% vs. 47.6%, $p < 0.05$) and they feel that they have not the control of the situation (87.8% vs. 60.5%, $p < 0.05$).

Discussion

According to the results of the study, patients seek information mainly from health professionals, feel tired, share their feelings with other members of their family, feel anxious and worried about the future due to their health problem, and feel that they have no control over their situation.

Needs assessment helps health and social care services to deliver personalized care that promotes the health and well-being of patients and carers, thereby improving their quality of life [6].

In the present study, the patients claimed that they do not control the situation. Numerous studies have emphasized the need for comprehensive management of behavioral problems, personal problems, caregiving and emotional activity problems, and social needs of patients with chronic diseases [7–9]. Patients' interest in self-management support depends on the control patients believe they have over their disease. The concept of health controllability, better known as health locus of control, has been found to be a factor influencing health-related behavior. Some studies suggest that patients with a high internal locus of control may be more attracted to self-management interventions [10]. In the context of self-management, one study reported that patients had feelings of anxiety. For that reason, healthcare professionals are advised to inform patients how to use eHealth data and how to interpret the results but there is a large percentage of patients, mainly of low economic status and advanced age, who are not willing to use eHealth [11].

A proposed model that has been widely applied to chronically ill people in Australia is the Severe Behavior Response Teams [SBRT] model, which emphasizes screening and early diagnosis and suggests that patient care at an advanced level depends on diagnosis at lower levels, while treatment, pharmacology, and rehabilitation services are provided based on patient needs. In case of patients that do not have complex needs, home care services can be provided, which is of interest to a large number of patients and their carers [12].

In Greece, there are not hospice centers, which means that there are not hospitality centers that provide high-quality spiritual, mental, social, and physical services to patients and their caregivers. Hospice providers could respond to the unique challenges of patients requiring palliative care [13]. Despite the growing demands for end-of-life care services due to the increasing incidence of chronic and life-threatening diseases, there are no hospices in Greece for patients and families who need optimal care services. The most important reasons for the lack of hospices centers include lack of skilled healthcare staff, lack of integrated care programs, lack of appropriate guidelines, lack of policies and financial problems [14].

In order to organize integrated healthcare services, the diversity of their symptoms and needs should be taken into account [15, 16]. In fact, designing healthcare services that are patient-centered rather than disease-centered is possible only through understanding and prioritizing patients' symptoms and problems [17].

Establishing and participating in support groups formally, informally and voluntarily, could be a suitable measure to gain knowledge about coping strategies as well as emotional and informational support [18]. In the Netherlands, for example, a Meeting Centers Support Program

Table 41.1 Mean responses to patient questions

Questions	Mean ± SD
The insurance fund covers all the costs of medical visits	2.79 ± 1.5
The insurance fund covers all the costs of the medicines	2.98 ± 1.6
The insurance fund covers all the costs of the supporting materials needed for the treatment (diapers, pads, etc.)	2.26 ± 1.3
The government meets the financial requirements of your illness	2.42 ± 1.4
You have retired—Quit your job because of your health problem	2.52 ± 1.7
You have reduced your working hours due to your health problem	3.07 ± 1.8
Your social life has been restricted	3.36 ± 1.5
Visits from relatives at home have decreased	3.27 ± 1.5
Visits from friends at home have decreased	3.26 ± 1.5
Your visits to relatives' homes have decreased	3.43 ± 1.5
Your visits to friends' homes have decreased	3.32 ± 1.5
The time available to you for relaxation is limited	3.17 ± 1.4
The time available to you for fun is limited	3.44 ± 1.4
The time you have available for vacations is limited	3.58 ± 1.5
Feeling "imprisoned"	3.4 ± 1.5
You have more aggressive behavior than before	2.98 ± 1.4
You are more impulsive than before	3.03 ± 1.4
Your memory has faded compared to before	3.20 ± 1.4
You perform your tasks at a slower rhythm than before	3.56 ± 1.3
You feel apathetic or are more apathetic than before	3.30 ± 1.4
You feel upset because of your health problem	3.66 ± 1.4
You feel sad because of your health problem	3.74 ± 1.4
You feel disappointed because of your health problem	3.74 ± 1.4
You feel despair because of your health problem	3.60 ± 1.4
You feel worried about the future because of your health problem	3.94 ± 1.3
You feel that you have not the control of the situation	3.80 ± 1.5
You feel overwhelmed	3.27 ± 1.5
You feel tired	4.05 ± 1.4
You feel angry	2.88 ± 1.4
You feel guilty	2.68 ± 1.5
You feel stressed	3.98 ± 1.3
You feel fear	3.65 ± 1.4
You feel embarrassed	2.85 ± 1.5
You feel a lack of acceptance	2.90 ± 1.4
You have all the information you need about your disease	3.37 ± 1.3
You have all the information you need about the available support services	2.95 ± 1.2
You have all the information you need about support services for carers	2.88 ± 1.3
You have all the information you need about available resources—Material supplies	2.83 ± 1.4
You have all the information you need about financial benefits	2.71 ± 1.4
You have all the information you need about the progress of your disease	3.07 ± 1.4
You are looking for information from libraries	2.45 ± 1.5
You are looking for information on the internet	3.10 ± 1.5
You are looking for information from medical papers	2.51 ± 1.5
You are looking for information from brochures	1.96 ± 1.2
You are seeking information from healthcare professionals	4.07 ± 1.4

(continued)

Table 41.1 (continued)

Questions	Mean ± SD
Your relatives do not understand what you are going through	3.37 ± 1.4
Your friends don't understand what you're going through	3.00 ± 1.3
You need home care services	3.18 ± 1.7
You need respite services (a service where professionals come to your home for a few hours so you have time to focus on your career, relationships and other leisure activities)	3.34 ± 1.6
You need financial support	3.35 ± 1.5
You need access to support services	3.65 ± 1.5
You need more information	3.63 ± 1.4
You need community support	3.63 ± 1.5
You need support from support networks	3.37 ± 1.5
You need support from social support groups	3.57 ± 1.5
You need to share your feelings with the rest of your family	4.01 ± 1.4

Table 41.2 Statistically significant differences among the care type of patients

Question	< 2 years	> 2 years	*p*-value
The insurance fund covers all the costs of medical visits	54.7%	36.2%	0.001
The insurance fund covers all the costs of the supporting materials needed for the treatment (diapers, pads, etc.)	46.7%	14.5%	0.001
The government meets the financial requirements of your illness	33.3%	23.2%	0.001
You have retired—Quit your job because of your health problem	61.3%	27.5%	0.001
You have reduced your working hours due to your health problem	73.3%	43.5%	0.001
Your social life has been restricted	61.1%	31.6%	0.001
Visits from relatives at home have decreased	46.7%	50.7%	0.001
Visits from friends at home have decreased	66.7%	47.8%	0.001
Your visits to relatives' homes have decreased	73.3%	52.2%	0.001
The time available to you for relaxation is limited	57.1%	40.8%	0.001
The time available to you for fun is limited	69.4%	54.9%	0.001
The time you have available for vacations is limited	81.6%	50.6%	0.001
You have more aggressive behavior than before	63.3%	37.8%	0.001
You are more impulsive than before	57.1%	38.2%	0.001
Your memory has faded compared to before	69.4%	43.8%	0.001
You feel apathetic or are more apathetic than before	69.4%	40.8%	0.001
You feel upset because of your health problem	81.6%	58.8%	0.001
You feel sad because of your health problem	93.9%	63.1%	0.001
You feel disappointed because of your health problem	87.8%	65.7%	0.001
You feel despair because of your health problem	75.5%	54.1%	0.001
You feel worried about the future because of problem your health	87.8%	70.8%	0.001
You feel that you have not the control of the situation	87.8%	60.5%	0.001
You feel overwhelmed	69.4%	42.1%	0.001
You feel tired	80%	73.9%	0.001
You feel angry	40%	29%	0.002
You feel stressed	89.3%	51.2%	0.001
You feel fear	88.1%	47.6%	0.001
You have all the information you need about available resources—Material supplies	93.3%	66.7%	0.029
You are looking for information on the internet	53.3%	31.3%	0.022
Your relatives do not understand what you are going through	73.3%	47.8%	0.023
You need access to support services	55.3%	54%	0.001
You need support from social support groups	93.3%	55.2%	0.020

[MCSP] is used as a supportive approach for patients with mild-to-moderate Alzheimer's disease living in the community as well as their carers [19].

Patients with chronic diseases report that their social role has changed and feel that they cannot participate in social life as before [20] or that their participation in society is limited [21]. Prevention of social isolation is crucial for some patients [22]. This could be achieved by involving them in community groups or social activities outside the home [23]; contact with family, friends and professional carers [24]; or going out and participating in their leisure time in various activities [22].

In the present study, it was found that patients seek information mainly about their disease and its progression from healthcare professionals. A study conducted in the Netherlands showed that patients with chronic diseases preferred information about their disease, medical care decisions, and support at a practical level [25]. It has been reported that patients and their relatives need more information than those provided by healthcare professionals [26]. Patients define a good physician as a good listener, honest, willing to communicate, and able to relieve them from bothersome symptoms [27].

One study found that providing formal care in a professional manner is important for patients with chronic diseases [28]. Patients consider that care should be provided by qualified and experienced staff, with adequate practical and social skills [20, 21, 28]. This kind of care is described as "good care."

41.4 Conclusions

The results of the present study showed that patients with chronic diseases suffered from numerous physical, mental, emotional, and cognitive problems. In addition, the symptoms of the disease, the lack of a holistic and integrated care system, the social stigma and lack of acceptance by society, the cultural as well as ethical issues related to the disease, the lack of support resources, and the financial burden of disease cause patients and their families to face various challenges. Thus, attention to the unmet needs of patients and caregivers could have beneficial effects for both patients and their caregivers.

Fully and comprehensively informing patients about the capabilities, use, and reasons for implementation is important to stimulate the adoption of eHealth in primary care. However, when offering eHealth to patients, it should be taken into account that not everyone is willing and able to use it.

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Investigation of Factors That Affect the Quality of Life After a Stroke

42

Maria Malliarou, Christina Tsionara,
Anna Patsopoulou, Axilleas Bouletis,
Vasileios Tzenetidis, Iokasti Papathanasiou,
Evangelia Kotrotsiou, Mary Gouva,
Athanasios Nikolentzos, and Pavlos Sarafis

Abstract

Stroke, as a disease, describes a group of disorders characterized by the presence of central nervous system symptoms either as a result of ischemia (ischemic stroke) or bleeding (hemorrhagic stroke). The appearance of a stroke results in a permanent physical or cognitive disability. The stroke incidence is the third cause of death after heart disease and cancer, and is the main cause of long-term disability.

The effects of a stroke on a patient's daily life, and hence on his quality of life, are intense and long-lasting. These include memory problems, speech difficulty, depression, reduced vision loss, and decreased walking ability. This limitation of the patient's motor activity has a direct negative impact on the quality of his life.

To investigate the degree of this impact, a research was carried out at a hospital of Central Greece. The total sample consisted of 90 patients and the responses showed that post-stroke symptoms are significant. Consequences and treatment control of the disease on the life of the sample were the questions with the highest score showing the significant effect that a stroke has on life the patients.

More specifically, the sample showed through responses that the disease affects their lives to a great extent. The pre-stroke scores on the domains of the sample are clearly higher than post-stroke. The highest difference was found in the use of the upper extremities in self-care and family roles while the lowest was found in the domain of thinking. The most affected domains were as follows: thinking, vision, and language. Alternatively, the least affected domain was family roles.

Keywords

Stroke · Quality of life · Illness Perception Questionnaire

All authors have equally contributed to this chapter.

M. Malliarou (✉) · A. Patsopoulou · V. Tzenetidis (✉) · I. Papathanasiou
Laboratory of Education and Research of Trauma Care and patient safety, Nursing Department, University of Thessaly, Larissa, Greece
e-mail: malliarou@uth.gr

C. Tsionara
Post-Graduate Program Primary Health Care, University of Thessaly, Larissa, Greece

A. Bouletis
404 General Military Hospital, Larissa, Greece

E. Kotrotsiou · P. Sarafis
University of Thessaly, Larissa, Greece

M. Gouva
Nursing Department, University of Ioannina, Ioannina, Greece

A. Nikolentzos
Hellenic Open University, Patras, Greece

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42.1 Introduction

The vascular stroke is defined as the sudden loss of neurological function, which is mainly due to obstruction or rupture of a cerebral artery and, less commonly, to a disorder of blood coagulation [1, 2]. Strokes affect patients' quality of life in a variety of ways, in addition to causing physical and emotional, cognitive, and/or social consequences. The concept of quality of life is multidimensional as it contains personal preferences and perceptions characterizing the preferences of a person's daily life. However, the general concept of quality contains some common denominators such as mobility or independence of movement, measurable quantities that are not amenable to generalizations, or subjective perceptions. It becomes clear, then, that the severity of the damage that follows a vascular stroke affects the patient's quality of life. Patients are now faced with another equally important and burdensome burden: ensuring their quality of life in their daily lives. The need to improve the quality of life of these patients necessitates greater attention to their rehabilitation and their return to the best possible living conditions. The main characteristic symptoms of a patient who has suffered a stroke are pain, fatigue, and depression. These characteristics are also key factors in reducing the quality of life of patients with negative extensions in their life expectancy as low quality of life is associated with increased mortality [3].

Previous studies have come to the conclusion that restrictions on daily activities and habits as well as restrictions on the reintegration of stroke patients into the community [4], have a negative impact on the quality of life of survivors of an acute stroke. Nevertheless, psycho-social factors seem to play a more important role than physical abilities in relation to quality of life [5].

The purpose of the research was to measure quality of life of the patients who have suffered a mild or moderate stroke. In addition, the differences of these levels in relation to the demographic data of the sample were also examined. The main research questions can be summarized as follows

How do patients with a stroke describe their quality of life?
Do demographic characteristics of the sample affect the sample's views on their quality of life and to what extent?
Does the patient's level of family support affect the quality of life of patients with stroke?

42.2 Material and Method

42.2.1 Description of Research Process

For the needs of the research, 90 questionnaires were completed by patients hospitalized after stroke in a general hospital in Central Greece. The sample was selected using convenience sampling and by applying the following inclusion and exclusion criteria.

Inclusion Criteria
Adult patients who had mild-to-moderate stroke from 1 to 12 months after the episode.

Exclusion criteria
Lack of cognitive functions
Presence of severe mental health problems Children and dementia patients

The researcher explained to the sample the purpose of the research and ensured the protection of their personal data through anonymity. During the process of completing the questionnaires, the researcher was present, explaining any questions of the research participants and facilitating the process.

Questionnaire
The first section of the questionnaire contains questions about the demographics of the sample, the medication they receive, and habits that affect their health, for example, smoking and comorbidity.

The second part of the questionnaire includes the Brief-IPQ (Illness perception questionnaire). The Illness Perception Questionnaire (IPQ) [6] is a widely used multifactorial questionnaire which assesses the five cognitive illness representations on a 5-point Likert scale. Five of the items assess cognitive illness representations: consequences (Item 1), timeline (Item 2), personal control (Item 3), treatment control (Item 4), and identity (Item 5). Two of the items assess emotional representations: concern (Item 6) and emotions (Item 8). One item assesses illness comprehensibility (Item 7).

The third part of the questionnaire includes the Family Support Scale (FSS) [7]. The Family support scale has been conceived in Finland and aims to record the sense of support that a subject receives from the members of his family. The scale is constituted by 13 items, which are answered on a Likert scale, ranging from 1 ("I disagree a lot") to 5 ("I agree a lot").

The fourth part of the questionnaire is the Stroke and Aphasia Quality of Life Scale39g (SAQOL-39 g). The SAQOL-39 g is a self-report scale carried out in an interview format to facilitate people with aphasia. It covers participants' perception of how stroke and aphasia have affected his/her functioning in four domains: physical, psychosocial, communication, and energy. The scale consists of 39 items each scored on a 5-point scale, with high scores indicating better HRQL. The Greek SAQOL-39 g has strong psychometric properties, with excellent acceptability (minimal missing data; no floor/ceiling effects), test-retest reliability (ICC = 0.96 scale, 0.83 – 0.99 domains), internal consistency (Cronbach's alpha 0.96 scale, 0.92 – 0.96 domains), and convergent ($r = 0.53 – 0.80$ scale; 0.54 – 0.89 domains) and discriminant validity ($r = 0.52$ scale; 0.04 – 0.48 domains) [8, 9].

The fifth part of the questionnaire contains the "Stroke-Specific Quality of Life Questionnaire (SS-QOLQ)" [10–12]. The Stroke Specific Quality Of Life scale (SSQOL) is a patient-centered outcome measure intended to provide an assessment of health-related quality of life (HRQOL) specific to patients with stroke. Patients must respond to each question of the SS-QOL with reference to the past week. It is a self-report scale containing 49 items in 12 domains: Mobility (6 items), Energy (3 items), Upper extremity function (5 items), Work/productivity (3 items), Mood (5 items), Selfcare (5 items), Social roles (5 items), Family roles (3 items), Vision (3 items), Language (5 items), Thinking (3 items), and Personality (3 items).

Its subscales are Energy, Upper extremity function, Work/productivity, Mood, Selfcare, Social roles, Family roles, Vision, Language, Thinking, and Personality.

Each domain is measured by three to six items using a 5-point (1–5) Likert scale where higher scores indicate better function.

The sixth part of the questionnaire contains the Barthel Index. The Barthel Scale/Index (BI) is an ordinal scale used to measure performance in activities of daily living (ADL).

Ten variables describing ADL and mobility are scored, a higher number reflecting greater ability to function independently following hospital discharge. Time taken and physical assistance required to perform each item are used in determining the assigned value of each item. The Barthel Index measures the degree of assistance required by an individual on 10 items of mobility and self-care ADL The Barthel includes 10 personal activities: feeding, personal toileting, bathing, dressing and undressing, getting on and off a toilet, controlling bladder, controlling bowel, moving from wheelchair to bed and returning, walking on level surface (or propelling a wheelchair if unable to walk), and ascending and descending stairs.

Reliability of the scales is shown in Table 42.1 and it is measured by calculating Cronbach's alpha.

Analysis

Descriptive analysis was performed for sociodemographic, health, and clinical variables. The observed change in SS-QOLQ before and after

Table 42.1 Cronbach's alpha of scales

	Cronbach's alpha	N of items
Brief-IPQ	0.639	8
FSS	0.567	13
SAQOL-39 g	0.977	39
SS-QOLQ	0.977	62
BI	0.773	11

stroke for the stroke patients was determined by comparing the SS-QOLQ scores at pre- and post-stroke.

42.3 Results

The sample of the study consisted of 54 men and 36 women being hospitalized after a stroke. Examination of the comorbidity of the sample showed the presence of 9 main diseases According to the results, the most common disease observed was hypertension (*N* = 76, *N%* = 84.40%), stress (*N* = 58, *N%* = 65.20%), heart-related diseases (*N* = 51, *N%* = 57.30%), and hyperlipidemia (*N* = 46, *N%* = 51.70%). In all previous cases, it was observed that there was concomitant medication in more than 85% except in the case of anxiety, where only 25% used medication (Table 42.2).

Consequences of the disease on the life of the sample (MT = 9.60. TA = 1.188) is the question with the highest score showing the significant effect that a stroke has on life the patients. The next highest score was in treatment control (MT = 8.14. TA = 7.105). The lowest mean score was presented on personal control the sample has over the disease (MT = 6.09. TA = 2.898) (Table 42.3).

Table 42.4 shows the mean values and standard deviations of the family support scale questions with the highest mean value appearing in the question "My family always does everything to make my life easier."

Table 42.5 presents the results of the 4 dimensions of (SAQOL-39). The highest mean value was found in the dimension of communication (mean = 4.09 SD = 1.097) and the lowest in the dimension of energy (mean = 2.75 SD = 1.165).

Mean values and standard deviations of the domains of SS-QOLQ are presented in Table 42.6. The pre-stroke scores on the domains of the sample are clearly higher than poststroke. The greatest disproportion of these scores was in the use of the upper extremities in self-care and family roles, while the lowest difference was found in the domain of thinking.

The most affected domains were as follows: thinking, vision, and language. Alternatively, the least affected domain was family roles.

Barthel Index

The results of the Barthel Index scale are shown in Table 42.7. More specifically, the highest score is presented in the mobility on level surfaces in transfers (bed to chair and back) and feeding and lower in bathing and grooming.

42.4 Conclusions

The self-evaluation of the sample in relation to the disease, according to answers given to the questionnaire about perceptions about the illness, was revealing about how much the illness affects them in their daily life. Consequences and treatment control of the disease on the life of the sample were the questions with the highest score showing the significant effect that a stroke has on life the patients.

The sample felt that their family supported them and they scored higher in the question "My

Table 42.2 Frequency of concomitant diseases

	No		Yes		Drug use	
	N	%	N	%	N	%
Hypertension	14	15.6%	10	11.1%	66	73.3%
Diabetes	64	71.9%	3	3.4%	22	24.7%
Hyperlipidemia	43	48.3%	5	5.6%	41	46.1%
Heart disease	38	42.7%	3	3.4%	48	53.9%
Stress/panic attack	31	34.8%	42	47.2%	16	18.0%
Respiratory problems	84	93.3%	4	4.4%	2	2.2%
Urinary problems	80	88.9%	8	8.9%	2	2.2%
Thyroid	84	93.3%	2	2.2%	4	4.4%
Cancer	88	97.8%	1	1.1%	1	1.1%

Table 42.3 Brief-IPQ (Illness perception questionnaire)

	Mean	SD
Consequences	9.60	1.188
Timeline	7.49	2.441
Personal control	6.09	2.898
Treatment control	7.96	2.312
Identity	8.14	7.105
Concern	7.84	7.388
Understanding	7.80	2.678
Emotional response	7.48	3.145
Total	7.80	2.252

Table 42.4 Family Support Scale (FSS)

	Mean	SD
1. My family supports me in each my effort	4.86	.463
2. At home they understand me even when I'm tired and angry	4.57	.899
3. I feel good when I get home after a hard day	4.78	.730
4A. There is no benefit in speaking about your daily difficulties at home	2.19	1.546
5A. They always blame me when the house is messy	4.04	1.439
6A. We often disagree on how we will share the housework	4.09	1.483
7. The atmosphere is very harmonious in our family	4.84	.474
8A. I am the main person in charge of the housework	4.18	1.446
9A. Conflicts in the house often absorb all my energy	2.45	1.711
10A. I am often accused of neglecting the housework	4.21	1.299
11A. It is impossible to really calm down at home	3.38	1.767
12. My family stays together despite the difficulties	4.88	.438
13. My family always does everything to make my life easier	4.90	.425
Total	4.86	.463

Table 42.5 SAQOL-39 g and its four domains

	Mean	SD
SAQOL-physical	3.20	1.320
SAQOL-communication	4.09	1.097
SAQOL-psychosocial	3.18	.921
SAQOL-energy	2.75	1.165
SAQOL39-total	3.11	1.031

Table 42.6 SS-QOLQ pre-post stroke

		Post-stroke		Pre-stroke	
Domains of SS-QOLQ		Mean	SD	Mean	SD
1.	Energy	1.41	0.748	2.18	1.119
2.	Language	2.74	1.259	4.10	1.138
3.	Mobility	1.42	0.874	2.93	1.356
4.	Vision	3.18	1.167	3.95	.976
5.	Upper extremity function	1.47	0.927	3.43	1.255
6.	Thinking	3.22	1.261	3.44	1.428
7.	Mood	1.54	0.880	2.98	1.032
8.	Personality	1.74	1.023	2.50	1.102
9.	Work/ productivity	1.31	0.701	2.80	1.590
10.	Self-care	1.30	0.661	3.24	1.428
11.	Family roles	1.27	0.635	2.86	1.247
12.	Social roles	1.31	0.664	1.90	1.193
13.	Total SS-QOLQ	1.28	0.636	3.02	0.996

Table 42.7 Barthel index

	Mean	SD
Feeding	4.62	4.563
Bathing	0.89	1.922
Grooming	1.17	2.127
Dressing	3.33	3.267
Bowels	3.44	4.412
Bladder	3.11	4.076
Toilet use	2.00	3.250
Transfers (bed to chair and back)	4.89	4.798
Mobility (on level surfaces)	6.61	6.035
Stairs	2.39	3.453
Total	32.46	28.942

family always does everything to make my life easier." The highest mean value was found in the dimension of communication. More specifically, the sample showed through responses that the disease affects their lives to a great extent. The pre-stroke scores on the domains of the sample are clearly higher than post-stroke. The greatest disproportion of these scores was in the use of the upper extremities in self-care and family roles, while the lowest difference was found in the domain of thinking. The most affected domains were as follows: thinking, vision, and language. Alternatively, the least affected domain was family roles.

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43

The Experience of Dancing Among Individuals with Cerebral Palsy at an Inclusive Dance Group: A Qualitative Study

Lydia Lentzari, Evdokia Misouridou, Vicky Karkou,
Marianthe Paraskeva, Chrysoula Tsiou,
Ourania Govina, Antonia Kalogianni,
and Stelios Parissopoulos

Abstract

Background

Art practices such as dance have the potential to support people with disabilities. It is possible that through dancing, bodies that may be regarded as "deficient" can be strengthened while enhancing their personal and cultural identities. It is also possible that inclusive group dance classes can enable the integration of people with disabilities in their social context. However, there is limited research on how these potential benefits are experienced by participants.

Aim

The purpose of this research is to describe the experience of people with cerebral palsy participating in regular dance classes.

Methods

Semi-structured interviews were conducted with six participants with cerebral palsy who participated in an inclusive dance group that was informed by the creative approach of Laban. The interviews were transcribed, coded, and analyzed according to the thematic analysis of Braun and Clarke. The qualitative analysis software program ATLAS.TI version 8 was used for organizing and data analysis.

Findings

The six interviews were analyzed and codified in four main categories: (1) the experience of cerebral palsy (the body does not help); (2) dance as a form of relationship with myself and the other; (3) the value of dancing and; (4) the dancer. These categories led to the creation of two subthemes: (a) the "unlocking" concerning the therapeutic effect of dance and (b) the "acquisition of a dancer's identity" by engaging with dance as an artform. An overall theme also emerged, "the passage from darkness to light."

L. Lentzari (✉) · E. Misouridou · C. Tsiou ·
O. Govina · A. Kalogianni · S. Parissopoulos
Department of Nursing, MSc "Neurological
Disorders – Evidence Based Practice", University of
West Attica, Athens, Greece
e-mail: lentzlydi@yahoo.gr

V. Karkou
Research Center for Arts and Wellbeing, Edge Hill
University, Ormskirk, UK

M. Paraskeva
School Nurse, Special Vocational Secondary School,
Egaleo, Athens, Greece

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Conclusions
Individuals with cerebral palsy, while taking the risk of being physically "exposed" in dance classes and dance group performances, managed to unlock their bodies, develop connections with others, acquire the identity of a dancer, and move from "darkness" to "light."

Keywords

Cerebral palsy · Rehabilitation · Disability · Laban method · Inclusive dance · Qualitative

43.1 Introduction

Cerebral palsy (CP) is a non-progressive disorder of the brain that is characterized mainly by motor and postural problems of the person, as well as possible difficulties at a cognitive level [26]. People with CP may encounter several practical and social issues in their daily life that may be linked with reduced or lack of self-care. In addition to the individual physical and cognitive challenges of each person with CP, society triggers and enlarges even further people's physical characteristics, labels them as "deficits," and contributes to the prejudice in the treatment of the disabled person with CP [28].

It has been argued that the image individuals with CP carry about themselves and their embodied experience of living with CP may change through participation in inclusive group activities [6, 22]. Art, such as dance in its various forms, has the capacity not only to offer the means to bridge the distance between people with disabilities and their social context, but also to strengthen their personal capacities. Dance is well suited at the individual's journey of searching for more possibilities and discovering one's identity, as it deals with movement and rhythm through the body. Dancing can become the means for "unlocking" artistic identity of the individual and offers the potential to bring down any barriers that create cultural and social discrimination [6, 52].

Although there is some research in relation to CP and the therapeutic benefits from participating in dancing lessons [14, 15, 28, 51, 52], there is very little qualitative research on the experience of dance at individuals with CP [20, 32]. Therefore, the aim of this study was to explore and describe via participants' accounts the experience of dancing at individuals with CP, who participated in inclusive dance groups on a weekly basis at a specialist CP Day Center in Athens.

43.1.1 Background

CP is an umbrella term that describes particular movement and postural characteristics often referred to as "disorders" associated with complications during or soon after the pregnancy [48, 56]. CP occurs at a frequency of 1.0–2.5/1000 in children born alive and it seems to be related to extremely preterm and low body weight [43, 44]. Individuals with CP may experience difficulties in movement and posture control and therefore may struggle in being part of a non-CP-friendly society, where able bodies are regarded as the norm. This results in low self-esteem, poor body image, and limited sense of agency [28, 51]. The motor disorders are usually accompanied by sensory and cognitive difficulties, communication problems, reduced perceptual ability, behavioral challenges, and occasionally seizures. As it is a condition that accompanies these persons throughout their lives, the ageing process may exacerbate existing symptoms and result in an increased incidence of fall among older adults [27].

Treatment efforts in CP have so far mainly focused on orthopedic surgery and physiotherapy in order to improve musculoskeletal characteristics and enhance functional ability [2, 59]. In most cases, these corrective processes attempt to bring the CP body closer to the norm of an able body. However, some scientists and health professionals call for emphasis on providing people with CP with the tools and skills to cope with the demands in daily life. They argue that the effectiveness of the "traditional" treatment process can be further improved by enhancing strengths rather than focus on deficits [28, 48]. It is possible that leisure activities, such as participation in dancing classes, have a positive effect on the health of people with disabilities. The benefits of these are multiple as they promote the creation of friendships, personal interests and ultimately contribute to the creation of the individual's personal identity [35, 58]. Furthermore, when individuals with CP participate in such leisure activities, there may be positive effects on motor skills. It is, however, important that such programs are tailored around people with CP needs to avoid limited participation and therefore to contribute to social integration and inclusiveness [19].

It has been reported that individuals with CP are interested in activities such as dancing which promotes participation and self-improvement [31]. The need for offering activity-based experiences in the CP population is emphasized in recent literature, as persons with CP have limited access to programs that combine both attention to enhancing movement skills and social participation [6, 17].

During recent years, there have been increased attempts to research dance for people with CP that provide evidence that therapeutic dance practices can impact positively both motion and emotion [8] and learning and well-being [40]. Contemporary research highlights the benefits of dancing and specifically states that "mixed dance groups" comprising of individuals with and without disabilities positively influence the development of movement skills. Dancing in a group highlight and embrace the specific needs that each body presents [28, 51]. Dance classes address the specific needs of children with disabilities, such as developing motor skills, learning, and adapting to group dynamics, and acquiring social skills. Research supports that dance can also allow the exploration of taboo topics such as sexual identify [33]. Furthermore, by presenting the group as an enjoyable and fun activity, it can improve the child's perception of therapy itself and enhance therapeutic outcomes in CP [34].

43.2 Methods

43.2.1 Study Design

A qualitative study illuminated the experience of dancing of six individuals with CP at a specialist CP Day Center in Athens. At which participants attended weekly an inclusive dance class.

43.2.2 Aim and Objective

The study aimed to describe, explore, and understand the experience of dancing in people with CP. More specifically, the study aimed to explore and highlight how individuals with CP experience their participation in an inclusive dance group (people with/or without disabilities), how it affects the psychosocial parameters of their lives, and how they perceive the contribution of dancing to enhancing their motor skills.

43.2.3 Participants and Procedure

The present study was conducted at a non-profit organization for individuals. The Center offers educational and rehabilitation services to individuals with CP, support to their families and specialist training to staff. The participants of the current study engaged in integrated dance groups that took place weekly. The dance program comprised of modern dance, which is an expressive form of dance that challenges the structured technique of classical ballet and began to develop late of nineteenth century [12]. It combined elements of Contact improvisation (CI) founded by Steve Paxton [38] and the Laban [25], Movement Analysis system [57]. Rudolf Laban set the principles for Laban Movement Analysis (LMA) [25], a detailed movement observation and analysis tool that informed creative or modern educational dance [53] and encouraged the development of dance movement therapy in the

UK and in various other countries [29, 30]. Laban had a strong belief that dance should be accessible to all [57]. Some of the developments of LMA in the USA was the Laban/Bartenieff Movement Studies (LBMS) that focus on describing “what moves, where it moves, how it moves, and why it moves, that is, the effect that self, others, and the environment have on that movement” [57, p. 2]. LMA is widely used in movement research, in many disciplines and not only in the field of dance, due to its ability to describe both qualitative and quantitative characteristics of movement [9, 10].

The duration of the lesson was one and a half hour. All classes were facilitated by a dance teacher, began with 10–20 min warm-up and included exercises for the muscles and articulations of the whole body. All the participants sat in a circle facing on the center. As the warm-up progressed, participants who could stand up continued to activate the body in the standing position; the rest continued either sitting in a wheelchair or in a simple stable chair, depending on their preferences. Eventually more demanding exercises were introduced involving balance, weight transferring, directions, different movement levels (upper, middle, lower), different quality in motion (bound and flow, direct and indirect, heavy and light), rhythms and coordination of the full body. Small choreographed phrases were encouraged inspired by the specific theme introduced each week. Each session ends with a 10-min cool-down mainly focusing on breathing and relaxing of the body.

The study adopted a purposive sampling approach. The informants (n = 6) had diversed motor skills and they have been participating in the dance group on a weekly basis for more than 3 years. The motor level of the subjects was related to levels I-IV on the Gross Motor Function Measure (GMFCS) assessment scale. Three participants (GMFCS I) could walk on their own, one (GMFCS II) walked with ongoing support from an adult, one (GMFCS III) walked with rollator or could use a wheelchair depending on his wish, and the last one (GMFCS IV) used her wheelchair, either by herself or by another person. The dance program aimed to promote movement experiences of people with disabilities through artistic means, and encouraged individuals to participate of their own free will. In the literature, motivation appears to be the key to a successful therapeutic process [51, 52]. For these reasons, the research team decided to explore and record the participants’ views, feelings, and accounts.

43.2.4 Data Collection and Ethics Approval

The first author, a physiotherapist and dancer, conducted the interviews (2018–2020), which were digitally recorded and then transcribed by the researcher. Although transcription was a challenge due to speech difficulties that most participants had had due to CP, the researcher was successful in doing this due to her experience with individuals with CP. The interviews consisted of exploratory open-ended questions. Additionally, probing and clarification questions were made during each interview depending on the participant’s responses. Participants were informed of the purpose and design of the study in advance and had signed an informed consent form. Their willingness to participate in the study was refreshed verbally before beginning the interviews. Ethics approval was obtained by the Ethics and Research Committee of the Centre. Participants were provided with information and details about the study in advance. Participation was voluntary and each informant had the right to withdraw anytime. Particular attention was given in protecting participants’ personal information (pseudonyms) and sensitive patient information according to the principle of confidentiality.

43.2.5 Data Analysis

Interviews transcripts were subjected to qualitative analysis and were coded line by line. Coding gradually reached higher levels of abstraction. Then, code categories derived from the codes and emerging patterns and themes were identified according to the stages of the thematic analysis approach of Braun and Clarke [11]. Thematic analysis is presented as an independent qualitative approach to analysis for identifying, analyzing, and reporting patterns (themes), and is characterized by flexibility and compatibility to phenomenological research [42, 55]. More specifically, these stages are the following: (a) familiarity with the data, (b) coding, (c) search for codes of higher abstract level, (d) review of codes, (e) definition and naming of themes, and (f) writing of findings [11, 36]. This process of grouping, categorizing, and theorizing the data is very common in qualitative research and helps the researcher to "make sense" of the data and reach meaningful interpretations and descriptions. The qualitative software program Atlas.ti v8 was used to organize and analyze the data.

43.2.6 Trustworthiness

Trustworthiness was ensured by satisfying the principles of credibility, confirmability, dependability, and transferability [42, 46, 49]. Credibility was established by providing a safe environment and adequate time for each interview session. The participants knew the main researcher and felt comfortable talking to her about their experience of dancing. The researcher herself dances with the participants on a regular basis and could easily relate to the descriptions and accounts of the participants. Transferability was met by adopting purposive sampling. Confirmability and dependability were satisfied by keeping a research diary, recording methodological decisions for the purposes of audit trail, and member checking. The audit trail included reflective writing and supervisory support from the master academic supervisors.

43.3 Findings

The experience of dancing among individuals with CP of the present study can be described as an individual's "Passage from darkness to light." The analysis of the interviews by the research team initially identified 19 code categories, which were then converted to subcategories and reduced to the following four code categories: (1) the experience of CP (the body does not help), (2) dancing as a form of relationship (with myself and with the other person), (3) the value of dancing, and (4) the experience of being a dancer (Table 43.1). Then, the analysis revealed two subthemes, which depicted the therapeutic and the artistic aspect of dance and dancing respectively: (A) "unlocking the body" and (B) "acquiring the identity of a dancer."

Further analysis and reflection on data revealed the overarching theme of "The Passage from Darkness to Light." The main theme captures the feeling and experiences of the participants and was inspired by Plato's Cave allegory (Plato: The Republic, 514a–520a) [45]. According to Plato's allegory, inside the cave we find people in chains, staying hidden in the darkness, unaware of what is on the light and believing that the truth is the reflection of the shadow of the fire behind them. But once they manage to break free and dare to come out of the cave, one will initially be blinded by the light, but if they persevere and not return, they will see life pulsing. In a similar way, the participants experienced new ways of understanding and learning about their body and selves via dancing and communication—physical and non-physical—with the members of the dance group. Their bodies engaged in a process that is best described as "unlocking" and opening despite the physical difficulties they had due to CP. On the other hand, they also experienced the artistic aspect of participation in the dance groups, as they felt they were also "dancers" and not-only people challenged by CP.

43.3.1 Subtheme A: The Therapeutic Aspect of Dance and Dancing: "Unlocking the Body"

The participants talked about participating in a group of equals. This condition allowed them to discover new physical and cognitive skills, improve their body balance, increase their strength and improve coordination of movement, socialize with other people, make friends, and

Table 43.1 Findings: Theme, subthemes, categories, and subcategories

Theme	Subthemes	Categories	Subcategories
“The Passage from Darkness to Light”	*Subtheme A* The therapeutic aspect of dance and dancing: “Unlocking the body”	1. The experience of CP (the body does not help)	1. Cerebral palsy
			2. Disability
			3. Pain
		2. Dancing as a form of relationship (with myself and with the other person)	4. Contact-communication
			5. Group
			6. Cooperation
		3. The value of dancing	7. Inclusive dance group
			8. Liberation
			9. Healing
			10. Emotions (positive)
			11. Movement
			12. Body
			13. The value of dancing
			14. Friendship
	Subtheme B The artistic aspect of dance: “Acquiring the identity of a dancer”	4. The experience of being a dancer	15. The beginning
			16. Anxiety
			17. Dancer
			18. Expression
			19. The desires (future)

ultimately become more active as members of the dance group. Their regular trip to the dance class every week served as a passage from the safety of their home to the outside world.

43.3.1.1 Category 1: The Experience of CP (the Body Does Not Help)

This category consists of three subcategories: (a) “cerebral palsy,” (b) “pain,” and (c) “disability.” The actual words and accounts of the participants demonstrated clearly to the researcher the difficulties they faced due to CP and the pain on their everyday life and dance lessons, as they felt they inhabited a “sore” body that made it difficult for them to move freely around or experience full range of limb movement. Some of the participants needed assistance to get around on a wheelchair. They also experienced anxiety because of their particularity and variation from the “norm” in their movement, and they often feared that this may cause discomfort to the people with normal mobility around them. Indicatively, the “difficult” and “inadequate” body, which is what the others see as different, rigid, clumsy, is a body in pain that seems to need constant help to get around and to be more functional.

> I have realized that I am moving slowly, and this can be a problem for the team or for some people who want to pass by quickly. (N2)
>
> Look, it’s [CP] making it a little difficult for me, the body, because sometimes I worry, I might lose my balance too, but in the end… I’m like ‘no you’re going to make it’. (N3)

According to the participants’ verbal accounts, pain becomes an inhibiting factor in their everyday life and whether they participate in a dance class. Consequently, their psychological state is badly affected. So, the limited and “sore” body is a constant reminder of their CP condition.

43.3.1.2 Category 2: Dancing as a Form of Relationship (with Myself and with the Other Person)

This category resulted from four subcategories: (a) "contact-communication," (b) "group," (c) "collaboration," and (d) "inclusive dance group." In this study, dancing as a member of an inclusive group created meaningful relationships between persons with and without disabilities. The adoption of Laban dance—that supports the inclusive groups—encouraged a sense of belonging and security for the participants through equality and acceptance of diversity.

> Dancing with another person with a CP is easy for me as she looks like me. And dancing with people without CP is equally enjoyable as they embrace and accept me, I feel equal to them. (N3)
>
> You can work with them, it's an important thing. And you share the stress, you "lose yourself," you forget yourself. That is, it makes you forget your anxiety. (N1)

Participants described that dance triggered and encouraged verbal and nonverbal communication between the members of the group. Therefore, dancing became the means for communication with people within the group and, by extension, outside the group, while creating a space of acceptance and understanding for the embodied expression of feelings.

> Dance creates expression and dynamism for me. It also creates a clear mind. Now I feel more comfortable. Before I didn't know what, it was like, and I was a coward. (N5)
>
> Yes, I've met people! I've learned not to be embarrassed and introvert. (N1)
>
> …because I didn't have as much communication before as I have now. I was closed into myself and thinking about things helped me get out, helped me express myself better. They [the dance members] also helped me find friends. Yes yes… I was closed into myself when I came here and I didn't talk easily, I didn't make friends. Then I started to open up. (N2)

According to the participants, when the cooperation between persons with CP and volunteers developed in a positive and accepting atmosphere, during the dance lessons, new ideas emerged and their self-motivation was enhanced and ultimately gave rise to new embodied experiences despite the difficulties in communication (i.e., speech) or the diversity of movements and physical limitations displayed by the CP members of the group. The participants felt they can achieve more in this way and mentioned that they were pushing their bodies outside their limits and their comfort zone. Furthermore, the dance lesson and the dynamics of the group were set in such a way that they accepted the influence of the partner dancer and learnt from another person who may have or may have no disability. They explored the dynamics that existed among the group members, and this helped them to develop social skills.

> It teaches you to co-exist with others, to get a good result you need to work together. That's why I let go and say, 'I can coexist with the others'. (N4)
>
> I feel stronger. I'm doing more things, things that I couldn't do in the past. I'm finally doing a lot of things! With my body, I do more movements outside of class now, i.e., at home alone. I have gained confidence. Yes, I think a lot it gives me the ability to do more things with them. It gives me ideas, motivation, I feel freedom through it. (N5)

43.3.1.3 Category 3: The Value of Dancing

This category consists by seven subcategories: (a) "liberation," (b) "healing," (c) "emotions (positive)," (d) "movement," "body," (f) "the value of dancing," and (g) "friendship." In this study, dance lessons were experienced by the participants as influencing their well-being and emotional state, and as creating a feeling of relaxation post each session. Dancing contributed to a sense of liberation—metaphorical and physical—either on the dance floor or on their everyday life.

> Dancing gives me ideas, motivation, I feel freedom through it. It helps me to move better with my hands and my body in general. It improves my movement. I feel stronger. In the beginning I was too shy but now I am now I am more

> relaxed after the group performances. [participant participated in dance performances] (N3)
>
> Dance for me is a way of expression! It offers me, in essence, a way to express myself to others, to communicate to them my abilities… to communicate what I can achieve and give through my movement… and to create something beautiful with what I feel inside. (N5)
>
> …So, I can do more with my body. To have freedom in my body. Through movement we give to each other. By moving more and more. We can also give each other new movement ideas. (N6)

According to participants, the very act of focusing on the dance exercises and choreography as members of the inclusive group—where they co-exist and inhabit the dance room with other "bodies"—helped them to forget any pain and discomfort of their own body. After each session the pain may have been reduced or even eliminated. Even when they experience pain or tiredness, it is a pleasant feeling as it derives from their dancing class, and they exercise they performed. In retrospect, the body came to the foreground, and this was apparent at the interview transcripts.

> Sometimes I'm tired or my leg hurts because I have a hip disfunction. (N4)
>
> Sometimes there's pain when I squeeze the arms to get power. There is pain, but it is pleasant. You forget about it, your body may hurt, but at that time when you are dancing you don't feel that you are in pain. (N1)
>
> I try to take the pain out and it helps me forget about it. My body is responding, because I've been in class for so many years, I've learned to respond now with practice and repetition. (N3)
>
> There was a time when my shoulder was bothering me, but after the dance class it stopped hurting. Yes, dance has strengthened my arms and I move my wheelchair more comfortably. (N6)

Participants reported positive emotions and experiences of healing and liberation. During dance lessons, the body changed and was transformed into a body that is "equal" and comparable to the "healthy" body of the volunteer dancers. This is how their body is "perceived" by the others in the dance class. That is because dance and dancing are not fully limited to one's kinetic image. The individual with CP does not need to exhibit and possess absolute physical "integrity" in order to move and dance. Through dancing and body contact, the dancer partner offers strength and encouragement to the other. This is consistent with Laban philosophy, where dancing is for everyone and not only for the talented. Difficulties in mobility and flexibility seem to downsize and matter less. Dancing allows learning new movements and choreography, realizing and practicing new skills, and finally reaching a deeper level of understanding and knowing of their own selves.

> Steps become stable, the rhythm and the disability are no longer separated. One offers not only strength to the other but also encouragement. (N2)
>
> When I find obstacles I may lose my balance, but there are also occasions when I feel like I'm flying after the lesson. (N4)

As the participants were dancing in an inclusive group, all dancers felt they were treated as equals among equals, despite their physical differences, and they did not give up even if they experienced pain due to deformity, incorrect body posture or previous injury. When dancing, the pain that occurs is "forgotten," ignored, and even "disappears." The act of exposing their bodies via dance sessions and performances offers the audience the opportunity to look at and watch a different body perform. This may lead to acceptance of their disability. The participants enjoy this social aspect of dancing and satisfies them greatly. However, this feeling of liberation and satisfaction is closely related to the friendship and physical contact with their fellow dancers. The mixed dance group protects individuals with CP, empowers them, and strengthens them, so the latter feel comfortable to freely express themselves. The moto of the group is "no discrimination in dance."

> There is no difference when dancing with a person with an CP than with a person without one. It's not about the disability, it's about loving what you do. You must like it, want it and love it. It changes all my feelings. (N1)
>
> You feel like you're doing something. You're communicating it. I get energy from the crowd. You

> give them something good and they give it back. (N5)
>
> It certainly creates positive feelings. I feel joy because I am with other people and what we do together is amazing. I feel safe in the group. I rely on the others because they can help me when I need it. (N4)

43.3.2 Subtheme B: The Artistic Aspect of Dance—"Acquiring the Identity of a Dancer"

The second subtheme reveals the artistic value that dance has in the lives of the participants. The status of dancer seems to be relevant in the new patterns of daily life. Through their participation in the dance course and through their exposure to the audience, participants described the process of acquiring knowledge and experiences related to being a dancer. By choosing a different and arduous process for their body, as described in the previous subtheme, overcoming the difficulties, and winning the acceptance of the crowd, they acquired the identity of a dancer.

43.3.2.1 Category 4: The Experience of Being a Dancer

Several participants described a timid beginning involving performance anxiety and stage fright, fear for the unknown, and worry for the success or failure of the performance. Thus, they often experienced negative emotions which they struggled to overcome.

> At the beginning there was anxiety, fear of whether I would make it. (N1)
>
> I was interested in joining the dance team from the beginning, but I was afraid I wouldn't make it. (N4)
>
> I was wondering what people will say when seeing me dancing in a different way. (N2)

Eventually the negative feelings changed and gave way to positive feeling that referred to achievements, desires, and needs for the future. The body changed, became stronger, weakness gave way, and overcame the obstacles. Fear receded and desires for development, recognition, and artistic creation emerged. Participants described having found a new way to express themselves through movement while earning social acceptance.

> When I go on stage the negative feeling stays behind the quintet, and if the body doesn't feel good, I just get over it. I stay true to my goal. I overcome my anxiety on stage and give the desired result to the audience I love. (N3)
>
> …But working with the team creates feelings of joy and enjoyment of the dance lesson. (N1)
>
> Exposure through performance helps me to have more confidence in what I do, in who I am. (N2)
>
> Achieving my goals helps me to feel capable of surpassing myself. (N2)
>
> The dance group helped me to overcome my limitations, to socialize, to express myself. (N4)
>
> I want to dance more. I need it! (N6)

Participants stressed that through the experience of a dancer while participating in an inclusive dance group, they could evolve, envision, and claim their wishes. This theme brings forward their new status as "dancers" which can be described as a new identity. They felt "joy," gained confidence in what they did, and they felt good for achieving their goals. This allowed them to change the social image they carried as individuals with what the society calls as "disabilities." Also, they felt less socially isolated, because they felt they were valued members of an inclusive dance group and therefore they belonged to a microcosmos that accepted them, embraced them, and integrated their "different" bodies.

> I transform myself into a dancer for the needs of the show and take energy from the audience to reach the final goal. I meet people and I can be more social with my new identity. I'm doing things that I couldn't before. (N1)
>
> The team I believe, helped me to learn to get along with everyone, to communicate. I learn to become better for me and for the others. All this journey helped me to take risks and have courage. I want to push my limits and feel freedom. I won't change dancing with all the money in the world. (N5)

43.4 Discussion

The present qualitative study explores and illuminates the experience of individuals with CP participating in an inclusive dance group practicing modern dance. The main theme that emerged was "the passage from darkness to light." That theme included two subthemes that described the therapeutic impact of dancing and the artistic aspect of dance respectively: "Unlocking the body" and "Acquiring the identity of a dancer."

The first subtheme "unlocking the body" captures the experience of CP through the participants' narratives. For example, they talk about the difficulties, the "limitations," and pain of their bodies. This discloses that their body does not help them. However, they also acknowledge the positive effect of dancing on their relationship with themselves and the others. And finally, their accounts highlight the value of dancing as they felt it liberated the motion of their body, it enriched them with positive feelings, and helped them create and maintain friendships in the dance group.

One of the main findings was that CP was experienced as a body that did not help the participants. Despite the social evolution that characterizes our century and the progress regarding the awareness and understanding of disability, the use of common words such as disability and deficit identifies people in a negative way, giving the stigma that society itself imposes on people with disabilities [4]. The biomedical paradigm stresses the benefits of rehabilitation or interventions (such as modifications) to promote what is—from this perspective—deemed to be "normal" functioning since it assumes that biological damage is the primary determinant of disability. Evaluation is frequently focused on what people "need" to "fit" in and easily "operate" in larger society. The social model, on the other hand, argues that physical limitations are a result of a culture that disregards those who have them. Disabling attitudes and situations are prevalent in society, which leads to disabilities [41]. In recent years, efforts have been made to accept and reintegrate people with disabilities into society [54]. This is important because the body image and mobility developed by people with disabilities can be described as inhibiting factors for them. Feminist theorist Grosz [24], when speaking about body image argues that the body itself is not just an individual element but a component of the psychology of the subject itself and the socio-historical context that governs it. The body is not a static medium; it is a carrier of movement, perception, and emotion. The movement of the body—being perceptual firstly due to its referentiality to things in the world and secondly being spatial since the body indicates place—demarcates, by its presence, the separation between self and environment and finally becomes expressed through "speech," through art [7]. The body speaks for itself, becoming a carrier of movement, perception, and emotion. The speaking body has its own experiences and needs to narrate. Beyond the part of art that firmly reinforces it, the moving body can offer important information to the scientists. The analysis of movement can have a potentially significant influence on the attempt to study the body through its movement and can also lead to a more comprehensive attempt to "rehabilitate" it. Certainly, this is true when keeping in mind the needs that arise in the daily life of people who have been described as having physical "disabilities" [20, 21, 33, 47].

Dancing was also experienced as a form of relationship with their own selves and others. Being part of an inclusive dance group develops the psychosocial adjustment and it also seems to create better self-image, self-esteem feelings, and can be the silver lining of social engagement [14, 28]. Dance is a tool for expression and communication that is usually affected in CP since differences in cognitive and movement skills are perceived as deficits [52]. Furthermore, dance can become the mean for recognition of the self, the capabilities of the body, and the production of motion. Through a new form of expression communicative abilities are strengthening and can be expanded from the inner self to the social environment. The reduction of possible pain, the maintenance of the body's functionality, and the activation of the individual in order to get in touch not only with their own world and self but also with society are equally important.

The value of dancing is the next finding we discuss. The participants felt liberated, they experienced positive emotions, their movement increased, and they described the whole process as a healing one. They also started new friendships. There is research that highlights the contribution of dance in terms of balance, motor control, coordination as well as improving gait [3, 8]. Additionally, there is research supporting the value of dance in enhancing two very important systems for movement production, the motor and the sensory systems, which in CP are commonly affected [14, 47]. Dance elucidates these two affected systems by enriching the motor learning and stimulating the vestibural system, which are important for body control, balance, coordination, and rhythm. Moreover, mobility and locomotion are supported by dancing activities and contribute to motor production, functionality, and reduce of pain [51]. In addition, there is growing evidence that apart from the physical aspects it also liberates the psyche and is a strong motivation for people with neurological disabilities to be involved with the others and participated. Thus, it enhances self-esteem, body image, and sense of accomplishment [28]. In conclusion, the participants in our study revealed that they could feel their bodies improving kinetically, and that they had positive emotions about themselves. According to them, the people around them confirmed all the above. Thus, dance seems to have multidimensional value for the participants of the study.

On the other hand, the environment of a person with a disability can often be a barrier to the individual starting a demanding activity such as dance. Even individuals with CP may be afraid to expose themselves, believing that their body will not be able to cope with the demands. In addition, participating in an inclusive dance group from an early age shows that it can enhance a sense of personal competence and belonging. Partly by creating the security for personal growth and exploration of new possibilities that may have been previously ignored [1, 19, 39]. Participants discovered a talent, a new identity. The more they exposed themselves to the unknown and to the audience, the more experienced they got. They learnt to overcome their fears and discover some talent. Thus, dance as art can become the mean to regenerate a disabled body to a dancer through personal empowerment and social engagement and by dancing, they continued to evolve the culture while enhancing the cultural identity of the body [5].

Finally, the body becomes expressive through dance and the participants acquire the identity of a dancer. The speaking body has its own experiences and needs to tell a story. In qualitative studies where individuals have been given the opportunity to narrate what they experience, they state that “they too have a body that they can talk about and observe” [50, p. 435]. Thus, the body is not only the medium of sight or touch but is itself visible and perceived while offering the possibility of being touched [1, 32, 50].

This study reveals the embodied experience of individuals with CP when they dance. According to Merleau-Ponty [37], all human perception is embodied. Without our bodies, we are unable to experience anything or use our senses. This is the foundation of the crucial idea in this context, which is embodiment. Human beings, their perception, and their consciousness are embedded within the body. The self and the body are not separate, and experience, whether conscious or not, is embodied. Merleau-Ponty’s phenomenology affirms that the body is more than a set of parts, it is corporeality and spirituality at the same time, and it is responsible for the integrity of human experience [23, 41]. The body is the medium of knowledge and existence; therefore, it is not possible to separate it from the soul. Merleau-Ponty sees it as the means of communication between the world and the self: the medium through which we perceive the world. According to the phenomenology of perception, the body is not only an object that is available for scrutiny. The body is the “locus” from which our experience of the world starts, it is a living entity [16, 18, 20, 21].

Efforts are already being made in this area and more are needed to make dance accessible to all, regardless of their mobility and cognitive abilities, even at a professional level [39]. Dance is recommended as a process-based activity through which individuals can have fun and be therapeutically empowered through exercise of the body and senses. The inclusion of people with what society perceives as disabilities to integrated/inclusive dance groups can help both the audience and the artists themselves to move towards a future free from preconceived stereotypes of how a dancer could or should be [13].

43.5 Limitations

This is a small-scale qualitative study that illuminated the experiences of individuals with CP at one dance group only. However, although the participants had difficulty in speaking and describing extensively their experiences, the first author who collected and analyzed the data was very familiar to their speech particularities and allowed them to share their experience. Further studies may move away from relying exclusively on verbal interviews as the only way of sharing experiences; creative means in the form of movement, mark-making or sounds in response to the interview questions could have enabled participants to find a "voice" that suited them. Furthermore, a large-scale research with informants from different dance groups would improve our understanding on dancing and CP, though the dance sessions differ a lot between each group.

43.6 Conclusion

This study aimed to investigate the experience of dancing at individuals with CP who participate in inclusive dance group. Drawing from the allegory of "Plato's cave," the participants described dance and dancing as a means of transformation, a "passage from darkness to light." They took the risk to change and transform, they exposed themselves and bodies to other dancers, and they gradually found their way towards the "light" and away from the darkness. They experienced dancing as "unlocking" and "opening" of their bodies and own selves. Not only did their bodies respond to the dance classes, they furthermore gained new friends and experienced equality within the group. They were freed from introversion and social isolation. Through their dancing, they felt accepted by the others and the society that surrounded them. Artistically, they acquired a new identity, that of a "dancer." Hence, they redefined their bodies and reached a new perception which was far away from inhabiting a "deficient" and "difficult" body.

Since individuals with "disabilities" usually experience social isolation, lack of stimuli and reduced activity, both at an individual and social level, we propose the establishment and strengthening of such programs and group activities, as they do not only serve a recreational role but also a therapeutic one with profound effect on the participants and the professionals who facilitate them. However, there is need for further research concerning the impact for example of the inclusive dance experience to able bodied dancers, exploring whether changes in perceptions around ability and disability are possible within the context of dance classes. Further research is also needed to look more closely into cognitive, alongside psychosocial parameters of people with CP, which are likely to be influenced by the moving body and dance.FundingOur project was funded by the postgraduate course "Neurological Disorders—Evidence Based Practice," Department of Nursing, University of West Attica, Athens.

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44

Brain Activity of Professional Dancers During Audiovisual Stimuli Exposure: A Systematic Review

Kyriaki Angelopoulou, Dimitrios Vlachakis,
Christina Darviri, George P. Chrousos,
Christina Kanaka-Gantenbein,
and Flora Bacopoulou

Abstract

Many studies have shown the effect of dance to the brain. It seems that long-term practice modulates brain plasticity and visuomotor skills, as it activates the Action Observation Network (AON). The aim of this systematic review was to evaluate potential differences in the brain activity (visuomotor skills) between professional dancers and non-dancer adults, measured by electroencephalography (EEG), during the observation of an individual who is dancing (video dance stimuli). This literature search was conducted from February to June 2022, according to the PRISMA guidelines, in the PubMed database using advanced search, mesh terms, and extensive manual search. The included articles were published in English. Specifically, case-control studies were selected, which used healthy adults, professional dancers, and non-dancers as participants, who were exposed to video dance clips and measured by EEG. The articles were excluded if they were based on different type of study, unhealthy population, control group with athletic background, different type of stimuli (rhythmic), or different type of task and procedure. The ratings of quality of evidence were conducted using the Joanna Briggs Institute's (JBI) critical appraisal tool. Five case-control studies were included with 193

K. Angelopoulou · C. Darviri
School of Medicine, National and Kapodistrian University of Athens, Athens, Greece
e-mail: Kyriaan@med.uoa.gr

D. Vlachakis
Laboratory of Genetics, Department of Biotechnology,
School of Applied Biology and Biotechnology, Agricultural University of Athens,
Athens, Greece
e-mail: dimvl@aua.gr

G. P. Chrousos
University Research Institute of Maternal and Child Health & Precision Medicine, and UNESCO Chair in Adolescent Health Care, Aghia Sophia Children's Hospital, National and Kapodistrian University of Athens, Athens, Greece

C. Kanaka-Gantenbein
First Department of Pediatrics, School of Medicine, Aghia Sophia Children's Hospital, National and Kapodistrian University of Athens, Athens, Greece
e-mail: ckanaka@med.uoa.gr

F. Bacopoulou (✉)
Center for Adolescent Medicine and UNESCO Chair in Adolescent Health Care, First Department of Pediatrics, School of Medicine, Aghia Sophia Children's Hospital, National and Kapodistrian University of Athens,
Athens, Greece
e-mail: fbacopoulou@med.uoa.g

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participants in total, 87% females. The participating groups of professional dancers ($n = 12–25$) had mean age 25.14 years, with at least 9–19 years of professional training, whereas control groups had the same sample size, mean age of 24.14 years, and no experience in dancing. Most of the studies presented high methodological quality. All studies showed significant differences in dancers' brain activity, especially regarding the visuomotor skills. The results showed faster activation of AON demonstrated by higher P300 at the frontocentral regions and increased sensitivity of the occipital temporal cortex. Dancers could cope easier with familiar—unfamiliar and effortful—effortless movements. They also demonstrated faster alpha band peak frequency, stronger synchrony over the bands theta, beta, gamma during the audiovisual stimuli, and the ability to encode faster the visual information. The results demonstrate that dancers had better visuomotor skills suggesting dance-enhanced neuroplasticity, as professional dancers processed their actions easier. Dance, which includes visuomotor tasks, could help in prevention, therapy, and rehabilitation of neurodegenerative diseases or movement disorders.

Keywords

Dance · Brain activity · Visuomotor skills · Action observation network · EEG

44.1 Introduction

The visuomotor skills express the ability to observe and analyze a visual stimulus and the motor reaction to it. When an individual observes another individual performing a familiar action, the action observation network (AON) which includes the mirror neurons system (MNS) is activated to imitate and execute this action. It is composed of the frontoparietal and occipitotemporal regions of the brain and it is involved in coding of action. These systems are vital in facilitating motor learning [1–3].

Many studies have shown the effect of dance to the brain. It seems that long-term practice modulates the brain plasticity and visuomotor skills, as it activates the MNS and AON. It is common for dancers to initially observe a choreography before they execute it. As a result, research in dance could give an insight to brain activity. A technique which can be used to capture dancers' brain activity during the observation of an individual dancing is electroencephalography (EEG) [4].

There are many hypotheses about dancers' brain activity, especially regarding the activation of AON, their ability of encoding visual information and their adjustment to different types of movements [2, 5, 6]. The aim of tis systematic review was to evaluate potential differences in the brain activity (visuomotor skills) between professional dancers and non-dancer adults, measured by electroencephalography (EEG), during the observation of an individual who is dancing (video dance stimuli).

44.2 Methods

44.2.1 Literature Research

This systematic review was conducted from February to June 2022, according to the PRISMA guidelines, in the PubMed database using advanced search and mesh terms. The following search terms were used: dance AND (brain activity OR "brain activity" OR brain waves OR "brain waves" OR visuomotor processing) AND EEG AND adults AND (video OR "video stimuli"). Extensive manual search was taken place to avoid exclusion of relevant research articles.

44.2.2 Selection Criteria

The systematic review included case-control studies published in English. Included participants were healthy adults, specifically groups of professional dancers and control groups of non-dancers.

The studies included an audiovisual stimulus as an exposure, that is, a video dance clip. The measurement of brain activity was conducted by EEG. The articles were excluded if they were based on different types of studies, unhealthy population, control group with athletic background, different type of stimulus (rhythmic), or different type of task and procedure, as shown in the PRISMA flow diagram (Fig. 44.1).

44.2.3 Data Extraction

At first, research articles' titles and abstracts were assessed according to the inclusion criteria. Subsequently, the same procedure was followed regarding the full texts. Then the data of the included articles, such as authors, year of publication, characteristics of participants (sample size, profession, mean age), type of stimuli exposure, measurement, and main results, were gathered, as shown in Table 44.1. The ratings of quality of evidence were conducted using the JBI critical appraisal tool. Its questions (Q) are presented in Table 44.2. Each question was answered with Y (yes), U (unclear) or N (no), resulting to a total Yes score (%) and a total score (%) for each study.

44.3 Results

44.3.1 Studies Included

The literature research in PubMed yielded 29 research articles, as shown in the PRISMA flow diagram (Fig. 44.1). Initially, screening of titles and abstracts was conducted, according to the inclusion criteria. The following were excluded: 3 articles that were reports, 6 articles that included unhealthy population (brain injury, chronic disease), 1 article due to athletic background of the control group, and 3 articles due to rhythmic and not visual stimuli exposure. The 16 remaining articles' full texts were assessed. Six of them were excluded due to their type of task and procedure, as participants were asked to initially practice the video's choreography or to dance it while they were watching video. Furthermore, five articles were excluded because of the stimulus, which was either an audio stimulus (tapping or music) separated from the visual, or a video dance game.

44.3.2 Characteristics of Studies

The remaining five case-control studies were included in this systematic review. The characteristics (sample, profession, exposure, method of measurement, main results) of the studies are shown in Table 44.1. The participants were 193 in total, adult volunteers, 87% females. Specifically, there were participating groups of professional dancers (n = 12–25), mean age 25.14 years, with at least 9–19 years of professional training, and control groups with the same sample size, mean age 24.14 years, with no experience in dancing. In most of the studies, ballet professional dancers were participating. In one study, the participants were ballet and contemporary professional dancers [7], one study had only contemporary professional dancers [8], and one study used a ballet professional dancers group, a group of non-ballet dancers and a group of non-dancers.

Moreover, one study used non-dancers and musicians with no experience in dancing as its control group. All participants were healthy, with no visual or neurological illness. They were right-handed, with the exception of one study which used 2 left-handed participants per group [7].

The participants (dancers and non-dancers) of all studies were asked to watch a dance video clip [7–11]. Two studies also included an additional task for studying dancers' motor imagery [9, 10]. Most of the studies showed a video without any familiar ballet movement, except for 2 studies which showed ballet movements of different level of expertise [9, 11].

All studies used EEG as a mean of measurement of dancers' and non-dancers' brain activity during the audiovisual stimulus. All studies except one [10] referred to the Event-Related

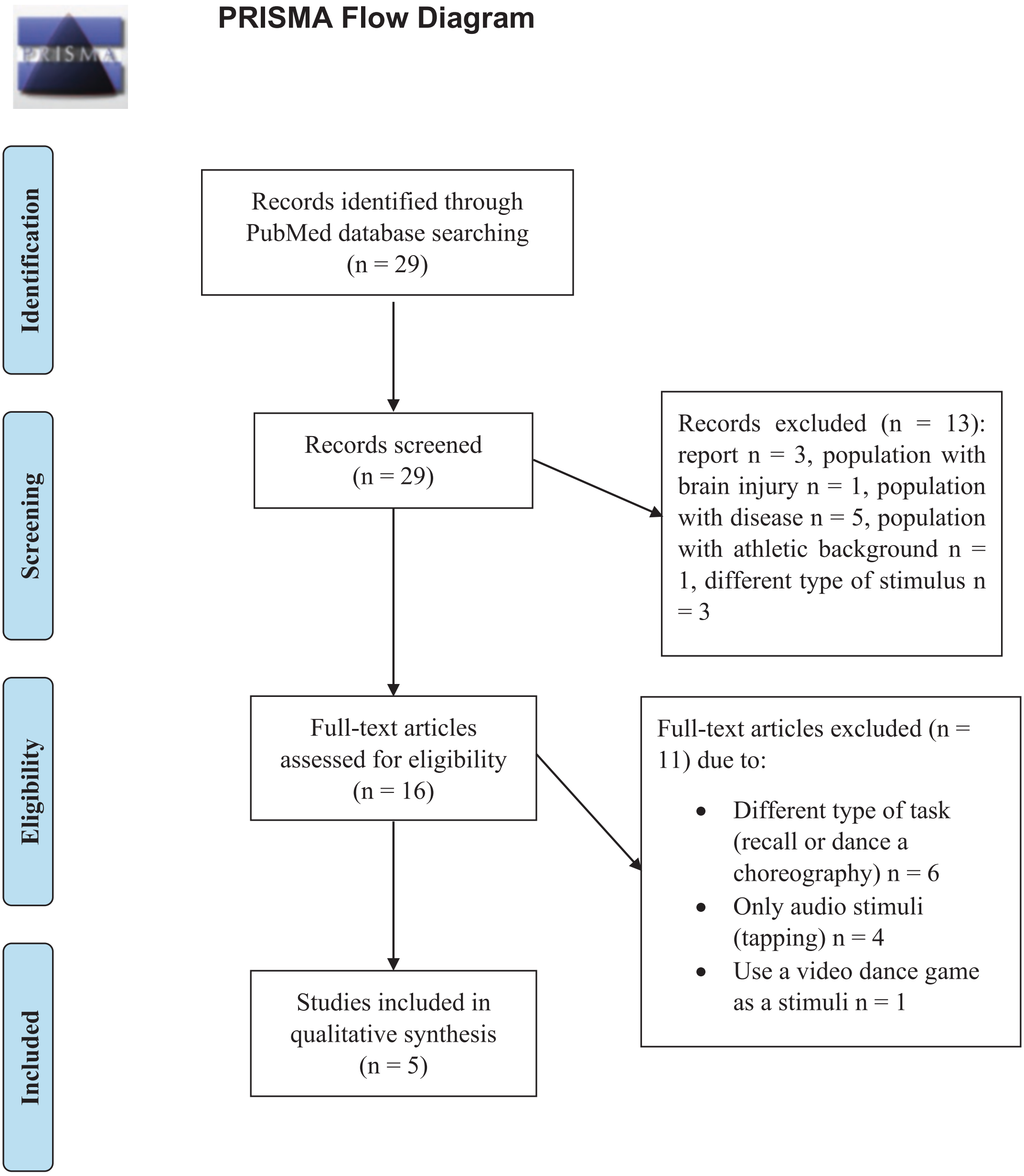

Fig. 44.1 PRISMA flow diagram

Potential (ERP) (*P* = 300) index, which is associated with stimulus recognition, categorization and visual awareness. Three studies have also used swLORETA (low resolution electromagnetic tomographic analysis) [8, 9, 11] and one study has also used the questionnaire “Visual and Motor Imagery Questionnaire—2 scale” (VMIQ-2scale) [10].

44.3.3 Quality Synthesis

Table 44.2 shows the methodological quality assessment of the 5 studies by the JBI critical appraisal tool. The studies presented high methodological quality. Two studies had a total score of 100% and three studies had a total score of 89%. Two of them used only women in the sam-

Table 44.1 Data extraction table

Author, Year	Participants	Professional dancers	Control group		Exposure	Method	Main results
Di Nota et al. (2017)	$N = 61$ (78.69% females) SD = 4.22	$N = 25$ Ballet dancers (88% females) $M = 20.56$ SD = 4.22	$N = 21$ Non ballet dancers (71.43% females) $M = 20.67$ SD = 3.6	$N = 15$ Non dancers (73.33% females)	Action observation (AO) (8 s video clip of a choreographed ballet dance: view max 30 times 15–20 min), confidence interval: 95% Kinaesthetic motor imagery (KMI) with audio stimuli (15–20 min) KMI portion of the visual and motor imagery questionnaire (VMIQ-2)	EEG headset VMIQ-2 scale	AO task: faster alpha band peak frequency (iAPF) ballet dance group—controlgroups ($p = 0.029$, $p = 0.018$) VMIQ-2 task: faster iAPF ballet group—control groups ($p = 0.049$, $p = 0.027$) KMI task: No significant difference between groups VMIQ-2—KMI task: All participants had significantly faster iAPF ($p = 0.000$)
Orlandi et al. (2020)	$N = 30$, 100% females	$N = 15$ Ballet dancers (100% females) $M = 24.6$ SD = 3.4	–	$N = 15$ Non dancers (100% females) $M = 24.9$ SD = 2.9	354 video clips lasted 2 s with movements of ballet repertoire motor imagery	EEG ERP swLORETA (low resolution electromagnetic tomographic analysis)	Significant main effect of the effort factor [$F(1, 28) = 15.92$, $p < 0.001$]. Effortful—standard effort: larger positivity (2.41 μV; SE = 0.38–1.70 μV; SE = 0.36) P300 dancer group (effortful: 6.33 μV; SE = 0.67; effortless: 4.13 μV; SE = 0.48; $p < 0.0002$) control group (effortful: 4.66 μV; SE = 0.67; effortless: 3.78 μV; SE = 0.48; $p = 0.097$)

(continued)

Table 44.1 (continued)

Author, Year	Participants	Professional dancers	Control group		Exposure	Method	Main results
Orlandi et al. (2017)	$N = 24$, 75% females	$N = 12$ Contemporary dancers (75% females) M = 29.8 SD = 4.84	–	$N = 12$ Non dancers (75% females) $M = 26.1$ SD = 4.72	440 video clips consisted of pairs of same or different body movements of 3 s	EEG ERP swLORETA	P300-Pre-condition (4.29 μV, SE = 0.52) P300-Post-conditions (Same movement: 3.08 μV, SE = 0.34; Different movement: 3.09 μV, SE = 0.33) N2: significance of the group factor [$F(1, 22) = 7.95$, $p = 0.0099$, $\varepsilon = 1$, ηp2 = 0.26] N2 fronto central sites dancers-control group: (−3.14 μV, SE = 0.53). N400: significant difference in comprehension of complex movements in dancers
Poikonen et al. (2018)	$N = 44$, 86.36% females	$N = 18$ Dancers (72.22% females)	$N = 18$ Musicians (72.22% females)	$N = 18$ Non dancers Non musicians (66.67% females)	20 trials of 15 min of dance video clip and audio Total: 60 min	EEG ERP	Dancers showed strong phase synchrony in the theta, beta, and gamma bands
Orlandi et al. (2019)	$N = 34$, 100% females	$N = 17$ Ballet dancers (100% females) $M = 25.59$ SD = 5.29	–	$N = 17$ Non dancers $M = 24.88$ SD = 2.78	326 dance video clips lasted 2 s	EEG ERP sWLORETA	Fronto-central regions in dancers and control group (mean value 4 μV – 1.6 μV). P300: Dancers—controls fronto central (3.27 μV, SE = 0.56, 0.96 μV, SE = 0.56), significant group factor [$F(1, 32) = 8.538$, $p < 0.007$] P300 central—frontal sites (Cz: 2,99 μV, SE = 0.41; FCz: 2.12 μV, SE = 0.41; Fz: 1.23 μV, SE = 0.41; $p < 0.001$), significant electrode factor [$F(2, 64) = 53.058$, $p < 0.0001$]

Table 44.2 Joanna Briggs institute (JBI) critical appraisal tool

References	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	%
Di Nota et al (2017)	Y	Y	Y	Y	Y	Y	Y	Y	Y	100
Orlandi et al. (2020)	Y	Y	Y	Y	Y	Y	Y	Y	Y	100
Orlandi et al. (2017)	N	Y	Y	Y	Y	Y	Y	Y	Y	89
Poikonen (2018)	Y	Y	Y	Y	Y	Y	Y	U	Y	89
Orlandi et al. (2019)	N	Y	Y	Y	Y	Y	Y	Y	Y	89
Total yes (%)	60	100	100	100	100	100	100	80	100	–

Q1. Was the design appropriate to address the target population? Q2. were study participants sampled in appropriate way? Q3. Was the sample size adequate? Q4. Were the study subjects and the setting described in detail? Q5. Was data analysis conducted with sufficient coverage of the identified sample? Q6. Were valid methods used for identification of the condition? Q7. was the condition measured in standard, reliable way for all participants? Q8. Was there appropriate statistical analysis? Q9. Was the response rate adequate, and if not, was the low response rate managed appropriately?

ple (Q1: N) [8, 11] and one study did not clarify some of the statistical data that were used (Q8: U) [7]. All questions gathered a total "yes score" of 100%, except for Q1 which gathered 60% and Q2 which gathered 80%.

44.3.4 Synthesis of Results

All studies showed significant difference in dancers' brain activity and visuomotor skills. The results showed faster activation of AON demonstrated by higher P300 at the frontocentral regions and increased sensitivity of the occipito-temporal cortex. Dancers could cope easier with familiar—unfamiliar and effortful—effortless movements [8, 9]. They also demonstrated faster alpha band peak frequency [10], stronger synchrony over the bands theta, beta, gamma during the audiovisual stimuli [7], and the ability to encode faster the visual information [9].

More specifically, in one study, the familiar ballet dance group showed faster alpha band peak frequency (iAPF) during the Action Observation (AO) task, relative to both non-ballet dance ($p = 0.029$) and non-dance ($p = 0.018$) groups, and also demonstrated faster iAPF in relation to non-ballet ($p = 0.049$) and non-dance groups ($p = 0.027$) during the VMIQ-2 task. No significant differences were observed between group effects during the Kinaesthetic Motor Imagery (KMI) task. Moreover, all participants had significantly faster iAPF during the VMIQ-2 task relative to the KMI task ($p = 0.000$) [10].

The results of one study showed a significant main effect of the effort factor [$F(1, 28) = 15.92$, $p < 0.001$]. A larger positivity was found in response to effortful (2.41 μV; SE = 0.38) than standard effort stimuli (1.70 μV; SE = 0.36). Moreover, a significant interaction between effort and group factors [$F(1, 28) = 6.54$, $p < 0.02$, $\eta p2 = 0.19$] and the relevant Tukey's posthoc test showed that the difference in P300 amplitude in response to effortful vs. effortless stimuli was significant only in the dancers' group (effortful: 6.33 μV; SE = 0.67; effortless: 4.13 μV; SE = 0.48; $p < 0.0002$) and not in the control group (effortful: 4.66 μV; SE = 0.67; effortless: 3.78 μV; SE = 0.48; $p = 0.097$). It seems that the control group has increased cognitive demands due to lack of dance-specific motor knowledge. Additionally, the dancers seem to have the visuomotor skills to encode effort information during action observation, as P300 suggested [9].

One study showed the significance of the Condition factor [$F(1.17, 25.77) = 15.36$, $p = 0.00034$]. P300 was larger in amplitude in response to the Pre-condition (initial movement) (4.29 μV, SE = 0.52) than both Post-conditions (Same movement: 3.08 μV, SE = 0.34; Different movement: 3.09 μV, SE = 0.33). P300 showed no significance difference in comprehension of different movements at dancers and non-dancers. *N*2 showed the significance of the Group factor [$F(1, 22)=7.95, p = 0.0099, \varepsilon = 1, \eta p2 = 0.26$]. *N*2 also, over the frontocentral sites of the scalp was larger in Dancers (−3.14 μV, SE = 0.53) than in Controls. N400 demonstrates a significance difference in comprehension of complex movements at dancers [8].

In one study, dancers showed strong phase synchronization in the theta, beta, and gamma bands. When professional dancers watched dance, they paid attention to and evaluated the movement from a different perspective than laymen. Musicians had also focused on the protagonist of the context. In silence, laymen had increased theta and gamma synchrony. They may have observed the dancer from a general social perspective considering her intentions, thoughts, and emotions or observed her in the spatial context [7].

One study showed that the frontocentral P300 indicated a larger positivity in dancers (3.27 μV, SE = 0.56) than controls (0.96 μV, SE = 0.56), as shown by the significant group factor [$F(1, 32) = 8.538$, $p < 0.007$]. The significant electrode factor [$F(2, 64) = 53.058$, $p < 0.0001$] and relative post-hoc tests showed that the P300 was larger over central than frontal sites (Cz: 2,99 μV, SE = 0.41; FCz: 2.12 μV, SE = 0.41; Fz: 1.23 μV, SE = 0.41; $p < 0.001$). Furthermore, the frontocentral distributed P300 recorded over the midline sites was sensitive to dance expertise, since it was larger in dancers (mean value 4 μV) compared to the control group (mean value 1.6 μV) [11].

In summary, ERP was larger in professional dancers in comprehension of the movements for effort, familiarity, and decoding.

44.4 Discussion

The purpose of this study was to indicate potential differences between dancers' and non-dancers' brain activity and specifically in their visuomotor skills. Dancers were found to have better visuomotor skills than non-dancers through the dance-induced neuroplasticity and especially the difference in activation of the AON. The articles' results showed better visuomotor skills from a different perspective. The dancers could adjust easier to familiar and unfamiliar, effortless, and effortful movements probably because of dance training, which requires visuomotor skills and leads to an increased ability to codify action parameters, such us muscular effort [9, 10]. It was also found that dancers could encode and detect very slight differences between two novel dance movements, as a result of their visuomotor expertise [8]. The dancers were easier related to the dance video and its movements, as suggested by the strong phase synchrony in theta, beta, and gamma bands [7]. They also had a larger occipitotemporal cortex which is involved in AON and perception of familiar dance movements [11].

Dancers are trained to quickly learn a choreography by observing a teacher or a choreographer. This ability activates the AON in occipital cortex. Increased activity of this network appears because of the motor familiarity expertise especially in the regions associated with the motor function [12]. According to a study, the mirror neurons, which are part of the AON, can coordinate the visual information with the observer's motor knowledge.

Mirror neurons are part of the AON. They are related to analysis of action and to visuomotor and sequence learning [12]. Moreover, the activation of mirror neurons is related to prediction, anticipation, as well as the execution of the movements. The neural regions composing AON respond both to observational and physical training. This result indicates that it is feasible to learn a movement by passive observation, without any instructions [13].

The results of this systematic review could demonstrate the experience-dependent plasticity of alpha and beta activity**,** because of the dancers' movement processing. Brain activity modulates depending on the dancers' experience and the ability of learning [13, 14]. Dance practice activates visuomotor networks. Higher iAPF underlines attention and readiness to perform cognitive tasks, including working with memory [15].

Another study, associated with observing and imagining movements, showed that dancers could adjust to the task depending on their ability to perform the movement and their experience. This indicates that expertise and motor repertoire modulate brain activity, thus AON in occipitocortex [16]. The stronger activation of the AON is justified due to memory strategies that dancers have developed through training [17] and due to their different manner of information processing. Their motor learning system is modulated to be fast and efficient. In this way, it is effortless to encode a visual information [18].

The results (P400) have, also, showed the ability of dancers to understand the difference between two novel movements. The evidence suggested a modulation of visuomotor perception of complicated movements through the AON. The dance training modulates the brain plasticity. The dancers showed larger P300, indicating faster movement processing and enhanced movement recognition. P300 response between dancers and no dancers had no difference only in one study. This might suggest a habituation to the repetition of the body instead of the same movement. Another study involved architects that were asked to detect specific target stimuli (buildings), however no modulation in brain activity was detected. This effect may be a result of the general visual familiarity acquired by all individuals during daily living [19]. Similar studies that were observing the errors at the movements of professional basketball players indicated the ability to automatically comprehend the difference [20]. The same outcome was observed in a study involving tango dancers who were asked to observe and comprehend the errors at dance steps.

Furthermore, the results showed that effort-related information modulated the dancers' ERP responses over frontal and parietal regions. This indicates better visuomotor action processing and especially encoding, due to dancers' motor knowledge. The dancers had increased sensitivity of the occipital temporal cortex to dance kinematics, due to extensive whole-body practicing. They could also process action faster. The sensitivity to frontocentral regions is related to the representation, item recognition and categorization. Several studies have shown a modulation of this region, as a result of expertise in dancers and musicians [21, 22]. A study showed enhanced P300 over parietal sites in professional badminton players, when asked to predict the ball's landing position during game action observation [23]. These suggest that enhanced P300 is an indicator of movement recognition in expert observers. Similarly, the dancers showed the ability to detect and categorize action variations and violations [24, 25].

Finally, the dancers showed strong synchrony in theta, beta and gamma bands. Emotional processing and movement in space are associated with enhanced theta synchrony [26]. The absence of alpha and beta desynchronization in dancers suggests, either more efficient neural processing and faster adaptation to these stimuli, or attention being directed to music during the audiovisual stimulus so no systematic changes occurring in synchrony with dance.

Other studies have shown that dancing enhanced cortical synchrony in different frequency bands (delta, theta, alpha, beta). This has been linked to the perception, imagining and preparation of the movement. It may reflect cognitive and affective skills that developed due to dance training [27].

This systematic report included a small number of articles, as only a few were found to respond to the inclusion criteria. There were even less studies combining this type of visuomotor tasks and the use of EEG. Also, a small number of males in these studies was included, as there were more the female dancers that volunteered. However, the samples of dancers and non-dancers, males and females were cross-linked. Nevertheless, all studies reported statistically significant outcomes. All studies indicate that dancers have better visuomotor skills and a higher ERP. Only one study showed decreased P300 response and increased response P400, which was justified by the methodology [8].

Overall, the result of this systematic review suggests that dance lessons could help in brain plasticity and, especially in the activation of AON, iAPF, memory and motor skills. Dancers seems to shape the perception of both music and dance. The EEG analysis method used in these studies could be applied in music and dance therapy, as well as in educational contexts, to understand and utilize brain plasticity under a motorically, cognitively and emotionally demanding task, such as dancing or playing music. Dance could help in prevention, therapy and rehabilitation of chronic diseases. For example, elderly have lower iAPF [28]. Neurological disorders such as Alzheimer's and Parkinson's diseases are common to the elderly and are characterized by short memory and movement disorders. It is suggested that dance-induced plasticity could help with their rehabilitation. Tasks which involve visuomotor skills could help to increase patients' skills passively by activating AON. Dance could be used as a way to heal cognitive or movement-related disorders [29, 30].

44.5 Conclusion

The results of this systematic review showed that dancers had better visuomotor skills, better activation of AON and they could cope with familiar-unfamiliar and effortful-effortless movements. They could encode faster the visual information and understand minimal differences between novel movements. They also had strong phase synchrony in theta, beta, and gamma bands and a faster activation and larger occipitotemporal cortex. These results imply a dance-enhanced neuroplasticity. The dancers, due to expertise, modulate their brain activity and they process easier any action than non-dancers. Future research is suggested to study the impact of visuomotor tasks measured by EEG in both sexes. Moreover, a study of visuomotor skills between different types of dance is suggested. Finally, the impact of visuomotor tasks on rehabilitation of chronic diseases could, also, be studied.

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The Effect of Schroth Method on Postural Control and Balance in Patients with Adolescent Idiopathic Scoliosis: A Literature Review

A. Kastrinis, G. Koumantakis, M. Tsekoura,
E. Nomikou, M. Katsoulaki, E. Theodosopoulos,
N. Strimpakos, and Z. Dimitriadis

Abstract

The objective of this review was to offer new information on the effectiveness of Schroth method on postural control and balance in patients with adolescent idiopathic scoliosis (AIS). PubMed, EBSCO, and Google Scholar databases were searched from June 2022 to August 2022 for prospective controlled trials and randomized controlled trials related to effects of Schroth exercises on postural control and balance in patients with AIS. The key words AIS, Schroth, balance, postural control, and proprioception were used. Studies written in English language, in the last decade were included. Seven studies were included in the review, with a total of 244 study subjects. Three studies investigated the effectiveness of Schroth exercises on balance and postural control. Two studies included investigated the effectiveness of Schroth method in combination with additional treatments of bracing and hippotherapy, while two other studies investigated effectiveness of Schroth when compared with Pilates and proprioceptive neuromuscular facilitation (PNF). The treatment duration varied from a week to 6 months. From the findings of this review, it is supported that Schroth method can have positive effects on balance and postural control in AIS patients. Further investigation is necessary.

Keywords

AIS · Schroth · Balance · Postural control and proprioception

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A. Kastrinis (✉) · N. Strimpakos · Z. Dimitriadis
Physiotherapy Department, Health Assessment and Quality of Life Research Laboratory, School of Health Sciences, University of Thessaly,
Lamia, Greece

G. Koumantakis
Department of Physiotherapy, Faculty of Health and Care Sciences, University of West Attica,
Athens, Greece

M. Tsekoura
Physiotherapy Department, School of Health Rehabilitation Sciences, University of Patras,
Rio, Greece

E. Nomikou
The House, Rehabilitation Center for Children,
Athens, Greece

M. Katsoulaki
PhysioDrasis, Physiotherapy Clinic, Athens, Greece

E. Theodosopoulos
Athens Scoliosis – Spine Rehabilitation Clinic,
Athens, Greece

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45.1 Introduction

Adolescent idiopathic scoliosis (AIS) is the most common spinal deformity affecting children and adolescents between 10 and 18 years old. It is a three-dimensional (3D) deformity, characterized by lateral deviation, axial rotation, and abnormal sagittal curvature of the spine [8, 17]. According to Negrini et al. [16], AIS is confirmed by a Cobb angle of 10° or more, as measured on the antero-posterior standing spinal radiograph, accompanied by vertebral rotation [16]. The prevalence of AIS is 0.47–5.20% in the general adolescent population around the world [12]. AIS is more prevalent in females, and females tend to progress more than males. Female-to-male ratio ranges from 1.5:1 to 3:1 and increases substantially with increasing age and Cobb angle. The female/male ratio is 1.4/1 in curves of 10 degrees and above, whereas it increases to 5/1 for curves of more than 30 degrees [17, 19]. Poor balance in static and dynamic condition and impaired postural control have been reported in many patients with AIS [18]. Progressive deformity in these patients can lead to asymmetrical load on the spine, abnormal center of pressure, increased trunk muscle contraction, and muscular imbalance between the two sides of spine [9, 21, 23]. Idiopathic scoliosis seems to be correlated with inadequate somato-sensorial evoked potentials, proprioception disorders, brain stem dysfunction, and other intracranial structural abnormalities [7, 23]. Therefore, it could be expected that this disease leads to impaired balance control. AIS might be treated conservatively or surgically and the basis for the effects of exercise therapy as a conservative treatment method has been reported recently. Physiotherapy scoliosis-specific exercises (PSSEs) are gaining ground in research as more effective than non-specific exercises in the management of AIS [5]. Schroth method is an individualized exercise program for three-dimensional posture correction through rotating breathing techniques that focus on improving patient's posture and spine alignment [22]. Other key features of the method are: proprioceptive exercises for body schema correction, body awareness exercises, stabilizing exercises, and exercises that integrate correct posture in daily routine [5]. Many studies have reported the beneficial effects of Schroth method on Cobb angle, pulmonary function, and functional movements [6, 22]. The literature data available concerning the effects of Schroth method on improving postural control are limited. The aim of this study was to determine the possible effects of Schroth method on postural control and balance in patients with AIS.

45.2 Search Strategy and Selection Criteria

A literature search was performed in PubMed, EBSCO, and Google Scholar databases from June 2022 to August 2022 for prospective controlled trials and randomized controlled trials related to effects of Schroth exercises on postural control and balance in patients with AIS. Key words or medical subject heading terms including “adolescent idiopathic scoliosis,” “Schroth,” “balance,” “postural control,” “proprioception,” and their combinations were used. The reference lists of systematic review articles and meta-analyses were scanned for any additional references missed from the above databases' search. Studies written in English language, in the last decade were included.

45.3 Study Findings

The abstracts of 22 studies were assessed for eligibility. Fifteen studies were eliminated because they did not match the inclusion criteria. A total of 7 studies were included in the review: including 244 patients with AIS. Two studies were performed in Egypt, three studies were performed in Turkey, one in Korea, and one in Saudi Arabia. The effects of Schroth method alone on balance were explored in three studies, while in the other studies the effectiveness of Schroth method was investigated in combination with other treatment methods or in comparison with other methods. Three studies compared Schroth exercise training with another intervention; one study compared

Schroth exercise with Pilates exercise, one study compared Schroth exercise with proprioceptive neuromuscular facilitation (PNF). One study investigated the effect of Schroth exercise combined with hippotherapy. One study included bracing as part of therapy. Two studies reported 3-month intervention duration, 1 study reported 8 weeks, 1 study reported 10 weeks, 1 study reported 18 sessions, and 1 had 6 months. One study examined the effects of a short-term Schroth exercise camp with a 7-day total duration (Table 45.1).

45.4 Discussion

Adolescent idiopathic scoliosis is a 3D spinal deformity highly associated with dysfunction in the postural regulation system particularly in scoliotic subjects with progressive curves [13, 15]. This review aimed to provide an overview of the possible effects of Schroth exercises on postural control and balance in patients with AIS. According to the results of seven studies, Schroth exercises appear to have a role in improving postural control, balance, and postural stability. Literature findings support these results. In a study conducted in 2018, Akcay-Bayraktar et al. investigated the effects of Schroth method in combination with orthotic device treatment on balance control in patients with AIS. The participants in the experimental group wore full-time rigid braces 23 h per day and performed tailor-made Schroth exercises, 3 times per week for a total of 18 sessions. This study showed that Schroth method in combination with bracing may provide significant improvements in certain components of postural control such as center of gravity sway velocity and limit of stability values. Furthermore, the results suggest that the inadequate vestibular system in patients with AİS may also develop. The improvements were mainly detected at the end of treatment, something that will be valuable information for future clinical studies. Previous literature [7, 10] has reported that AIS is associated with proprioception defects and peripheral and/or spinal joint proprioception dysfunction, which may be related to the initiation and progression of scoliosis. Akyurek et al. [3] examined the efficacy of physiotherapeutic scoliosis-specific exercises (PSSEs) on spine joint reposition (JR) sense. They applied an 8-week Schroth exercise program in scoliotic subjects with mean age 13.79 ± 1.82 years. They assessed patients' JR error, angle of trunk rotation (ATR), and postural parameters at the first session and at the end of 8 weeks. The data demonstrated that Schroth exercises contribute to the improvement of joint position sense and posture. The combined effects of hippotherapy together with Schroth exercises on postural asymmetry and dynamic balance were evaluated in a study by Abdel-aziem et al. [1]. In this randomized controlled study, 52 patients with mild AIS (Cobb angles ranging from 10 to 25 degrees) were allocated in two groups. Both groups received Schroth exercise for 10 weeks, while the experimental group additionally received hippotherapy training. The researchers observed that hippotherapy in addition to Schroth method was more effective than Schroth exercises alone in improving posture asymmetry and balancing ability of AIS patient. These improvements suggest that this combination should be considered when developing rehabilitation programs for adolescent idiopathic scoliosis. Scoliosis causes weight distribution changes and the weight loading position changes according to the type, the position, and the Cobb angle. Two previous studies made a comparison between effects of Schroth and Pilates exercises [11] and Schroth exercises and proprioceptive neuromuscular facilitation (PNF) [14] on body weight distribution and static plantar pressure distribution in patients with idiopathic scoliosis. Both studies showed significant improvements in Schroth groups compared to the other two interventions. This suggests that Schroth exercises are more effective than the Pilates exercise or PNF. Further study is needed. Radwan et al. [20] compared 20 AIS patients aged 10–16 with 20 of their peers not diagnosed with AIS. In their study they used the Biodex Balance System to evaluate the overall stability index (OSI), anteroposterior index (APSI), and mediolateral stability index (MLSI). The measurements took place

Table 45.1 List of studies

Study	Age (years)	Sample (*N*)	Intervention	Frequency	Outcome measures	Results
Abdel-aziem et al. [1] (Saudi Arabia)	IG: 14.74 ± 1.79 CG: 15.04 ± 1.81	52	IG: Hippotherapy and Schroth exercises CG: Schroth exercises	Schroth exercises: 3 times/week, 10 weeks Hippotherapy: 15 sessions	Formetric 4D system (scoliotic, kyphotic angle, pelvic obliquity, pelvic torsion, and vertical spinal rotation) Biodex Balance system (Stability indexes)	All variables (spinal measurements, stability indexes) were improved More significant improvement in IG
Mohamed and Yousef [14] (Egypt)	Schroth G: 14.50 ± 1.20 PNF G: 14.90 ± 1.40	34	Schroth G: Schroth exercises PNF G: proprioceptive neuromuscular facilitation	3 times/week, 6 months	Cobb angle: anterior–posterior full spine ATR: scoliometer Static plantar pressure distribution of both feet 6 minute walk test (6MWT): Functional capacity	Significant differences were observed in all variables in the Schroth therapy group
Kim and HwangBo [11] (Korea)	Schroth exercise group: 15.6 ± 1.1 Pilates exercise group: 15.3 ± 0.8	24	SEG: Schroth exercises PEG: Pilates exercises	3 times/week, 12 weeks	Cobb angle Body weight distribution: Gait View Pro 1.0	SEG demonstrated significant changes in the Cobb angle and weight distribution compared with the PEG

(continued)

Table 45.1 (continued)

Study	Age (years)	Sample (*N*)	Intervention	Frequency	Outcome measures	Results
Aktan and Erdoganoglou [2] (Turkey)	16.13 ± 2.87	45	Short-term Schroth exercise camp	4–5 h per day/7 days	ATR: scoliometer Postural symmetry: Anterior Trunk Symmetry Index, Posterior Trunk Symmetry Index Trunk muscle endurance: straight plank and side plank durations Dynamic balance: Y Balance Test Cosmetic deformity perceptions: Walter-Reed Visual Assessment Scale Health-related QoL: Scoliosis Research Society 22-item questionnaire	Decrease in ATR Positive effects on postural symmetry, trunk muscle endurance, dynamic balance, cosmetic deformity perceptions, and health-related QoL
Radwan et al. [20] (Egypt)	10–16	40	Schroth exercise therapy in two treatment periods (1 and 3 months)	3 times/week, 3 months	Postural stability: Biodex Balance system (OSI, APSI, MLSI) cobb angle	Improved stability indices and cobb angles after 3 months of schroth exercise therapy SET compared to 1 month
Akcay-Bayraktar et al. [4] (Turkey)	IG: 13.3 ± 1.2 CG: 13.8 ± 1.4	20	Schroth exercise and brace treatment	3 times/week, 18 sessions	Postural control parameters: m clinical test of sensory interaction and balance (CTSIB)	Significant improvement in certain components: Center of gravity/sway velocity Limit of stability

(continued)

Table 45.1 (continued)

Study	Age (years)	Sample (*N*)	Intervention	Frequency	Outcome measures	Results
Akyurek et al. [3] (Turkey)	13.79 ± 1.82	29	Schroth exercise	16 sessions/8 weeks	JP error: dual inclinometer ATR: scoliometer Posture parameters: Posture Screen Mobile, Posterior Trunk Asymmetry Index, and Anterior Trunk Asymmetry Index Deformity perception: Walter- Reed Visual Assessment Scale	Positive effects on JP sense, vertebral rotation, and posture

APSI anteroposterior index, *ATR* angle of trunk rotation, *CG* control group, *IG* intervention group, *JP* joint position, *MLSI* mediolateral stability index, *OSI* overall stability index, *PEG* Pilates exercise group, *PNF* proprioceptive neuromuscular facilitation, *QoL* quality of life, *SEG* Schroth exercise group

before the treatment with Schroth method, in 1 month period and after 3 months of treatment. The control group was measured only once. According to the authors, the treatment was most effective for improving OSI, APSI, and MLSI values after 3 months of treatment. Aktan and Erdoganoglu [2] have studied the effect of Schroth method after a 7-day intensive program on 45 AIS patients. The duration of the exercise was 4.5 h daily. The authors reported positive effects on postural symmetry, trunk muscle endurance, dynamic balance, cosmetic deformity perceptions, and health-related quality of life (QoL). The emerging research on Schroth method mainly investigates how effective is the Schroth on Cobb angle and angle of trunk rotation reduction and the effect on quality of life for the AIS patients. Further research is needed to study the effects of Schroth on proprioception, balance, and other functional characteristics. The studies included in this review report positive effects. The duration and the dosage of the exercises vary. It is encouraging that Schroth effects are visible even in a short period of time [2]. A follow-up would be useful in order to determine if this short-term effect remains after a period of time.

45.5 Clinical Significance of the Study

Physiotherapeutic scoliosis-specific exercises (PSSEs) are very important in preventing and improving symptoms of AIS. Schroth method, apart from having a beneficial effect on curve severity and trunk imbalance, can improve posture and body balance of scoliotic subjects. Improving Cobb angle, angle of trunk rotation, and quality of life is very important for the AIS patients. The benefits of Schroth methods in other functional areas should be studied as well.

45.6 Conclusions

According to the findings of this review there is encouraging data showing that Schroth method may be effective and contribute to the improvements in certain components of postural control.

Schroth method seems to be also beneficial when combined with other treatments. The duration and the dosage of treatment provided are not standardized but beneficial findings appear even in short time. In future studies, the effectiveness of Schroth exercises on balance and postural control should be focused on in patients with different spinal curve patterns and severity of scoliosis.

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Illiteracy, Neuropsychological Assessment, and Cognitive Rehabilitation: A Narrative Review

Maria Petri, Lambros Messinis,
Panayiotis Patrikelis, Anastasia Nousia,
and Grigorios Nasios

Abstract

Object Neuropsychological assessment is particularly important for the accurate discrimination of cognitive abilities and weaknesses of patients in order to determine the appropriate therapeutic intervention. However, the reliability and validity of neuropsychological assessment appears to be influenced by a wide range of factors, including literacy and educational level.

Aim This systematic review evaluates neuropsychological tests appropriate for the valid assessment of illiterate individuals and the effectiveness of cognitive rehabilitation programs for illiterate and/or low-educated individuals according to the results of English language studies that have been published in the PubMed/Medline electronic database until August 2022 (no initiation date).

Results 49 studies were included for neuropsychological assessment and 4 studies for cognitive rehabilitation. In terms of investigating the validity and reliability of neuropsychological tests for the assessment of healthy illiterate individuals, most studies concluded that for the majority of neuropsychological tests there is a significant difference in performance between healthy illiterate and literate individuals. However, there was consensus among studies that the performance of illiterate subjects was equivalent to the performance of literate subjects on tasks depicting colored and real objects. Regarding cognitive rehabilitation programs, all four studies concluded that they are effective in improving the cognitive functions of illiterate and/or low-literate patients with mild cognitive impairment and/or mild dementia.

Conclusions For the assessment of illiterate individuals, it is imperative that neuropsychological tests with high ecological validity (i.e., tests related to activities of daily living) be administered so as not to underestimate their cognitive functioning. At the same time, cognitive enhancement/stimulation programs seem to be effective in this population group; however, this area needs further investigation.

Keywords

Illiteracy · Neuropsychological assessment · Cognitive rehabilitation

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M. Petri · L. Messinis (✉) · P. Patrikelis
Lab of Cognitive Neuroscience, School of Psychology, Aristotle University of Thessaloniki, Thessaloniki, Greece
e-mail: lmessinis@psy.auth.gr

A. Nousia · G. Nasios
Department of Speech and Language Therapy, School of Health Sciences, University of Ioannina, Ioannina, Greece

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46.1 Introduction

Illiterate people and/or people who have not received formal education form a significant part of the world's population. In particular, in several developed countries, older people are the age group with the highest rates of illiteracy [59]. The fact that age has been associated with an increase in the incidence of cognitive impairment [12] makes the contribution of neuropsychological assessment particularly important both in accurately distinguishing between normal and abnormal brain aging [55] and in designing appropriate therapeutic intervention, such as cognitive rehabilitation [23].

Culture [1], language [2], education [36], and literacy [37] are the main factors that influence individuals' performance on neuropsychological tests. The fact that several tests are administered during neuropsychological assessment, which are based on skills that are mainly developed in school contexts, calls into question the reliability and validity of neuropsychological assessment in illiterate and/or low-educated individuals. Indeed, it has been argued that literate individuals perform significantly better on the majority of neuropsychological tests compared to illiterate individuals [3]. Furthermore, it has been noted that some neuropsychological tests fail to discriminate healthy illiterate individuals from literate Alzheimer's disease patients [61]. Therefore, differences in performance between illiterate and literate individuals in most neuropsychological tests seems to contribute to the underestimation of the cognitive abilities of the former, ultimately resulting in the formulation of erroneous diagnoses of cognitive impairment that are not confirmed by their clinical history [23, 42].

A valid neuropsychological assessment plays a particularly important role in the design of cognitive rehabilitation programs for patients who experience cognitive impairment with variable etiology, such as the onset of neurodegenerative disorders (e.g., dementia) [23]. The absence of approved pharmaceutical interventions for both mild cognitive impairment (MCI) and dementia [18] makes the implementation of non-pharmaceutical interventions, such as cognitive enhancement/stimulation programs, particularly important [53]. The effectiveness of cognitive intervention programs has been investigated mainly in literate and highly educated individuals, while a limited number of studies have investigated their effectiveness in illiterate and/or low-educated individuals with cognitive impairment.

Considering all of the above, the aims of this narrative review are (a) to identify which types of neuropsychological tests or cognitive tasks are likely to be appropriate for the assessment of illiterate individuals and (b) to evaluate the effectiveness of cognitive rehabilitation programs in illiterate and low-educated individuals.

46.2 Method

46.2.1 Database and Search Terms

For the first objective, relevant studies were searched in the PubMed/Medline electronic database using the keywords neuropsychological assessment, neuropsychological tests, and illiterate individuals. For the second objective, the same database was used including the keywords cognitive rehabilitation, cognitive training, computerized cognitive training, illiterate individuals, low-educated individuals, mild cognitive impairment, and mild dementia. For both objectives there was no restriction on the year of publication. English articles were included until August 2022 (no initiation date).

46.2.2 Inclusion and Exclusion Criteria

With regard to the first objective, research studies were selected in which the sample included illiterate or low-educated (up to 4 years of education) individuals over 50 years of age, and the objective was to compare the performance of the aforementioned population group with individuals of higher educational level in neuropsychological tests. Studies that included individuals with existing pathology (psychiatric, neurological, or neurodegenerative disorders) and studies that administered screening tests exclusively were excluded.

For the second objective, studies involving illiterate or low-educated individuals (up to 4 years of education) with mild cognitive impairment (MCI) or mild dementia were selected. Studies that did not report the educational level of the individuals and included illiterate individuals in the same study group as individuals with more years of education were excluded. Also, studies that did not investigate the effectiveness of cognitive programs but evaluated other types of interventions (e.g., art therapy) were excluded. Studies in which participants manifested cognitive impairment due to other pre-existing clinical conditions (such as substance abuse, traumatic brain injury, HIV/AIDS) were also excluded.

For both objectives, meta-analyses, systematic reviews, and case studies were excluded. The selection of articles that met the above criteria was initially assessed by the abstracts. We reviewed the full text only in the case where the criteria were not met by the abstract.

46.3 Results

46.3.1 Neuropsychological Assessment

A total of 1593 articles were retrieved from the PubMed/Medline database. Based on the aforementioned inclusion and exclusion criteria, a total of 49 studies were included in the review. Twenty-three studies compared the performance of healthy illiterate and literate individuals on language tests, 21 studies on tests of visuospatial and visuoconstructive functions, 18 studies on memory tests, 26 studies on executive tasks, and 7 studies on tests of working memory and attention.

46.3.1.1 Language

For the assessment of language skills, 9 studies [8, 24, 32, 41, 46, 49, 51, 54, 56] administered tasks of repetition of pseudo-words and complex sentences and 14 studies [20, 22, 28, 29, 31, 32, 35, 40, 50–52, 54, 58, 61] administered object naming tests. Eight studies [8, 24, 32, 46, 49, 51, 54, 56] found statistically significant differences in performance between illiterate and literate subjects on the repetition of pseudo-words and complex sentences tests. The study of Ostrosky-Solis et al. [41] comparing the performance of illiterates with the performance of individuals with 3–4 years of education found no difference. Regarding the object naming tasks, nine studies [20, 22, 28, 29, 31, 32, 40, 54, 61] administered tests with objects in black-and-white line drawings and five studies [35, 50–52, 58] administered tests that depicted colored as well as real/actual objects. In all studies, illiterates had significantly lower scores in naming objects in black-and-white line drawings, whereas in naming colored and real objects, illiterates and literates performed similarly.

46.3.1.2 Visuospatial and Visuoconstructive Functions

For the assessment of visuospatial and visuoconstructive functions, seven studies [5, 21, 29, 34–36, 40] administered the clock drawing test, two studies [4, 28] administered the copy of Rey's complex figure test, one study [41] administered the copy of a semi-complex figure test, seven studies [4, 17, 32, 35, 36, 47, 61] administered the copy of specific figures tests (such as: house, cube, Mini Mental State Examination [MMSE] pentagons, Greek Cross), three studies [11, 51, 54] the cancellation test, one study [31] the line orientation test, and three studies [10, 33, 58] stick construction test. In the clock drawing test, all studies found significant statistical differences in performance between illiterate and literate subjects. In the Rey's complex figure copying test and a semi-complex figure copying test, significant differences in all studies are also found. In the copy of specific figures tests, six studies [4, 17, 35, 36, 47, 61] recorded significantly lower performance of illiterates compared to literates, while the study of Manly et al. [32] found no difference between the two groups. Significant differences were also recorded in the cancellation test in two studies [11, 54], while the study of

Reis et al. [51] found no difference in performance. Meanwhile, illiterates performed lower than literates in the study of Mandyla et al. [31] in which the line orientation test was administered. Finally, two studies [10, 33] recorded similar performance between illiterate and literate subjects on the stick construction test, while in the study of Tripathi et al. [58] illiterates performed significantly lower than literate subjects.

46.3.1.3 Memory

For the assessment of memory, 14 studies [4, 13, 14, 16, 28, 30–32, 34, 40, 41, 51, 58, 61] administered word learning and recall tests, six studies [13, 19, 30, 35, 40, 62] administered object learning and recall tests, four studies [4, 28, 31, 41] administered the immediate and delayed recall of a complex figure test, and four studies [4, 16, 30, 39] administered story learning and recall tests. In the word learning and recall tests, 12 studies [4, 13, 14, 16, 28, 30–32, 34, 40, 58, 61] identified differences in performance between illiterate and literate subjects in the learning condition, while 1 study [51] detected no difference. It is important to mention that in the study of Folia and Kosmidis [13] differences were found between illiterates and literates in the first learning trial, while in the total number of learned words (by the completion of the fifth trial) there was no difference. In the delayed word recall condition, ten studies [4, 13, 16, 28, 30, 31, 40, 41, 58, 61] recorded statistically significant differences between illiterates and literates while three studies [32, 34, 51] found similar performance between the two groups. Six studies referred to the recognition condition, of which five [30, 31, 41, 51, 61] recorded similar performance between illiterates and literates while only the study of Folia and Kosmidis [13] found differences in performance between the two groups.

Illiterate and literate subjects performed similarly in the object learning condition in all six studies [13, 19, 30, 35, 40, 62] administering this test. Similar results were obtained in the delayed recall condition in five studies [19, 30, 35, 40, 62], while the study of Folia and Kosmidis [13] found differences in performance between the two groups. In the recognition condition, only two studies [13, 35] were reported, which found no difference in performance.

In the immediate and delayed recall of a complex figure test, all studies [4, 28, 31, 41] recorded lower performance of illiterate subjects compared to literates in the immediate recall condition. Three studies [4, 31, 41] found significant differences in the performance of illiterates in the delayed recall condition while the study of Kwon et al. [28] found no difference. In the recognition condition, only one study [28] was reported in which illiterates had lower performance. Finally, in the story learning and recall test, in all four studies [4, 16, 30, 39] illiterates had significantly lower scores in both conditions.

46.3.1.4 Executive Functions

For the assessment of executive functions, most studies used the verbal fluency test. Twenty-four studies administered the category fluency test of which 23 studies [5–7, 9, 14, 15, 22, 28, 29, 32, 34, 35, 37, 38, 40, 41, 44, 46, 48, 49, 54, 58, 61] used animal fluency task and five studies [15, 28, 35, 37, 51] used the supermarket fluency task. Illiterates had significantly lower performance compared to literates on the animal fluency task in 16 studies [6, 7, 9, 14, 15, 22, 28, 29, 35, 37, 38, 40, 44, 49, 54, 58] while in 7 studies [5, 32, 34, 41, 46, 48, 61] no difference was detected. In supermarket fluency in all five studies, illiterates had similar performance to literates.

The phonological fluency task was administered in 11 studies [5, 25, 28, 31, 32, 41, 44, 46, 48, 49, 54], in all of which significant differences were found between the two groups. The Wisconsin Card Sorting Test (WCST) was used by two studies [7, 38] in which illiterates had particularly lower scores compared to literates. One study [7] administered the Iowa Gambling Task (IGT) and recorded differences in the performance of illiterate and literate subjects, while in one study [58] using the Tower of Hanoi Test a greater proportion of illiterates refused to complete the test, suggesting the particular difficulty of illiterates in such tasks. Finally, two studies [31, 44] that administered the Trail Making Test-Part A recorded lower scores of illiterates compared to literate subjects while in one study [14] that used the Color Trail Test, no difference was found.

46.3.1.5 Attention and Working Memory

For the assessment of attention and working memory, seven studies [4, 7, 26, 28, 44, 56, 58] administered the Digit Span Test, both forward and backward. Five studies [4, 7, 44, 56, 58] found significantly different performance between illiterate and literate subjects on the forward and six studies [4, 7, 26, 28, 44, 58] on the backward condition. The study of Kwon et al. [28] and the study of Silva et al. [56] recorded no difference between the two groups in forward and backward, respectively. Two studies [56, 58] administered the Spatial Span Test, forward and backward. The study of Tripathi et al. [58] recorded lower scores of illiterates compared to literate participants in forward and backward tasks, while in the study of Silva et al. [56] no difference was found.

46.3.2 Cognitive Rehabilitation

A total of 48 studies were retrieved from the PubMed/Medline database. Based on the aforementioned inclusion and exclusion criteria, a total of four studies were selected for this review. None of the studies used computerized cognitive training programs as all four studies used traditional/conventional cognitive programs. The participants of the three studies [27, 57, 60] were illiterate or with low education (maximum 4 years of schooling) while the study of Palo Villegas et al. [43] included exclusively illiterate subjects. All studies claimed that illiterate and/or low-educated individuals showed significant improvement in cognitive functioning after completing the intervention programs.

46.4 Discussion

The present narrative review investigated the appropriateness of various specific-domain neuropsychological tests and the clinical effectiveness of cognitive intervention programs for illiterate individuals. The role of illiteracy and education appears to be catalytic in the development and enhancement of basic cognitive processes. It has been argued that verbal and visual memory, language, and visuospatial and executive functions are particularly significantly affected by the ability to read and write [45]. The present review confirms that illiterate individuals particularly struggle in the majority of neuropsychological tests, as in the majority of the selected studies, illiterate subjects had significantly different performance compared to literate subjects on cognitive tasks of language, memory, working memory and attention, and visuospatial and executive functions. However, in the studies that used tests that depicted colored and real objects, which were largely related to the everyday life of illiterate subjects, uneducated subjects performed equally to literate subjects.

Cognitive training programs seem to be effective in improving the cognitive functions of illiterate and low-educated subjects, as all the studies selected in this review yielded positive results. Further investigation is needed to determine the effectiveness of such programs in maintaining and/or improving the impaired cognitive functions of illiterate and/or low-educated subjects. Due to the rapid development of technology, it is important to investigate both the applicability and clinical effectiveness of cognitive training software programs in this population group.

46.5 Limitations

Some limitations need to be taken into account with regard to this narrative review. First, there was a limitation in the number of databases used, in which research studies were searched with specific keywords limited to English articles. At the same time, particularly for the exploration of the second objective, there was no consensus among the selected articles regarding the definition of low educational level, resulting in the selection of studies based on the average years of education of the participants.

46.6 Future Perspectives

One recommendation for future research is to assess the reliability and sensitivity of different neuropsychological tests to discriminate between healthy illiterate individuals and patients with higher education (>12 years of education) with dementia (such as Alzheimer's disease). In addition, another interesting perspective would be to compare the performance on various neuropsychological tests between healthy illiterate and low-educated individuals (up to 3 years of education) to investigate whether merely learning to read and write contributes to better performance of individuals. Finally, regarding cognitive training programs, their effectiveness could also be investigated in illiterate and/or low-educated patients with more severe dementia.

46.7 Conclusions

In conclusion, it is imperative that during the neuropsychological assessment of illiterate subjects, tests with high ecological validity be administered. More specifically, tests that are related to real-life activities should be selected and tests based on school tasks should be avoided. Finally, the application of cognitive intervention programs appears to be effective for illiterate individuals. However, this area needs further investigation.

Conflicts of Interest The authors declare that they have no conflicts of interest. No funding was received.

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Telerehabilitation and Fall Prevention in Older Adults

M. Tsekoura, A. Kastrinis, E. Nomikou,
and M. Katsoulaki

Abstract

The objective of this review is to summarize the evidence regarding the use of telerehabilitation in the fall prevention of older adult patients. Medline and Google Scholar databases were searched from July to August 2022 for studies related to telerehabilitation interventions in older adults above 60 years of age. The study included all trials related to the telerehabilitation programs and fall prevention in older adults. The search items included "telerehabilitation," "falls," and "older adults." Five studies were included involving 694 older adults. The interventions included online exercise classes and exercise sessions via digital video disks (DVDs) and phone calls. The results of the present review showed that telerehabilitation offers positive clinical results for fall prevention.

Keywords

Telerehabilitation · Falls · Older adults

47.1 Introduction

Falls are common among older adults [1]. It is estimated that approximately 30% of community-dwelling people of ≥65 years of age experience a fall at least once per year [2]. Approximately half of the falls result in an injury, and 10% result in serious injuries with substantially increased medical costs [3]. Falls affect health status, quality of life, and activities of daily living. The importance of fall-prevention rehabilitations has been well recognized [4]. Strength and balance exercises have been proven to be effective in reducing the risk and rate of falls [4–6].

Teleconferencing could be an effective way of delivering evidence-based strength and balance exercises by providing increased contact with health care professionals [7]. Recently, new telecommunication-based methods that enable the patients to receive rehabilitation in their own home have been developed and applied in the field of rehabilitation [4, 8]. Telemedicine and telehealth are global terms used to describe any use of telecommunication systems to deliver

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M. Tsekoura (✉)
Department of Physiotherapy, School of Health Rehabilitation Sciences, University of Patras, Rio, Greece
e-mail: mariatsekoura@upatras.gr

A. Kastrinis
Health Assessment and Quality of Life Research Laboratory, Department of Physiotherapy, University of Thessaly, Lamia, Greece

E. Nomikou
"The House" Physio and Rehab Clinic, Athens, Greece

M. Katsoulaki
"Physiodrasis," Physio and Rehab Clinic, Athens, Greece

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health care from a distance [9]. Telerehabilitation is defined as the delivery of rehabilitation using telecommunication technologies [10]. Telerehabilitation is a specific area of telehealth that refers to clinical rehabilitation services involving evaluation, diagnosis, and treatment. Limited access to in-person services and the concern about potential exposure to severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) also accelerated the acceptance of telerehabilitation by many patients [11]. The efficacy of telerehabilitation for fall prevention in elderly people has been totally unclear. Thus, the objective of this review is to summarize the evidence regarding the use of telerehabilitation in fall prevention of older adults.

47.2 Methods

The search was conducted in the electronic databases Medline/PubMed and PubMed Central and from July to August 2022. Additional searches were carried out on Google Scholar and ResearchGate platforms. The study included all trials related to the telerehabilitation programs in older adults (aged >60 years). Studies were selected if they included a telerehabilitation program for fall prevention in older adults. Exclusion criteria of the study were: [1] studies for which only abstract was available, [2] duplicate studies, and [3] studies including cases with neurological problems. The search items included “telerehabilitation,” “falls,” and “older adults.”

47.3 Results

The current search identified a total of 33 studies related to telerehabilitation in older adults. Five [5] studies met eligibility criteria involving 694 participants aged >60 years. One study was performed in Italy [12], one in Japan [4], and one in Turkey [13] (Table 47.1).

The duration of the programs varied from 4 weeks [13], 12 weeks [4, 14], to 6 months [12, 15]. Telerehabilitation included online and digital video disk (DVD) exercise sessions, and phone calls. The intervention group showed improvements in incidence of falls [12, 14, 15], in physical performance [4, 13, 15], and fear of falling (FoF) [4].

47.4 Discussion

This review demonstrates the efficacy of the telerehabilitation for preventing falls in the elderly population. Telerehabilitation services have been successfully utilized throughout the world for years and have become commonplace since the coronavirus disease-2019 (COVID-19) pandemic. The COVID-19 pandemic has caused a disproportionate impact on older people [16]. Falls are common and there is a need to consider and identify alternative methods of delivering effective fall-prevention strategies [15].

In the present review, studies show that exercise classes performed online or via DVDs may be effective for fall prevention. In the study conducted by Davis et al. [15] researchers assessed the feasibility of delivering the Otago exercises via an interactive DVD in combination with monthly physical therapist phone calls to older adults. They chose to utilize DVD technology because DVDs are a viable option for delivering health and lifestyle interventions. The Otago Exercise Program (OEP) via a DVD was an effective strategy in significantly improving fall-risk profile in older adults [15]. These findings are in consistence with literature. The OEP is helpful for improving actual balance including static, dynamic, and proactive balance; enhancing confidence in balance control; and reducing fear of falling in older adults [17].

Studies show that telerehabilitation exercise programs may decrease the incidence of falls [12, 14]. Fear of falling is associated with the occurrence of falls in community-dwelling older adults [18]. A systematic review has shown that individuals with FoF have more than double the risk of falling than those without FoF [19]. This fear is common in older people and is also associated with serious physical and psychosocial consequences. Exercise interventions in community-dwelling older people probably reduce fear of

Table 47.1 Caption

Study	Age (years)	Sample (*N*)	Intervention	Duration	Outcome measures	Results
Bernochi et al. (2019); RCT (Italy) [12]	79 ± 6.6	283	IG: telerehabilitation home-based program CG: conventional care	6 months	Incidence of falls	Fewer patients experienced falls in the IG
Morrichi et al. (2022) (Japan) [4]	84.6 ± 4.5	9	IG: 6 exercises—telemedicine system	3 months	TUG; BBS; HHD	Half of the participants showed improvement
Tekin and Cetisli-Korkmaz (2022) (Turkey) [13]	>60	255	IG: home exercise program of calisthenic exercises delivered through telerehabilitation CG: no exercise	4 weeks	SPPB; fear of falling; depression	Improvement in the IG
Jacobson et al. (2021) (USA) [14]	72.6	65	IG: online and on-demand video exercise classes, self-assessments, and online surveys	12 weeks; 6 months of follow-up	Fall rate and minutes of PA per week	Minutes of PA increased by 206%; annualized fall rate decreased by 28%
Davis et al. (2016) (Canada) [15]	79.6 ± 4.5	82	IG: Otago exercises via an interactive DVD and walking CG: no exercise	6 months	SPPBT; physiological fall risk	IG: decline in fall risk; significant between-group improvement in the overall PPA score

BBS Berg Balance Scale, *CG* control group, *HHD* hand-held dynamometer, *IG* intervention group, *PA* physical activity, *PPA* Physiological Profile Assessment, *RCT* randomized controlled trial, *SPPBT* short physical performance battery test, *TUG* Timed Up & Go test falling [20]. Results of the study conducted in Turkey show that calisthenic exercises delivered through telerehabilitation improve fear of falling. Further evidence from well-designed randomized trials is required.

Possible reasons for the use of telerehabilitation may include inability to travel, evaluation or reevaluation of the performance and efficacy of therapy, and providing equitable access to people who are geographically remote and to those who are physically and economically disadvantaged [16, 21]. Despite the potential benefits of telerehabilitation, licensure concerns, insurance coverage, and legislative issues have historically made it difficult to adopt [16]. Additionally, when conducting telerehabilitation, it is extremely important to secure the safety of the participant [4]. Technology cannot, however, replace hands-on therapy, and health professionals may not want to learn how to adapt their practices [4]. Telerehabilitation is a young field of telemedicine and is still undergoing research and development [22–24].

The results of the present review showed that telerehabilitation offers positive clinical results for fall prevention. The use of digital media to deliver interventions like exercise programs is becoming an increasingly important consideration from a rural and resource perspective (15 s). The advantages of lower cost and less interference by the rehabilitation processes in patients' daily life could justify implementing telerehabilitation in clinical settings in the COVID-19 era [21]. Telerehabilitation can also improve treatment adherence, improve physical and mental function and quality of life, and be delivered in a manner that is satisfactory to patients [21, 22]. More robust studies are needed to address questions about the feasibility, safety, and effectiveness of telerehabilitation modalities across subgroups of patient populations and settings, such as those who are frail or at risk of falling.

47.5 Conclusions

Findings provide preliminary support for the benefits of telerehabilitation exercise programs for fall prevention in older adults. Further high-quality studies specific to exercises delivered via telerehabilitation are needed.

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Relationship of Hand Grip Strength, Physical Activity, and Anthropometric Characteristics in a Sample of Male and Female Physiotherapy Students

M. Tsekoura, S. Bakirtzi, S. Papadimitropoulou, E. Billis, K. Fousekis, A. Kastrinis, and E. Tsepis

Abstract

The present study aimed to determine gender differences in the hand grip strength (HGS) and to examine the relations between HGS, anthropometric characteristics, and physical activity (PA) in Greek young adults. A cross-sectional observational study of 276 students (21.5 ± 4.1 years, 122 men, 154 women) was conducted at the University of Patras, Greece. HGS was assessed via a hand-held grip strength dynamometer; body composition was determined by bioelectrical impedance analysis; and calf, mid-arm, and waist circumferences with inelastic tape. PA was assessed with the modified Baecke Questionnaire for Habitual Physical Activity (mBQHPA). The mean of HGS was 37.15 ± 11.2 kg. Men had significantly ($p < 0.001$) greater HGS than women. Statistically large correlation was detected between HGS and muscle mass ($r = 0.73$; $p \leq 0.001$), gender ($r = 0.6$; $p \leq 0.001$), mid-arm ($r = 0.74$; $p \leq 0.001$), and calf circumference ($r = 0.69$; $p \leq 0.001$). Results show that fat mass was a risk factor associated with HGS, found using regression analyses in both genders. However, PA was a significant associated factor only for women participants (OR = 0.77; 95% confidence interval [CI]: 0.17–1.38; $p \leq 0.05$). In summary, the HGS of Greek physiotherapy students was associated with muscle mass, gender, mid-arm, and calf circumference.

Keywords

Hand grip strength · Muscle mass · Physical activity

48.1 Introductions

Hand grip strength (HGS) is a concise measure used to evaluate muscle strength, and reflects general health. It is considered a crucial factor in maximizing performance and control of many daily activities and sporting [1–3]. HGS not only reflects the strength of the upper limb muscles, but also reflects and predicts the overall strength of the skeletal muscles and physical fitness [4–7].

M. Tsekoura (✉) · S. Bakirtzi · S. Papadimitropoulou · E. Billis · K. Fousekis · E. Tsepis
Department of Physiotherapy, School of Health Rehabilitation Sciences, University of Patras, Rio, Greece

A. Kastrinis
Athens Scoliosis Rehabilitation Clinic, Athens, Greece

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Muscular strength, as determined with a hand grip dynamometer, is becoming increasingly recognized as a predictor of cardiometabolic disorders [8], and of all-cause mortality in healthy populations [9]. It can provide diagnostic information and can be used to assess clinical outcomes [10, 11] of different pathologies. HGS is related to the loss of physical function and is associated with increased health recovery time after illness or surgery, malnutrition, type II diabetes, cardiovascular complications, sarcopenia, frailty, and overall mortality [6, 11–14].

There are numerous studies investigating HGS but they are performed in different age groups and results are controversial [15–17]. It seems that HGS can be affected by many factors including age, sex, body mass index (BMI), and hand dimensions [3]. Other factors that could influence the strength of the grip are fatigue, nutritional status, bone mineral content, and restricted motion [17, 18]. It has been well reported that there is significant loss in muscle strength with aging [11, 19]. Since muscle strength appears to be a critical component in maintaining physical function, mobility, and vitality, it is paramount to identify factors that contribute to the loss of strength in younger ages in order to design preventive techniques. In this respect, it is important to evaluate HGS of young adults for preventing future decline in muscle strength in adults. There has been also great interest in physiologic differences between men and women across ages and the magnitude of the sex difference in muscular strength is well documented [20]. However, few studies have reported sex differences in HGS among young adults [4, 21].

Considering the importance of HGS for diagnostics and prognostic reasons, it seems important to further examine sex differences in HGS and to understand its associated risk factors. Potential difference between males and females may have significant impact on both prevention of different pathologies and treatment techniques for health improvement in various populations. It is also expected that this new knowledge will help physiotherapists to design targeted therapeutic exercise programs in order to address the sex-specific differences and to induce specific adaptions in order to minimize these risk factors for decrease in health in people of all ages. The investigation of anthropometric characteristics and lifestyle factors (e.g., level of physical activity [PA]) that are associated with lower hand grip strength levels may provide specific characteristics in relation to population subgroups that should be considered in relation to the planning of prevention strategies and coping with health diseases, and to identify associated risk factors [16]. Based on the reported associations between HGS and physical abilities, it is of particular interest to examine the possible relationship between HGS and PA in young adults. In addition, physiotherapists should have good HGS for manual therapy and other techniques. Therefore, the aim of this study was to assess the gender differences in HGS and to investigate the relationship of it with anthropometric characteristics and physical activity in Greek physiotherapy students.

48.2 Material and Methods

48.2.1 Study Design and Participants

This cross-sectional study was done at Department of Physiotherapy, University of Patras, Greece, during the period from March 1, 2018, to May 30, 2019. A convenient sample of 276 physiotherapy students of both sexes participated in this study. Participants were eligible for inclusion if they were over 18 years of age and were studying at physiotherapy department at University of Patras. Exclusion criteria included (a) pacemaker fitted, (b) cardiovascular diseases or high blood pressure not controlled with medication, (c) medical or other musculoskeletal problems that could affect ability to complete objective assessments, and (d) body mass index (BMI) > 50. Objectives of the study were explained to participants. They were assured that information obtained would be anonymous and confidential. All participants signed an informed consent form prior to their inclusion. The study protocol was approved by the Ethical Committee of the Technological Educational Institute of Western Greece (121/17-1-2018).

48.2.2 Data Collection

Data was collected via a self-reported questionnaire designed for the purpose of the study. The questionnaire included socio-demographic information (name, age, sex, smoking status, comorbidities). The assessment procedure was carried out at University of Patras.

48.2.3 Outcome Measurement Tools

48.2.3.1 Body Composition Assessment

Height was measured with a wall stadiometer without shoes. Body weight was measured to the nearest 0.1 kg and height was measured to the nearest 0.1 cm. Measurements of height and weight were used to calculate body mass index (BMI) (kg/m^2). Body composition was determined using bioelectrical impedance analysis (BIA), with a Tanita BC-601 model body analysis monitor. Participants removed their socks, stood on two metallic electrodes on the floor scale barefoot, and held two metallic grip electrodes placed in the palm of their hand with their fingers wrapped around the handrails. Calf, mid-arm, and waist circumferences were measured in centimeters with non-elastic tape with the participants in the upright position, with feet 20 cm apart and body weight equally distributed on both feet. Calf circumference was measured at the calf's greatest girth. Mid-arm circumference was taken to the nearest 0.1 mm on the upper left arm (halfway between the acromion process and the olecranon process). Waist circumference was measured at the minimum circumference between the iliac crest and the rib cage. Measurement was taken at a normal expiration [22].

48.2.3.2 Hand Grip Strength Assessment

HGS was measured using a standard hydraulic hand dynamometer (Saehan, Seoul, Korea). Each patient's dominant hand was tested. Before testing, the examiner demonstrated how to hold the handle of the dynamometer. The patients were seated with the shoulders neutrally rotated and adducted, the forearm to be tested unsupported, elbow flexed at 90°, and wrist between 0 and 30° as recommended by the American Society of Hand Therapists and described in "The Nutrition UP 65 Study Protocol" [23, 24]. The participants were asked to press the handle of the dynamometer with maximum strength for three times and the highest value was recorded as the subject's grip strength [24]. HGS was expressed in kilograms (kg).

48.2.3.3 Physical Activity Assessment

Physical activity was assessed using the Greek version of the modified Baecke Questionnaire for Habitual Physical Activity (mBQHPA) [25]. The mBQHPA is a 19-item instrument with 3 distinct domains (work-related activity, sport-related activity, leisure-related activity) [26]. Each domain has several questions scored on a 5-point Likert scale, ranging from never to always or very often. Each item provides potential answers in an ordinal scale, rated from 1 to 5. The total mBQHPA score may range from 3 to 15; the higher the score the higher the physical activity level [25, 26]. The questionnaire was administered as a face-to-face interview, by an experienced researcher.

48.2.4 Statistical Analysis

All statistical analyses were performed with the SPSS Statistics software package, version 20.0 (IBM Corporation, Armonk, NY, USA). Frequencies and percentages were calculated for the categorical variables, while continuous variables were expressed as mean ± standard deviation (SD). Pearson correlation coefficient was used to provide a better understanding of the relationship between HGS and the other variables. The association between variables was calculated using Pearson-r correlation coefficients. Pearson-r categorization was made according to Cohen ($r = 0.10$ small, $r = 0.30$ medium, and $r = 0.50$ large) [27]. Effects of factors associated with HGS were evaluated using regressions analysis. A t-test for independent samples was used to determine the differences between men and women. Statistical significance was accepted at *p*-value ≤0.05, and adjusted odds ratio (OR) and their 95% confidence interval [CI] were reported to consider the strength of association.

48.3 Results

Two hundred and seventy-six (276) participants (21.5 ± 4.11 years) were included in this study. Out of 276 students, 154 (55.8%) were women and 122 (44.2%) were men. Men had significantly ($p < 0.001$) greater HGS than women (45.23 ± 10.02 vs 30.7 ± 7.39, respectively). Table 48.1 presents the characteristics of the participants.

48.3.1 Correlations of HGS and Other Variables

A Pearson correlation coefficient matrix for anthropometric characteristics and PA is presented in Table 48.2. The HGS was positively correlated with muscle mass ($r = 0.74$; $p \leq 0.001$), sex ($r = 0.6$; $p \leq 0.001$), mid-arm measurement ($r = 74$; $p \leq 0.001$), and calf circumference ($r = 0.69$; $p \leq 0.001$). Moderate correlations were presented with fat mass ($r = 0.43$; $p \leq 0.001$), calf circumference ($r = 0.4$; $p \leq 0.001$), BMI ($r = 0.35$; $p \leq 0.001$), and waist circumference ($r = 0.3$; $p \leq 0.001$).

Men showed moderate correlation with muscle mass ($r = 0.38$; $p \leq 0.001$), while women showed strong correlation with muscle mass ($r = 0.75$; $p \leq 0.001$) and moderate correlation with calf and mid-arm circumference ($r = 0.47$; $p \leq 0.001$, respectively).

48.3.2 Predictors of HGS in Male and Female University Students

Table 48.3 presents the risk factors for HGS among the 276 students using regression analysis gender comparisons shown in Table 48.2. The findings of this study demonstrated that HGS was significantly associated with muscle mass, fat mass, and mid-arm circumference. PA was a risk

Table 48.1 Participants' characteristics

Variable	Total participants ($N = 276$)	Men ($N = 122$; 44.2%)	Women ($N = 154$; 55.8%)	*p*-value
Mean ± SD				
Age (years)	21.5 ± 4.11	21.49 ± 3.3	21.51 ± 4.67	NS
BMI (kg/m^2)	23.85 ± 3.87	25.08 ± 3.63	22.88 ± 3.78	≤0.05[a]
Drugs (number)	0.1 ± 0.5	0.1 ± 0.37	0.24 ± 0.58	≤0.05[a]
Hand grip strength (kg)	37.15 ± 11.2	45.23 ± 10.02	30.7 ± 7.39	≤0.001[b]
Fat mass (%)	22.96 ± 7.84	18.87 ± 6.57	26.26 ± 7.22	≤0.001[b]
Muscle mass (kg)	50.38 ± 11.79	59.32 ± 9.4	43.15 ± 7.9	≤0.001[b]
Calf measurement (cm)	36.82 ± 3.36	38.2 ± 3.1	35.71 ± 3.11	≤0.001[b]
Arm measurement (cm)	28.4 ± 4.04	30.37 ± 3.1	26.75 ± 4	≤0.001[b]
Waist measurement (cm)	81.17 ± 12.44	86.21 ± 11.25	76.8 ± 11.8	≤0.001[b]
mBQHPA	8.11 ± 1.32	8.29 ± 1.31	7.9 ± 1.3	≤0.05[a]
Number and percentage (%)				
Smoking				
Yes	75 (27.2%)	36 (29.5%)	39 (25.35)	NS

BMI body mass index, *mBQHPA* modified Baecke Questionnaire for Habitual Physical Activity, *NS* non-significant differences

[a]Significant; [b]High significance

Table 48.2 Pearson correlation coefficient matrix for anthropometric characteristics, PA, and HGS in physiotherapy students ($N = 276$)

	Age	BMI	Muscle mass	Fat mass	Calf CC	Mid-arm CC	Waist CC	Physical activity
HGS ($N = 276$)	$r = 0.05$; NS	$r = 0.35$; $p \leq 0.001$	$r = 0.74$; $p \leq 0.001$	$r = 0.43$; $p \leq 0.001$	$r = 0.69$; $p \leq 0.001$	$r = 0.74$; $p \leq 0.001$	$r = 0.33$; $p \leq 0.001$	$r = 0.13$; $p \leq 0.05$
HGS ($N = 122$; men)	$r = 0.06$; NS	$r = 0.15$; NS	$r = 0.38$; $p \leq 0.001$	$r = -0.26$; $p \leq 0.05$	$r = 0.18$; $p \leq 0.05$	$r = 0.33$; $p \leq 0.001$	$r = 0.02$; NS	$r = 0.01$; NS
HGS ($N = 154$; women)	$r = 0.07$; NS	$r = 0.31$; $p \leq 0.001$	$r = 0.75$; $p \leq 0.001$	$r = -0.13$; NS	$r = 0.47$; $p \leq 0.001$	$r = 0.47$; $p \leq 0.001$	$r = 0.23$; $p \leq 0.05$	$r = 0.12$; NS

BMI body mass index, *CC* circumference, *HGS* hand grip strength, *NS* non-significant differences

Table 48.3 Factors associated with HGS among Greek physiotherapy students (*N* = 276)

Variable	OR	95% CI	*p*-value
BMI (kg/m^2)	0.22	0.56–0.6	NS
Age (years)	0.25	0.04–0.46	NS
Gender	3.57	1–6	NS
Muscle mass (kg)	0.43	0.27–0.6	≤0.001[b]
Fat-free mass (%)	−0.28	−0.46 to 0.11	≤0.001[b]
Calf circumference (cm)	−0.06	−0.2 to 1.11	NS
Mid-arm circumference (cm)	0.66	0.2–1.1	≤0.05[a]
Waist circumference (cm)	−0.08	−0.19 to 0.03	NS
Physical activity	0.26	−0.42 to 0.95	NS

BMI body mass index, *CI* confidence interval, *NS* non-significant differences, *OR* odds ratio
[a]Significant; [b]High significance

Table 48.4 Factors associated and comparisons between genders with HGS among Greek physiotherapy students (*N* = 276)

	Men (*N* = 122)		Women (*N* = 154)		
Variable	OR (95% CI)	*p*-value	OR	(95% CI)	*p*-value
BMI (kg/m^2)	−0.58 (−0.45 to −1.62)	NS	0.036 (−0.88 to −1.46)		NS
Age (years)	0.53 (0.0–1.06)	NS	0.07	(−0.09 to −0.25)	NS
Muscle mass (kg)[b]	0.34 (0.06–0.62)	≤0.05[a]	0.66	(−0.49 to −0.83)	≤0.001[a]
Fat-free mass (%)[a]	−0.52 (−0.87 to −0.17)	≤0.05[a]	−0.5 (−0.2 to −0.04)		NS
Calf circumference (cm)	−0.27 (−1.1 to −0.62)	NS	0.13	(−0.3 to −0.59)	NS
Mid-arm circumference (cm)	0.44 (−0.43 to −1.32)	NS	0.3 (−0.16 to −0.77)		NS
Waist circumference (cm)	−0.14 (−0.34 to −0.06)	NS	−0.00 (−0.11 to −0.1)		NS
Physical activity[a]	−0.37 (−0.15 to −0.85)	NS	0.77	(0.17–1.38)	≤0.05

BMI body mass index, *CI* confidence interval, *NS* non-significant differences, *OR* odds ratio
[a]Significant; [b]High significance

factor for women (OR = 0.77; 95% CI: 0.17–1.38) but not in men (OR = −0.37; 95% CI: −0.15 to 0.85). Fat mass was also negatively associated with women (OR = −0.52; 95% CI: −0.87 to −0.17) (Table 48.4).

48.4 Discussion

To our knowledge, this is the first study to examine the HGS and factors associated with it among an academically oriented group of Greek undergraduate physiotherapy students. Furthermore, this is the first study within Greece to obtain gender-stratified objective measures of HGS in young adults. Identifying factors associated with HGS in relation to gender differences could allow for targeted interventions (especially in university), to improve the health of students and help in the prevention of pathologies in the future including cardiometabolic syndrome [8], sarcopenia, and frailty [11].

The present study was designed to determine the relationship between HGS, PA, and anthropometric characteristics using a standardized protocol so that the predictors of HGS could be identified. HGS is a reliable measurement when standardized methods and calibrated equipment are used [28]. In the present study, the HGS assessment was performed according to guidelines [23, 24]. There are different methods of positioning patients during measurement and for calculating their grip strength from repeated measures, so the American Society for Surgery of the Hand and the American Society of Hand Therapists have standardized positioning, instruction, and calculation of grip strength [23, 28]. Grip testing was undertaken using the second- and third-handle positions of hand dynamometer [29]. Most participants exhibited comfort and maximum HGS when using the third-handle position. Because of the difference in hand size, women tend to exhibit their greatest grip strengths with the handle in the second position, whereas the third-handle position is usually the most advantageous for men [30].

As it was expected, HGS scores were significantly reduced in female compared to male participants. These results are in agreement with previous studies [31, 32]. Males tend to be physically stronger than females, which could be due to more muscle mass and less body fat [33, 34]. One factor directly associated with higher strength levels in men would be the higher plasma concentrations of the major anabolic hormones(testosterone,growthhormone(GH),andinsulin-like growth factor 1 (IGF-1)) in men [12]. After completion of male puberty, circulating testosterone levels in men are consistently 10–15 times higher than in children or women at any age [35, 36].

In the study population, the anthropometric parameters were higher in males than in females, which are statistically significant. Body composition differs also between men and women participants, with women having proportionally more fat mass and men more muscle mass. Due to higher levels of circulating testosterone in males, muscle mass is reported to be higher because of increased muscular hypertrophy [37]. There are also some genes that are upregulated in women compared with men and that are known to code for proteins that are in signaling pathways of growth factors known to regulate muscle mass: growth factor receptor-bound protein 10 (GRB10) and activin receptor type-2A (ACVR2A) [38, 39]. Differences in muscle mass, muscle metabolism, and gender-specific muscle fiber characteristics have been the most suitable explanations for these changes between male and females [37].

Results show that there were three factors associated with HGS for men and women: muscle mass (OR = 0.43; 95% CI: 0.27–0.6; $p \leq 0.001$) fat mass (OR = −0.28; 95% CI: −0.46 to 0.11; $p \leq 0.001$), and mid-arm circumference (OR = 0.66; 95% CI: 0.2–1.1; $p \leq 0.05$). It would be expected BMI to be a risk factor; however, in the present study results showed no statistically significant correlation. BMI is widely used and accepted as simple method to classify overweight and obesity. In the present study, mean BMI was 23.9 (SD = 3.9), indicating a normal body fat range [40]. Maybe this is a factor that may justify these results. There are several factors that could influence the association between HGS and anthropometric characteristics. Factors such as different body anthropometries observed for ethnic difference, geographic location, cultural status, lifestyle habits including nutrition, and pattern of physical activities can play an important role [16]. It is suggested further research in regard to the relationship of these variables with hand grip strength scores.

Muscle mass showed a strong significant correlation with HGS in both genders, and it seems a strong predictor for low HGS in women ($p = 0.004$). Results for correlations between hand grip strength and muscle mass were similar to results of one more study conducted in students [21]. This finding is important because it can illustrate the importance of inclusion of strength training in young adults since it may provide muscle mass and strength benefits. Decrease in muscle strength and muscle mass is associated with various pathologies including cardiometabolic syndrome, sarcopenia in elderly and in general, etc. Therefore, HGS could be a strong predictor of health issues.

Results show that fat mass is a potential risk factor for low HGS in both genders. In the literature, data show that increased fat mass, adiposity, or body fat percentage of lean body mass should be maintained within the normal range to get proper HGS. So, proper and specific training, methodologies, diet plans, and nutrition factors can influence fat mass percentage and therefore HGS [41].

Results of the present study showed that HGS has no significant associations with PA levels for both genders. There are data in the literature indicating that HGS could be significantly different between hand grip-related athletes and non-athletes [42]. The estimation of HGS is of immense importance in sports like wrestling, tennis, football, handball, basketball, volleyball, and baseball, where a sufficient degree of grip strength is necessary to be successful [15, 43]. However, the sample of this study demonstrated a regular PA level lower than the different athletic populations analyzed. Most of the participants showed low scores in mBaecke questionnaires and these results are supported by the literature. A national Korean survey indicated that only 20.8% of college students engage in moderate-to-vigorous PA [44]. Similarly, US college students also have a low rate of participation in moderate-to-vigorous PA, at 21.2% [45, 46]. Despite the numerous physical and psychological benefits of PA, the prevalence of achieving PA recommendations decreases in college students. Although physical activity correlations with muscle strength appear weak, indicating that habitual physical activity may not be effective at reducing muscle strength, maintaining a physically active lifestyle is crucial to healthy aging due to its many health benefits [47, 48]. The literature on relationship between PA and muscle strength is mixed. Reasons for the discrepancies among studies examining the relationships between PA and muscle strength are unclear but could reside in the methods that were used to assess those factors as well as differences in the characteristics of the population studied [48].

48.4.1 Clinical Relevance

HGS is a safe, convenient, and reliable measure, indicating convenience in clinical practice and research setting. HGS differs significantly between sexes and is influenced by body composition [49]. The findings of this study underline the importance of HGS measurement, at all ages. HGS is likely to be increasingly used in clinical settings, for example in the assessment of sarcopenia for elderly population [50]. However, understanding the relationship between HGS and anthropometric characteristics and physical activity in young adults seems important for diagnostics and prognostic reasons [49]. The estimation of HGS is of immense importance in determining the efficacy of different prevention and treatment strategies. Results of this study may serve as a support for decision-making on health interventions and will provide information able of being reproduced. Interventions in adults aiming to increase strength levels should be performed, with special attention to females and those physically inactive [16]. In addition, HGS should be good among physiotherapists because they need hand strength for proper force applications for the manual therapy and management of their patients [51].

A better understanding of how HGS relate to other risk factors has the potential to improve health-promotion efforts.

48.4.2 Limitations

This study had several limitations. First, the sample is non-probabilistic. They were all young adults studying physiotherapy raised in different parts of Greece; however, the prevalence of physical inactivity is higher among university students [52], and this could be a factor that can influence the results. Further studies in larger samples from different educational background seem important. Second, the hand dimensions were not investigated. Studies have showed that there is a correlation between finger length and other hand anthropometric characteristics [42, 53]. Further studies could examine the relationship between HGS and hand shape and/or finger length. Third, PA was measured objectively via a questionnaire. Although fulfilling a questionnaire is a subjective method, it is easy and less expensive to use in population studies. However, it can influence the results because participants can easily overestimate or underestimate their time spent on activities. Although the mBaecke questionnaire is widely used and is valid and reliable [25, 54–56], in future studies it would be interesting to investigate the PA with objective methods (e.g., accelerometers, maximal oxygen consumption (VO2)).

48.5 Conclusions

In summary, this study identified that HGS is associated with muscle mass in young men and women. These findings suggest that muscle mass may be protective against lower HGS values for both genders. In women fat mass and physical activity are associated with HGS, suggesting that both are predictor variables related to low HGS in young women. These findings have clinical significance since we highlight the importance of including muscular strength testing in health-monitoring systems in early adulthood for the primary prevention of different disorders.

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The Effects of Exercise in Older Adults with Hyperkyphotic Posture

49

M. Tsekoura, M. Katsoulaki, A. Kastrinis,
E. Nomikou, K. Fousekis, E. Tsepis, and E. Billis

Abstract

The objective of this review was to investigate the effects of exercise in older adults with hyperkyphosis. Medline and Google Scholar databases were searched from June to August 2022 for studies related to exercise interventions in older adults above 60 years of age. All types of exercise interventions (such as strengthening, stretching, Yoga, and/or any other exercise with a focus on treatment or prevention of postural malalignment) were included. The keywords used were “hyperkyphosis,” “exercise,” and “older adults.” Ten studies were included involving 625 older adults with hyperkyphotic posture. The exercise interventions included spine strengthening (strengthening of back and abdominal muscles), poses of Yoga and postural alignment, and flexibility and respiratory muscle exercises. Duration of exercise programs varied from 6 weeks (1 study) to 8 weeks (3 studies), 12 weeks (4 studies), and 6 months (3 studies). Exercise adherence was generally good in studies. In summary, low to moderate evidence suggest that exercises in age-related hyperkyphosis have a role in the management of this group of patients. It can be beneficial in order to improve postural control, spinal stability, and kyphosis outcomes. The adherence reported across studies suggests that exercise is an acceptable treatment option for people with age-related hyperkyphosis. Types of exercise and dose–response parameters of exercise eliciting improvement warrant further investigation. Due to heterogeneity in clinical trials, future research is needed with the goal of improving the health of our growing geriatric population.

Keywords

Hyperkyphosis · Exercise · Older adults

49.1 Introduction

Hyperkyphosis is the most common spinal deformity in older adults, affecting 20–40% of this population [1, 2]. Increased thoracic kyphosis

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M. Tsekoura (✉) · K. Fousekis · E. Tsepis · E. Billis
Department of Physiotherapy, School of Health Rehabilitation Sciences, University of Patras, Rio, Greece
e-mail: mariatsekoura@upatras.gr

M. Katsoulaki
“Physiodrasis,” Physio and Rehab Clinic, Athens, Greece

A. Kastrinis
Department of Physiotherapy, Health Assessment and Quality of Life Research Laboratory, University of Thessaly, Volos, Greece

E. Nomikou
“The House” Physio and Rehab Clinic, Athens, Greece

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(kyphosis angle greater than 40°) is associated with several significant health consequences, including back pain, impaired physical function, impaired pulmonary function, impaired balance, falls, fractures, decreased functionality and quality of life, limitation in daily activity, and even earlier mortality [1, 3–5]. Some potential causes of hyperkyphosis and degenerative changes in the spine with age are decreased spinal extension mobility and poor posture, vertebral body wedging, dehydration of the intervertebral disks, and reduced back extensor muscle strength [4, 6, 7].

The evaluation and treatment of hyperkyphosis are challenging due to the lack of standardized diagnostic criteria and evidence-based treatment options. Treatment modalities are currently in use, including surgery, bracing, and physiotherapy [7]. Surgery (e.g., kyphoplasty and vertebroplasty) is not indicated for everyone because of various risks such as subsequent vertebral compression fractures [8]. Spinal orthoses can be an effective treatment option but orthoses have been only tested in women with underlying spinal osteoporosis [7, 9]. Physiotherapy and therapeutic exercise should be a first-line approach, particularly because many of the causes of hyperkyphosis are of musculoskeletal origin. Specialized treatment of hyperkyphotic posture in older adults may increase quality of life and help those patients to take an active role in their health care [1, 7]. Thus, the aim of this study was to evaluate the effects of exercise in older adults with hyperkyphosis.

49.2 Search Strategy and Selection Criteria

The PubMed and Google Scholar databases were searched for prospective controlled trials and randomized controlled trials related to the exercise treatment of hyperkyphotic posture in older adults (aged >60 years). The above-mentioned databases were searched during the period from June 2022 to August 2022 using the terms “hyperkyphosis,” “older adults,” and “exercise.” The reference lists of systematic review articles and meta-analyses were scanned for any additional references missed from the above databases’ search. Only English literature was included for the current review.

49.3 Studies’ Findings

The current search identified a total of 215 studies related to hyperkyphosis, older adults, and exercise. Ten studies were abstracted and included in the review, including 625 older people with hyperkyphosis. Three studies were performed in USA [10–12], three studies were performed in Germany [13–15], one in Italy [16], one in Australia [17], one in Iran [18], and one in Korea [19].

The intervention duration ranged from 6 weeks [15] to 24 weeks [11, 14]. The frequency of exercises differed in reviewed studies from two to three days per week (Table 49.1). Exercise interventions included Yoga training [10, 11], breathing exercises [11, 19], Pilates exercises [17], flexibility [6, 12, 16] and strengthening exercises [6], correction exercises [14, 18, 19], aerobic exercises [12], and postural training [15].

49.4 Discussion

This review aimed to provide an overview of the possible exercise interventions for older adults with hyperkyphosis. According to the results of ten studies, it seems that exercise interventions (postural training, strengthening exercises, specific exercises to enhance breathing, thoracic mobility and stability, Yoga, Pilates) appear to have a role in increasing kyphosis and improve posture in older adults with hyperkyphosis. Literature findings support these results [1, 7, 20]. However, the included studies used different methods to diagnose hyperkyphosis and different outcome measures. The determination of standards for posture in the sagittal plane is difficult and largely depends on the measurement technique used [21]. Future studies should address this issue.

The rehabilitation for age-related hyperkyphosis is a growing area of interest among

Table 49.1 List of studies

Study	Age (years)	Sample (*N*)	Intervention	Frequency	Outcome measures	Results
Katzman et al. 2007 (Germany) [6]	72 ± 4.2	31	IG: Multidimensional group exercise	2 times/ week, 12 weeks	Kyphosis; knee and hip ROM; gait speed; PPT	All variables were improved
Benedetti et al. 2008 [16] (Italy)	70.9 ± 5.1	34	IG: Adapted physical activity with specific exercises for flexed posture; flexibility at pelvic and shoulder girdle and strengthening back extensor muscles CG: A non-specific physical activity protocol	2 times/ week, 12 weeks	Hip, knee, and ankle ROM; MMT; OWD	Improvement in the occiput-to-wall distance only in intervention group
Kuo et al. 2009 (Australia) [17]	60–75 (mean 64)	34	IG: Pilates exercise (thoracic extension, abdominal strengthening, core stabilization) CG: Postural education	2 days/ week, 10 weeks	Thoracic angle with photometric techniques	Slightly decreased thoracic flexion in IG
Katzman et al. 2017 (Germany) [14]	70.6 ± 0.6	99	IG: Group spine-strengthening exercise and postural training CG: Health education meeting	3 times/ week, 6 months	Kyphosis measured by radiography and Debrunner kyphometer, gait speed, TUG, and 6 min walking test	Significant differences were observed in kyphosis angles in the IG; no group differences in physical function
Morey et al. 1999 (USA) [12]	>65 (mean 71.9)	134	IG: Aerobic exercise and spinal flexibility exercises CG: Aerobic exercise	3 times/ week, 3 months supervised exercise and 3 months home-based exercise	Maximal oxygen uptake (VO_2 max); functional reach, timed-bed-mobility; and the physical function scale (PhysFunction) of the medical outcomes study SF-36	No differences between groups
Greendale et al., 2002 (USA) [10]	63.3–86 (mean 75)	21	IG: 4 series of Yoga poses—recumbent, on hands and knees, back bends in prone position, and standing poses	2 times/ week, 3 months	Debrunner kyphometer (mean 60.9°)	Mean height increased 0.52 cm; tragus to wall decreased 2.02 cm

(continued)

Table 49.1 (continued)

Study	Age (years)	Sample (*N*)	Intervention	Frequency	Outcome measures	Results
Katzman et al. 2019 (Germany) [15]	71.6 ± 4.9	12	IG: Technology-based exercises and postural training (via video clips)	6 week	Change in kyphometer-measured kyphosis; OTW; PASE	Kyphosis decreased 8 degrees, PA increased, OTW decreased 1.9 cm
Greendale et al. 2009 (USA) [11]	75.5 ± 7.4	180	IG: Hatha yoga poses and breathing	3 days/ week, 6 months	Debrunner kyphometer; standing heig ht.; time chair stands; functional reach; walking speed	4.4% improvement in kyphosis
Jang et al. 2021 (Korea) [19]	71.6 ± 4.9	50	IG: Thoracic corrective exercise and program-specific exercises to enhance breathing, thoracic mobility, and stability CG: Education and booklet of exercises	2 days/ week, 8 weeks	Angle of kyphosis; kyphosis index; balance; SF-36	All parameters improved in the IG
Sedaghati et al., 2022 (Iran) [18]	IG: 66.00 ± 2.44 CG: 65.13 ± 2.74	30	IG: Corrective exercises CG: General health advice	3 days/ week, 8 weeks	Dorsal kyphosis (flexible ruler); FHA; TUG; the 180°-turn test	Improvement in functional balance and postural stability

IG intervention group, *CG* control group, *ROM* range of motion, *PPT* physical performance test, *MMT* manual muscle testing, *SF-36* short form health survey questionnaire, *TUG* Timed Up and Go test, *PA* physical activity, *PASE* Physical Activity Scale for the Elderly, *OTW* occiput-to-wall distance, *OWD* occiput to wall distance, *FHA* forward head angle

researchers and clinicians [2]. Hyperkyphosis causes various health outcomes (e.g., impaired pulmonary function, falls, fractures) [1] and can impair activities of daily living [22]. Early assessment and treatment seems important. Results of this review shows that the most common exercise programs for hyperkyphosis are corrective exercises [14, 18, 19], and flexibility and strengthening exercises [6, 12, 16]. A few studies also included abdominal-strengthening exercises [10, 16, 17]. Corrective postural exercises are based on Kendall's theory. This theory suggests that back extensor exercises may reduce the angle of kyphosis with the strong back muscles counteracting the anteriorly directed gravitational pull on the thoracic spine [23, 24]. Exercise-based interventions may include spinal muscle strengthening, core stabilization exercises, as well as stretching exercises.

Yoga also seems an effective treatment approach [10]. Posture depends on a variety of factors, i.e., age, gender, lifestyle, occupation, muscle balance, kinesthetic sense, somatic parameters, as well as genetic and environmental factors [25, 26]. Undertaking specific exercise programs or other forms of physical activity (e.g., Pilates, Yoga) can affect posture, including sagittal spinal curvatures. A study conducted by Garbara (2021) [26] (in 667 people who were practicing Yoga, and 578 as a control group) showed that Yoga practitioners had a generally less pronounced thoracic kyphosis. This suggests that Yoga exercises can affect the shape of the anterior–posterior curves of the spine [26]. Further research is needed.

In a study conducted in 2018 [15] researchers investigated the effectiveness and acceptability of a technology-based intervention on kyphosis.

The intervention included exercise and posture training program sent as video clip links and text messaging prompts via a mobile phone to older adults [15]. This study shows that self-management programs may improve heath behaviors [27]. In addition, technology use is rapidly increasing in older populations and telehealth is expected to serve a greater role in the delivery of health care in the future [28]. Telerehabilitation has many advantages (greater access to clinicians, reduced travel demands) for older patients but technology-based exercise and posture training in older adults with hyperkyphosis warrant further study [15, 27, 28].

The adherence reported across studies suggests that exercise is an acceptable treatment option for people with age-related hyperkyphosis. Older people's adherence to exercise programs is associated with a range of program and personal factors [29]. Physical and therapeutic exercise has become standard practice in clinical care due to the fact that it leads to numerous benefits in many different pathological and non-pathological populations [30]. Health professionals should design strategies to enhance exercise adherence in this population [29].

Dosing in exercise is extremely important to get the beneficial effects [31]. Available intervention programs vary in terms of frequency, duration, and intensity of exercises. In the present review, literature shows that the intervention duration ranged from 6 weeks to 24 weeks. It is difficult to give a patient aged >60 years with hyperkyphotic posture-specific exercise prescription based on the results of these ten studies.

49.4.1 Clinical Significance of This Study

Treatments and exercise that prevent worsening kyphosis are important due to the progressive nature of kyphosis with aging [32]. Exercise is beneficial [31] and health professionals should consider parameters such as dosing of exercise in order to be more effective in management of older adult patients with hyperkyphosis. Furthermore, this review could help designing in future best practice guidelines for this group of patients. Future studies should also analyze the quality of studies including exercise in this group of patients.

49.5 Conclusion

The review's findings provide encouraging qualitative data on effects of exercise interventions in older adults with hyperkyphotic posture. Exercise interventions should focus on postural alignment, strengthening, and flexibility. Additional research, especially large, well-controlled randomized clinical trials are required to confirm the optimal type of intensity and progression of exercise.

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Water Quality Analysis Using Physicochemical Parameters and Estimation of Pesticides in Water from Various Sources of Tirupati, Andhra Pradesh, India

K. Swathi, B. Nikitha, M. Malleswari,
M. Munisankar, S. D. Meena, and A. Roja

Abstract

Tirupati is one of the famous tourist places in India. So, safe drinking water is a priority. Therefore, to handle ground water contamination and to make aware the people in the area of Tirupati, in the present paper, research was conducted with the goal to estimate water quality by using physico-chemical parameters and to analyse pesticides with analytical technique Gas Chromatography-Mass Spectrometry (GC-MS) of ground water in and around Tirumala, Tirupati, located in Andhra Pradesh State of India. For this estimation, ground water samples were collected from different locations of Tirupati, i.e. Sri Padmavati Mahila Visvavidyalayam (SPMVV) (Women's University), Mallamgunta, LalBahudhur (LB) Nagar, Singalagunta, Sri Venkateshwara (SV) University, Perumallapalli, Settipalli, Akkarampalli (AK Palli), Srikrishna Nagar, Gandhipuram, Pathalaganga and Cherlopalli areas, and water quality parameters (alkalinity, pH, total hardness, chloride, calcium, potassium and silica) were tested. Based on the physico-chemical parameters obtained it can be concluded that the water was good. Tirumala Pathalaganga water was found be within the standard limits set by the World Health Organisation (WHO), so it is pure water without any contaminants. Reverse Osmosis (RO) water does not contain any contaminants; it is free from dissolved solids and ions so it is pure and clean water. Ground water sample that was collected from Tirupati area was less polluted than surface water sample, so it is pure when compared with tap water. Hence, drinking water pollution should be controlled by the proper environment management plan. Ground and surface water of this area should be treated to make it suitable for drinking and to maintain proper health conditions of people living in this area. All samples that were collected from groundwater from the fields of Settipalli area exceeded the standard limits set by the WHO and Bureau of Indian Standards (BIS), which suggests poor water quality. The present study reported the contamination status of diclorvos, methyl parathion, parathion and malathion in ground water of Tirupati in Settipalli, Andhra Pradesh, India. In agriculture, pesticides are

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K. Swathi (✉) · B. Nikitha · M. Malleswari ·
S. D. Meena · A. Roja
Institute of Pharmaceutical Technology, Sri
Padmavati Mahila Visvavidyalayam,
Tirupati, Andhra Pradesh, India

M. Munisankar
School of Engineering and Technology, Sri
Padmavati Mahila Visvavidyalayam,
Tirupati, Andhra Pradesh, India

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frequently viewed as a quick, simple and low-cost option for controlling weeds and insect pests. The results obtained from the present study shall be useful in future management of the ground water in Tirupati area.

Keywords

Physicochemical parameters · Water quality · Pesticide analysis · Tirupati · GC-MS

50.1 Introduction

Tirupati is one of the famous tourist places in India. As a result, safe drinking water is a priority. Therefore, to handle groundwater contamination and to make aware the people in the area of Tirupati, in present paper, research was conducted with the goal to estimate water quality by using physicochemical parameters and to analyse pesticides with analytical technique (Gas Chromatography-Mass Spectrometry (GC-MS)) of groundwater in and around Tirumala, Tirupati, located in Andhra Pradesh State of the country India. For this estimation, groundwater samples were collected from different locations of Tirupati, i.e. Sri Padmavati Mahila Visvavidyalayam (SPMVV) (Women's University), Mallamgunta, LalBahudhur (LB) Nagar, Singalagunta, Sri Venkateshwara (SV) University, Perumallapalli, Settipalli, Akkarampalli (AK Palli), Srikrishna Nagar, Gandhipuram, Pathalaganga and Cherlopalli areas, and water quality parameters (alkalinity, pH, total hardness, chloride, calcium, potassium and silica) were tested. Based on the physicochemical parameters obtained, it can be concluded that the water was good. Tirumala Pathalaganga water was found to be within the standard limits set by the World Health Organization (WHO), so it is pure water without any contaminants. Reverse Osmosis (RO) water does not contain any contaminants; it is free from dissolved solids and ions, so it is pure and clean water. Groundwater sample that was collected from Tirupati area was less polluted than surface water sample, so it is pure when compared with tap water. Hence, drinking water pollution should be controlled by the proper environmental management plan. Ground and surface water of this area should be treated to make it suitable for drinking and to maintain proper health conditions of people living in this area. All samples that were collected from groundwater from the fields of the Settipalli area exceeded the standard limits set by the WHO and Bureau of Indian Standards (BIS), which suggests poor water quality. The present study reported the contamination status of dichlorvos, methyl parathion, parathion and malathion in groundwater of Tirupati in Settipalli, Andhra Pradesh, India. In agriculture, pesticides are frequently viewed as a quick, simple and low-cost option for controlling weeds and insect pests. The results obtained from the present study shall be useful in future management of the groundwater in Tirupati area.

50.2 Experimental Materials, Methods, Results and Discussions of Selected Study Area

The current study examines the quality of water in several areas in Tirupati, Chittoor district, Andhra Pradesh, in terms of physicochemical parameters. It is situated at a latitude of 13.6288 N and a longitude of 74.4192 E. Tirupati covers a total area of 27.44 km^2. Water is used for agriculture, residential and fishing activities in various locations of Tirupati.

For residential and drinking purposes, people in rural areas around Tirupati rely primarily on groundwater. The goal of this study was to obtain a physicochemical analysis of water in order to assess the health of the people who live in this area. According to the WHO, contaminated water causes 600 million instances of diarrhoea and 46,00,000 childhood deaths per year. For drinking purposes, most Indians rely on surface and groundwater (Figs. 50.1, 50.2 and 50.3).

50.3 Selection of Sampling Points

As a result, 13 alternative localities in the state of Chittoor were picked based on predetermined criteria. SPMVV, LB Nagar, Mallamgunta,

Fig. 50.1 Location of sample collection

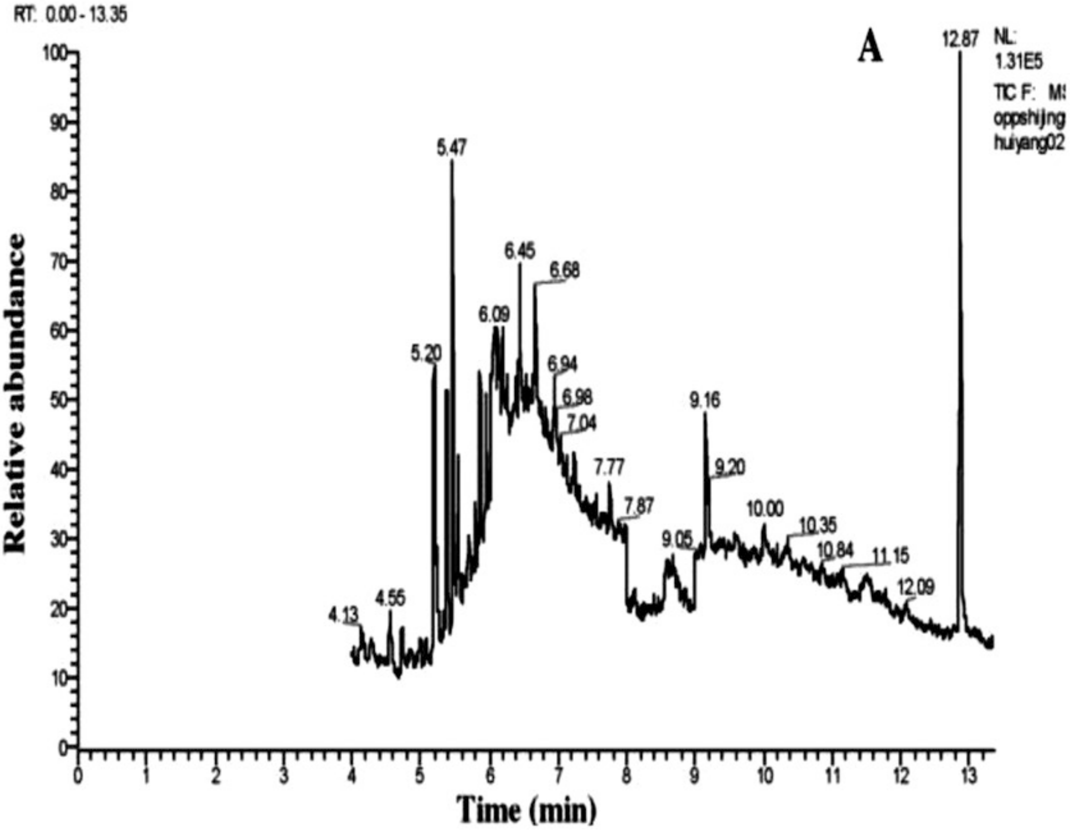

Fig. 50.2 Chromatogram obtained by solid phase extraction-gas chromatography-mass spectrometry (SPEC-GC-MS) of unspiked groundwater samples. (**a**) Groundwater samples spiked with ortho-phosphorous pesticides (0.5 ug/L final concentration)

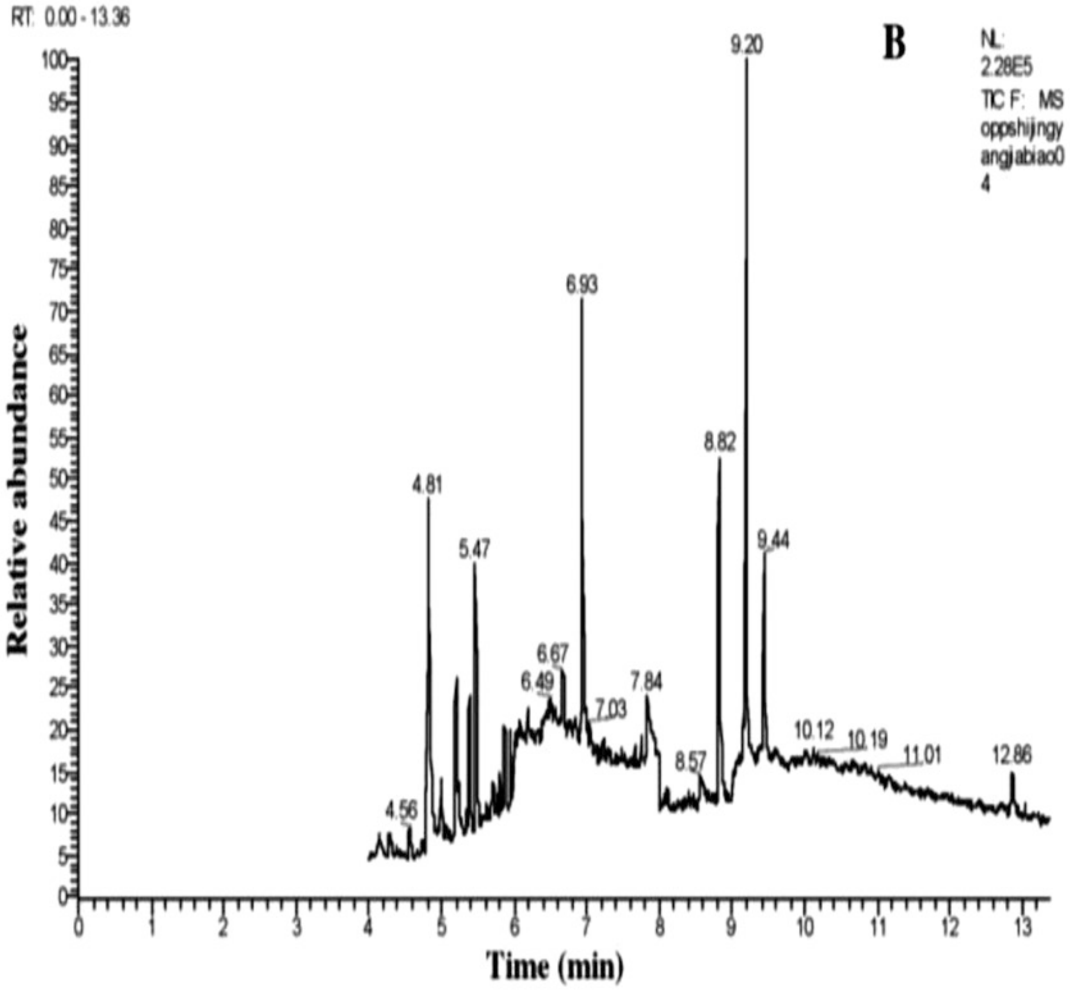

Fig. 50.3 Chromatogram of non-spiking groundwater samples collected by the SPE-GC-MS. (**b**) Ionisation detector (ID) peaks: (1) dichlorvos (4.8 min); (2) methyl parathion (8.8 min); (3) malathion (9.2 min); (4) parathion (9.4 min)

Table 50.1 Samples

S. no.	Sample location	Type of sample	Sample no.
1	SPMVV	Tap water	S1
2	Mallamgunta	Bore water	S2
3	LB Nagar	Bore water	S3
4	Singalagunta	Telugu Ganga water	S4
5	SV University	Tap water	S5
6	Perumallapalli	Drinking water	S6
7	Perumallapalli	Bore water	S7
8	Settipalli	Pond water	S8
9	AK Palli	Bore water	S9
10	Srikrishna Nagar	RO water	S10
11	Gandhipuram	Tap water	S11
12	Pathalaganga	Waterfalls	S12
13	Cherlopalli	Bore water	S13

Table 50.2 Experimental results for the physicochemical parameters in study area with methods used

S. no.	Parameter and methods used for analysis	S1	S2	S3	S4	S5	S6
1	Colour (visual comparison)	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless
2	Odour	Odourless	Odourless	Odourless	Odourless	Odourless	Odourless
3	Appearance	Clear	Clear	Clear	Clear	Clear	Clear
4	Conductivity (conductivity meter)	744	199.9	614	485	325	648
5	Turbidity (turbiditymeter)	21	1.6	1.7	2.2	2	1.9
6	pH (pH meter)	6.78	8.2	7.3	8.5	7.2	8.2
7	Total dissolved solids (TDS)	836	260	487	383	271	515
8	Dissolved oxygen	2.56	1.28	3.584	2.688	3.712	2.56
9	Acidity (titrimetric method)	60	130	110	40	90	100
10	Alkalinity (titrimetric method)	542	480	490	380	350	560
11	Temperature (thermometer)	28.7	28	29.6	31.6	28.6	28.9

Table 50.3 List of ions and time windows used for selective ion monitoring-mass spectrometry (SIMEI-MS) detection, retention times and regression results for the analytes

Compound	Starting time/min	*m/z*	Retention time (min)	Regression equation	r^2	Linear range (mg/L)
Dichlorvos	4	109, 79, 185, 220	4.82	*y* = 1 × 107x + 129,629	0.9967	0.01–2.00
Methyl parathion	8	109, 263, 125	8.85	*y* = 1 × 107x – 636,386	0.9820	0.01–2.00
Malathion	9	125, 93, 173, 127, 285	9.21	*y* = 1 × 107x + 286,3160	0.9928	0.01–2.00
Parathion	9.35	109, 125, 155, 139, 291	9.46	*y* = 1 × 107x + 83,557	0.9900	0.0055–1.10

Singalagunta, SV University, Perumallapalli, Settipalli, AK Palli, Srikrishna Nagar, Gandhipuram, Pathalaganga and Cherlopalli were among the places visited (Tables 50.1, 50.2 and 50.3).

50.4 Conclusions

The water of Andhra Pradesh and Tirupati region were studied for various physicochemical properties. The study was carried out by collecting groundwater from this region and performing physicochemical analysis of groundwater samples gathered in several Tirupati locations.

From the observations, it can be concluded that the concentration of turbidity, conductivity, total acidity content and dissolved oxygen are within the limits but only the sample that was collected from groundwater in fields exceeded the standard limits set by the WHO and BIS, which suggests poor water quality in this water sample (Settipalli). The sample that is collected at Tirumala (Pathalaganga) was found to be within the standard limits set by the WHO, so it is pure water without any contaminants. RO does not contain any contaminants; it is free from dissolved solids and ions, so it is pure and clean water. Groundwater sample that was collected from Tirupati area was less polluted than the surface water sample, so it is pure when compared with tap water.

Hence, drinking water pollution should be controlled by the proper environmental management plan. Ground and surface water of this area should be treated to make it suitable for drinking and to maintain proper health conditions of people living in this area. The present study reports the contamination status of dichlorvos, methyl parathion, parathion and malathion in groundwater in the Tirupati sample (Settipalli), Andhra Pradesh, India. In agriculture, pesticides are frequently viewed as a quick, simple and low-cost option for controlling weeds and insect pests. Pesticide use, on the other hand, has a huge environmental cost. Pesticides have infiltrated nearly every aspect of our ecosystem.

Acknowledgments This study is supported by Sri Padmavati Mahila Visvavidyalayam, Tirupati, Andhra Pradesh, India.

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Method Development and Validation of Gallic Acid in Liquid Dosage Form by Using RP-HPLC Method

Aavula Roja, Peram Uma Maheshwari, Ramapuram Munemma, and Konda Swathi

Abstract

A simple, rapid, precise, sensitive, and reproducible reverse-phase high-performance liquid chromatography (RP-HPLC) method has been developed for the quantitative analysis of gallic acid in the pharmaceutical dosage form. Chromatographic separation of gallic acid was achieved on Waters Alliance-e 2695, by using Waters X-Terra RP-18 (150 × 4.6 mm, 3.5 μ) column and the mobile phase containing *0.1%* formic acid and ACN in the ratio of 70:30% v/v. The flow rate was 1.0 mL/min; detection was carried out by absorption at 275 nm using a photodiode array detector at ambient temperature. The number of theoretical plates and tailing factor for gallic acid was NLT 2000 and should not be more than *2* respectively. Percentage relative standard deviation of peak areas of all measurements is always less than 2.0. The proposed method was validated according to ICH guidelines. The method was found to be simple, economical, suitable, precise, accurate, and robust method for quantitative analysis of gallic acid.

Keywords

RP- HPLC · Gallic acid · Liquid dosage form

51.1 Introduction

Reverse-phase chromatography or RP-HPLC is a commonly used HPLC technique for the analysis of a wide range of compounds. In this technique, the stationary phase used in nonpolar while the mobile phase is aqueous or moderately polar in nature. Hydrocarbons are used as the stationary phase and water or acetonitrile is used as the mobile phase in this kind of high-performance liquid chromatography (RP-HPLC). Solutes are eluted in decreasing polarity order in RP-HPLC. For RP-HPLC, stationary phases for the silanol group are produced by treating the surface with an organo chloro silane. Non polar hydrocarbon chains in the stationary phase interact with sample molecules to provide a retention mechanism in RP-HPLC.

Gallic acid was determined by *Carl Wilhelm Scheele* in 1786. It is a naturally occurring low-molecular-weight tri phenolic compound. Its chemical name is 3,4,5-trihydroxy benzoic acid. It is also known as trihydroxy benzoic acid. It exists both independently and as a component of tannins (specifically, gallotannin). Bark, wood, leaves, fruits, roots, and seeds are only some of the plant parts that contain gallic acid or its deriv-

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A. Roja · P. U. Maheshwari · R. Munemma · K. Swathi (✉)
Pharmaceutical Analysis, Institute of pharmaceutical technology, Sri Padmavathi Mahila Visvavidyalayam, Tirupathi, India

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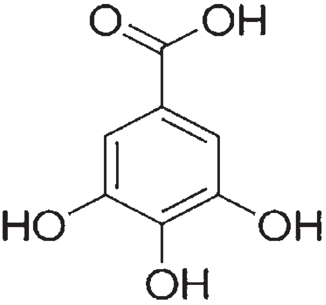
atives. Mechanism of action: Gallic acid has been shown to be selectively hazardous for cancer cells while having no effect on normal cells, inducing the death of cancer cells via mitochondria-mediated mechanisms. Gallic acid has been credited with a number of health benefits, including antioxidant, anti-inflammatory, and anticancer actions. It has a specific beneficial role in the apoptosis of cancer cells and brain health.



Molecular structure of gallic acid

51.1.1 Experimental Work

Materials, Reagents, and Chemicals

The pure form of gallic acid, HPLC grade water, acetonitrile, triethyl amine, and formic acid (Rankem), and pipettes, beakers, burettes, and measuring cylinder which are manufactured by Borosil.

Equipment

HPLC (Alliance) was manufactured by Waters e 2695 – Empower software 2.0 versions, UV–vis spectrophotometer by UV-1700, and ultrasonicator (UCA 701) by Unichrome and PH meter by Eutech.

51.1.2 General Preparations

Preparation of Standard Stock Solution

Accurately weigh and transfer 100 mg of gallic acid working standard into a 100 mL clean dry volumetric flask, add diluent and sonicate to dissolve it completely, and make volume up to the mark with the same solvent (stock solution). Further pipette 5 mL of the above stock solutions into a 50 ml volumetric flask and dilute up to the mark with diluent (100 ppm of gallic acid).

Preparation of Buffer (0.1% Formic Acid) 1 mL of the formic acid is dissolved in 1 L of HPLC water and filtered through 0.45 μ membrane filter paper.

Preparation of Mobile Phase Mobile phase was prepared by mixing 0.1% formic acid and ACN taken in the ratio 70:30. It was filtered through a 0.45 μ membrane filter to remove the impurities, which may interfere in the final chromatogram.

Chromatographic Condition

Multiple trails were run to determine the optimal chromatographic settings for this approach use suitable high-performance liquid chromatographic equipped with PDA detector.

Column:	Waters X-Terra RP-18 (150 × 4.6 mm, 3.5 μ)
Movable phase:	Acetonitrile and 0.1% formic acid (30:70)
Wavelength:	275 nm
Flow rate:	1 mL/min
Injection volume:	10 μL
Run time:	5 min

Preparation of Diluent Mobile phase was used as a diluent.

Preparation of Standard Solution

Accurately weigh and transfer 100 mg of gallic acid working standard into a 100 mL clean dry volumetric flask, add diluent and sonicate to dissolve it completely, and make volume up to the mark with the same solvent (stock solution).

Further pipette 5 mL of the above stock solutions into a 50 mL volumetric flask and dilute up to the mark with diluent (100 ppm of gallic acid).

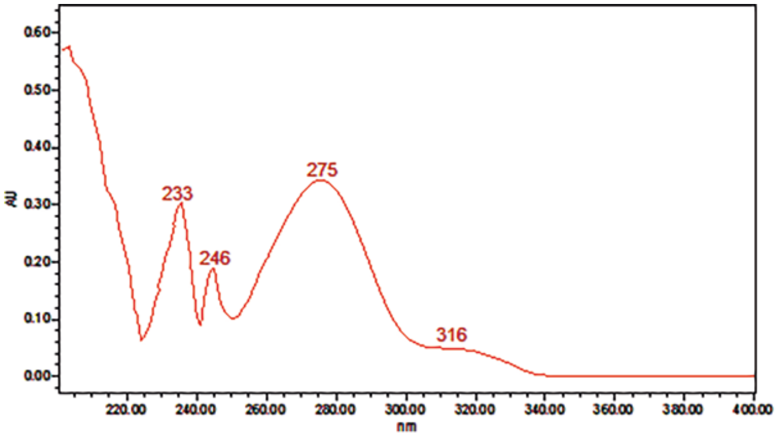
Procedure

Inject 10 µL of the standard, sample into the chromatographic system and measure the areas for gallic acid peak and calculate the %assay by using the formulae.

Determination of Working Wavelength (λmax)

The isosbestic wavelength was utilized to make an estimate of the drug's potency. At the isosbestic point, the molar absorptivity of all interconvertible compounds is equal to one another. That is why we relied on this wavelength for our precise medication estimations.

The wavelength of maximum absorption of the solution of the drug in a mixture of acetonitrile and 0.1% formic acid (30:70) was scanned using PDA detector within the wavelength region of 200–400 nm against acetonitrile and 0.1% formic acid (30:70) as blank. The absorption curve shows an isosbestic point at 275 nm. Thus 275 nm was selected as the detector wavelength for the HPLC chromatographic method.



PDA – Spectrum of gallic acid

51.1.3 Syrup Formulation

Preparation of Simple Syrup

Weigh 66.35 g of sucrose. Add sucrose in hot purified water under continuous stirring until it dissolved. Kept aside for cooling.

As per IP 666.7 g of sucrose in 1000 ml of water

Preparation of Gallic Acid Syrup

Add gallic acid, preservative (sodium benzoate), diluents, and sweetener (glycerine) in the above simple syrup. Stir the solution for 20 min. After cooling, filter the final syrup through filter paper.

System Suitability

The tailing factor for the peak due to gallic acid in standard solution should not be more than 2.0.

Theoretical plates for the gallic acid peak in standard solution should not be less than 2000.

Formula for Assay

$$\%\text{Assay} = \frac{AT}{AS}{}^{*}\,\frac{WS}{DS}{}^{*}\,\frac{DT}{WT}{}^{*}\,\frac{\text{Average weight}}{\text{Label claim}}{}^{*}\,\frac{P}{100}{}^{*}\,100$$

where:

AT = average area counts of test (sample) preparation
AS = average area counts of standard preparation
WS = weight of working standard taken in mg
DS = dilution of working standard in mL
DT = dilution of test (sample) in mL
WT = weight of test (sample) taken in mg
P = percentage purity of working standard
LC = Label claim mg/mL

Procedure
Inject each level into the chromatographic system and measure the peak area.

Plot a graph of peak area versus concentration (on the X-axis concentration and on the Y-axis peak area) and calculate the correlation coefficient.

Range
The range of an analytical technique is the concentration range across which its precision, accuracy, and linearity have been shown.

Inclusion Criteria
Correlation coefficient should be not less than 0.999.

51.1.4 Preparation Accuracy Sample Solutions

For the Preparation of 50% Solution (with Respect to Target Assay Concentration)
Accurately weigh and transfer 50 mg of gallic acid standard into a 100 mL clean dry volumetric flask, add diluent and sonicate to dissolve it completely, and make volume up to the mark with the same solvent (stock solution).

Further pipette 5 mL of the above stock solutions into a 50 mL volumetric flask and dilute up to the mark with diluent (50 ppm of gallic acid).

For the Preparation of 100% Solution (with Respect to Target Assay Concentration)
Accurately weigh and transfer 100 mg of gallic acid standard into a 100 mL clean dry volumetric flask, add diluent and sonicate to dissolve it completely, and make volume up to the mark with the same solvent (stock solution).

Further pipette 5 mL of the above stock solutions into a 50 mL volumetric flask and dilute up to the mark with diluent.(100 ppm of gallic acid).

For the Preparation of 150% Solution (with Respect to Target Assay Concentration)
Accurately weigh and transfer 150 mg of gallic acid standard into a 100 mL clean dry volumetric flask, add diluent and sonicate to dissolve it completely, and make volume up to the mark with the same solvent (stock solution).

Further pipette 5 mL of the above stock solutions into a 50 mL volumetric flask and dilute up to the mark with diluent (150 ppm of gallic acid).

Procedure
Inject the standard solution, accuracy – 50%, accuracy – 100%, and accuracy – 150% solutions.

Inclusion Criteria
The % recovery for each level should be between 98.0% and 102.0%.

Precision
Precision is the degree of repeatability of an analytical method under normal operating conditions. Precision is of three types:

1. System precision
2. Method precision
3. Intermediate precision (a. Intraday precision, b. Interday precision)

System precision is checked by using standard chemical substances to ensure that the analytical system is working properly.

In this peak area, % of drug of six determinations is measured and % RSD should be calculated.

In method precision, a homogenous sample of a single batch should be analyzed six times. This indicates whether a method is giving constant results for a single batch. In this, analyze the sample six times and calculate the % RSD.

The precision of the instrument was checked by repeatedly injecting (n = 6) solutions of 100 ppm of gallic acid.

Acceptance Criteria
The % RSD for the absorbance of six replicate injection results should not be more than 2%.

Robustness
As part of the robustness, deliberate change in the flow rate, mobile phase composition, temperature variation was made to evaluate the impact on the method.

A. The flow rate was varied from 0.9 mL/min to 1.1 m.

   A standard solution of 100 ppm of gallic acid was prepared and analyzed using the varied flow rates along with the method flow rate.

   On the evaluation of the above results, it can be concluded that the variation in flow rate affected the method significantly. Hence, it indicates that the method is robust even with a change in the flow rate ± 10%.

B. The variation of the Organic Phase ratio.

   A standard solution of 100 ppm of gallic acid was prepared and analyzed using the varied in mobile phase ratio.

Limit of Detection (LOD) and Limit of Quantification (LOQ)

The limit of detection (LOD) and limit of quantification (LOQ) of the drug carry were calculated using the following equation as per international conference harmonization (ICH) guidelines.

$$\text{LOD} = 3.3X\sigma / S$$

$$\text{LOQ} = 10X\sigma / S$$

LOD for gallic acid was found to be 0.3 μg/mL and LOQ for gallic acid was found to be 1 μg/mL.

51.1.5 Degradation Studies

Preparation of Stock

Accurately weigh and transfer 100 mg of Gallic acid working standard into a 100 mL clean dry volumetric flask, add diluent and sonicate to dissolve it completely, and make volume up to the mark with the same solvent (stock solution).

Acid Degradation

Pipette 5 mL of the aforementioned solution was added to a 50 mL vacuum flask, followed by 3 mL of 1 N HCl. The vacuum flask was then maintained at 60 °C for 6 h before being neutralized with 1 N NaOH and diluted to 50 mL with diluent. Filter the solution using 0.22-micron syringe filters and transfer it to bottles.

Alkali Degradation

Pipette 5 mL of the above solution into a 50 mL volumetric flask and add 3 mL of 1 N NaOH was added. Then, the volumetric flask was kept at 60 °C for 6 h and then neutralized with 1 N HCl and make up to 50 mL with diluent. Filter the solution with 0.22 microns syringe filters and place it in vials.

Thermal-Induced Degradation

Gallic acid sample was taken in Petri dish and kept in a hot air oven at 105 °C for 24 h. Then the sample was taken and diluted with diluents and injected into HPLC and analyzed.

Peroxide Degradation

Pipette 5 mL above stock solution was added to a 50 mL vacuum flask, 1 mL of 3% w/v hydrogen peroxide was added to the flask and the volume was built up to the mark using diluent. The vacuum flask was then maintained at 60 °C for 6 h. After that, the vacuum flask was left at room temperature for 15 min. Filter the solution using 0.45-micron syringe filters and transfer it to bottles.

Reduction Degradation

Pipette 5 mL of above-stock solution was added to a 50 mL vacuum flask, 1 mL of 10% sodium bisulfate was added to a flask and the volume was built up to the required volume with diluent. The vacuum flask was then maintained at 60 °C for 6 h. After that, the vacuum flask was left at room temperature for 15 min. Filter the solution using 0.45-micron syringe filters and transfer it to bottles.

Photolytic Degradation

Gallic acid sample was placed in sunlight for 24 h. Then the sample was taken and diluted with diluents and injected into HPLC and analyzed.

Hydrolysis Degradation

Pipette 5 mL of above-stock solution was added to a 50 mL vacuum flask, 1 mL of HPLC grade water was added to a flask and the volume was built up to the required volume with diluent. The vacuum flask was then maintained at 60 °C for 6 h. After that, the vacuum flask was left at room temperature for 15 min. Filter the solution using 0.45-micron syringe filters and transfer it to bottles.

51.2 Results and Discussion

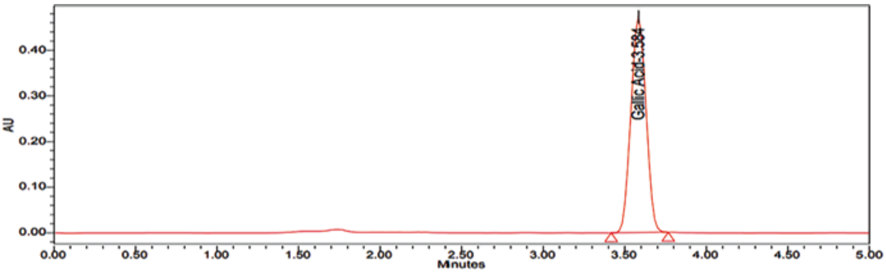
Optimization of Chromatographic Conditions (Fig. 51.1 and Table 51.1)

Specificity (Figs. 51.2, 51.3 and 51.4)

51.3 Analytical Method Validation (HPLC)

The method's linearity, accuracy, precision, and specificity were all confirmed to be satisfactory. The method was validated in accordance with ICH standards.

Linearity



Chromatogram of linearity

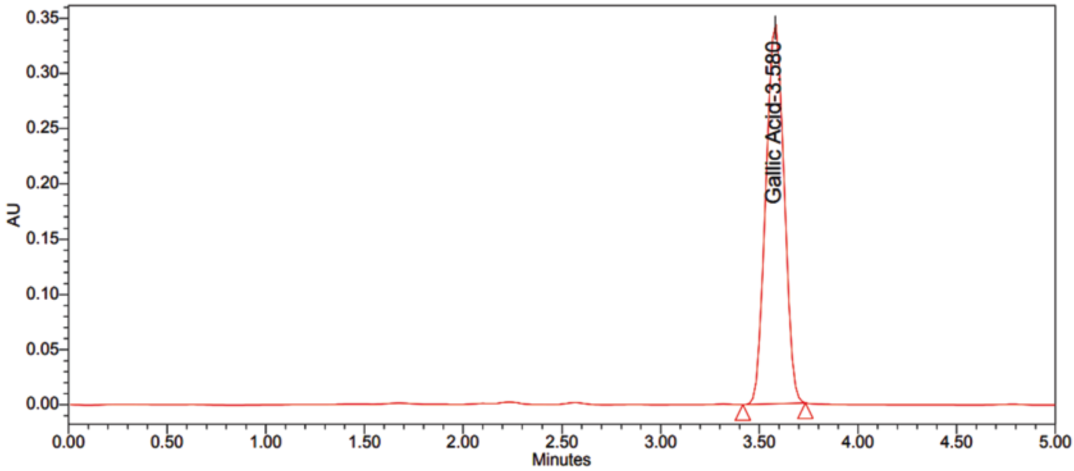


Fig. 51.1 Chromatogram of Trial-6

Table 51.1 Optimized chromatographic conditions

Parameters	Observation
Instrument used	Waters HPLC with autosampler and UV detector
Injection volume	10 µL
Movable phase	Acetonitrile and 0.1% formic acid (30:70)
Column	Waters X-Terra RP-18 (150 × 4.6 mm, 3.5 µ)
Wave length	275 nm
Flow rate	1 mL/min
Runtime	5 min
Temperature	Ambient(25 °C)
Mode of separation	Isocratic mode

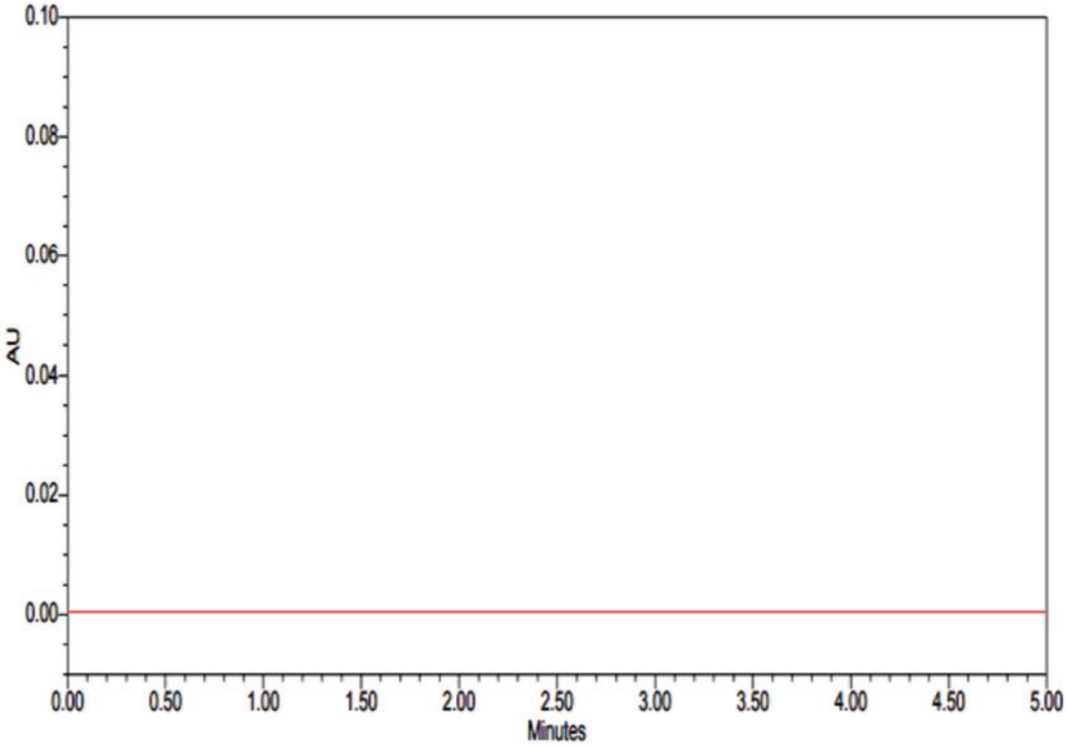


Fig. 51.2 Chromatogram of blank

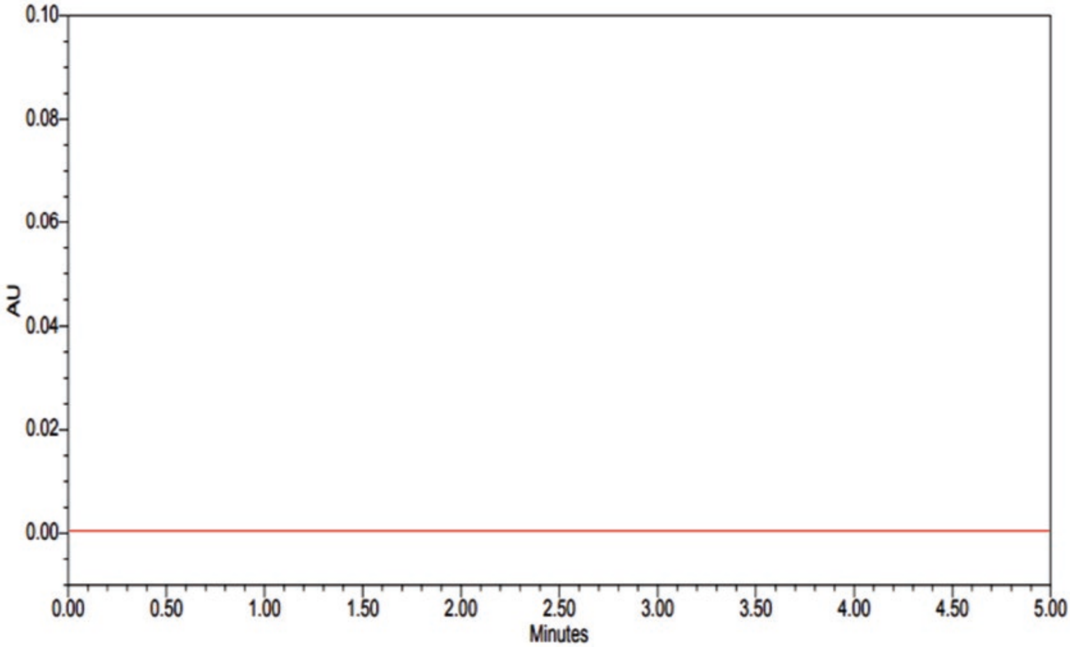


Fig. 51.3 Chromatogram of placebo

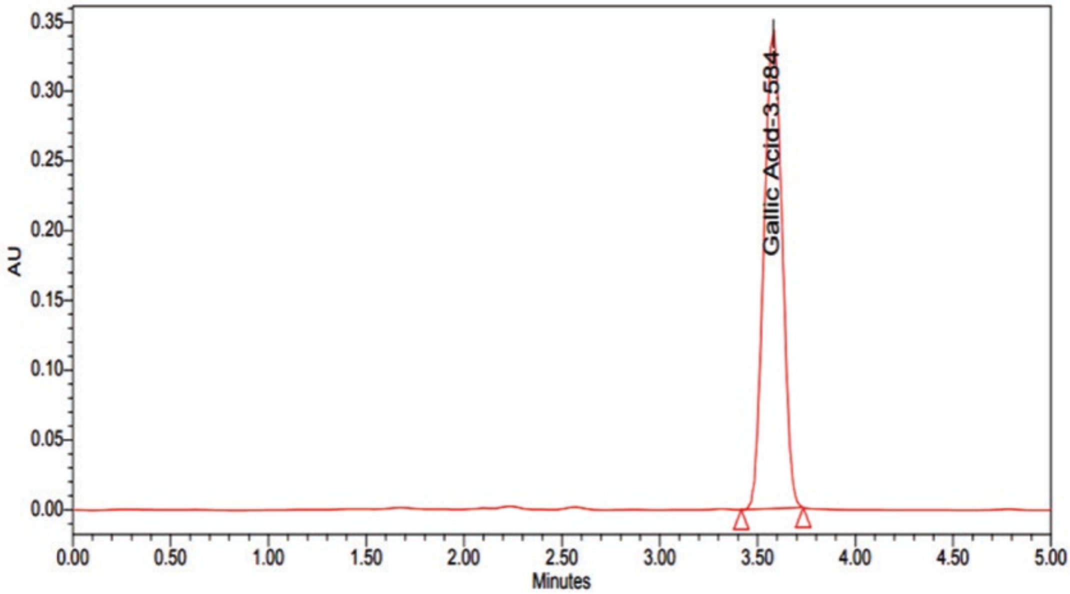


Fig. 51.4 Chromatogram of standard

Accuracy (Table 51.2, Figs. 51.6, 51.7 and 51.8)

Precision (Tables 51.3, 51.4 and Fig. 51.9)

Acceptance Criteria The % RSD for the area of six standard injections results should not be more than 2% (Table 51.5 and Fig. 51.10).

Acceptance Criteria The % RSD for the area of six standard injection results should not be more than 2%.

Robustness (Table 51.6, Figs. 51.11, 51.12, 51.13 and 51.14)

Results of Linearity for Gallic Acid (Fig. 51.5)

S. no	Gallic acid	
	Conc. (µg/mL)	Peak area
1	25.00	512,492
2	50.00	1,033,316
3	75.00	1,474,077
4	100.00	2,016,525
5	125.00	2,533,019
6	150.00	3,023,594
Regression equation	$y = 20135.78x + 3105.61$	
Slope	20135.78	
Intercept	3105.61	
R^2	0.9998	

LOD and LOQ (Table 51.7, Figs. 51.15 and 51.16)

Degradation Studies (Figs. 51.17, 51.18, 51.19, 51.20, 51.21, 51.22, 51.23, 51.24 and Table 51.8)

51.4 Conclusion

The devised HPLC technique for estimating the target drug is easy to use, quick to implement, highly reliable, and cheap. Both the mobile phase and the solvents are easily accessible, inexpensive, dependable, sensitive, and quick to prepare. The sample recoveries revealed noninterference of formulation excipients in the estimate, and they may be utilized in labs for the regular analysis of chosen medications, all of which were in excellent agreement with their individual label claims. Since the HPLC method's system validation parameters have demonstrated good, accurate, and repeatable findings (without any interference of excipients), it can be inferred that the quick and easy procedures presented will be most beneficial for analysis. This study found that the stability indicating test technique by RP-HPLC was straightforward, reproducible, sensitive, and specific, with no cross-contamination from placebo or degradation products. So, they are suitable for regular gallic acid testing.

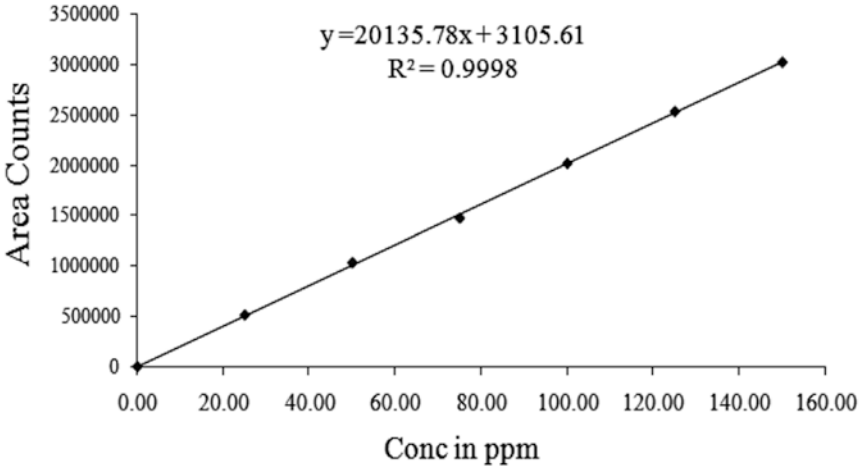


Fig. 51.5 Calibration curve for gallic acid at 275 nm

Table 51.2 Accuracy results of gallic acid by RP-HPLC method

% Concentration (at specification level)	Area	Amount of API added (mg)	Amount found (mg)	% Recovery	Mean recovery
50%	1,007,441	50	49.94	99.9	100.8
100%	2,035,921	100	100.93	100.9	
150%	3,072,308	150	152.31	101.5	

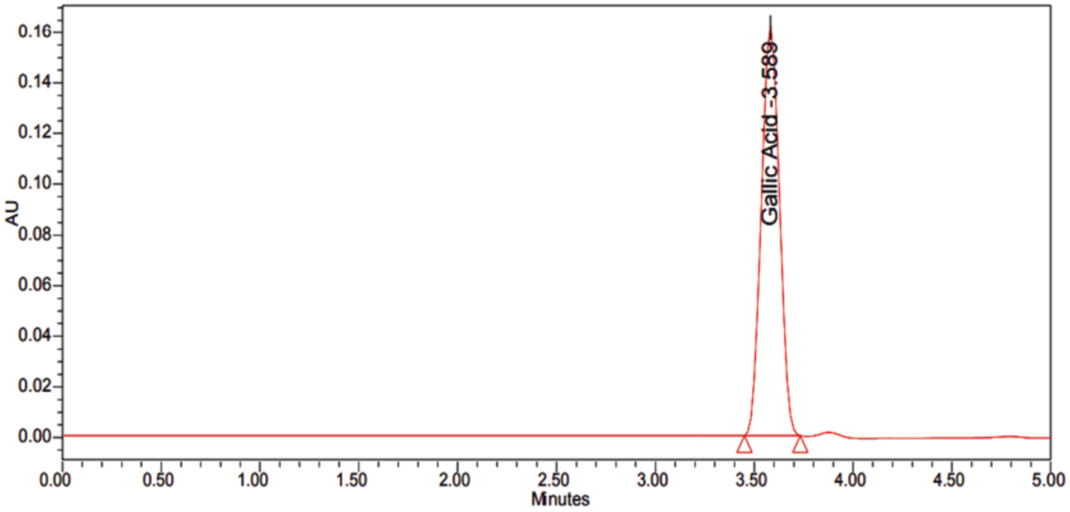


Fig. 51.6 Chromatogram for accuracy 50%

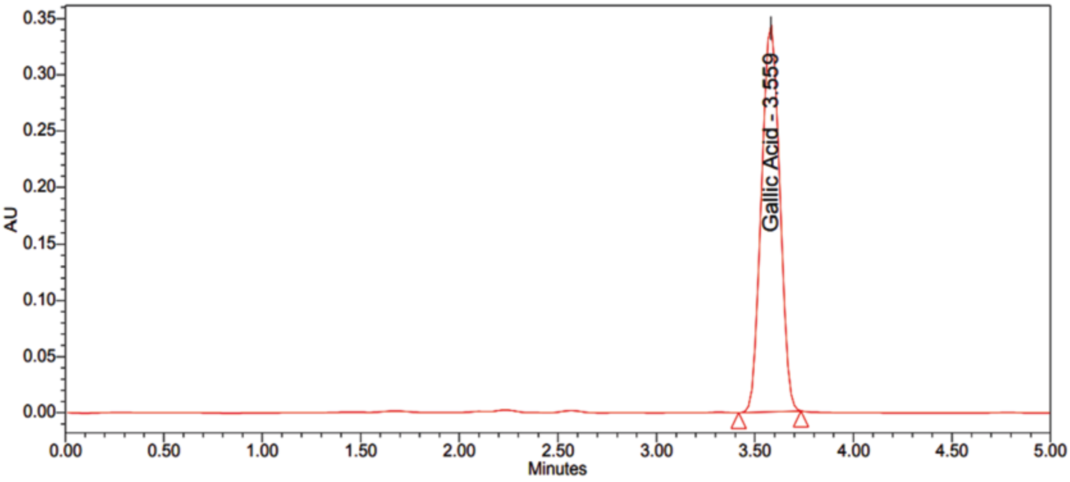


Fig. 51.7 Chromatogram for accuracy 100%

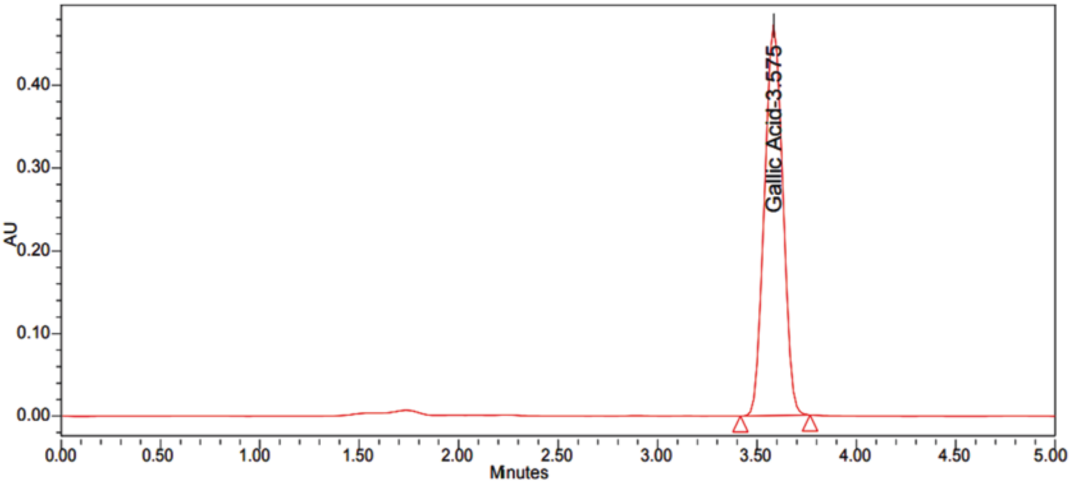


Fig. 51.8 Chromatogram for accuracy 150%

Table 51.3 Standard results for gallic acid by RP-HPLC method

Injection	Area for gallic acid
Injection-1	2,018,100
Injection-2	2,012,025
Injection-3	2,012,025
Injection-4	2,016,525
Injection-5	2,018,100
Injection-6	2,026,125
Average	2,017,150
Standard deviation	5201.49
%RSD	0.26

Table 51.4 Method precision for gallic acid by RP-HPLC method

Injection	Area for gallic acid
Method precision-1	2,005,679
Method precision-2	2,022,432
Method precision-3	2,013,387
Method precision-4	2,007,485
Method precision-5	2,022,066
Method precision-6	2,041,679
Average	2,018,788
Standard deviation	13242.329
%RSD	0.66

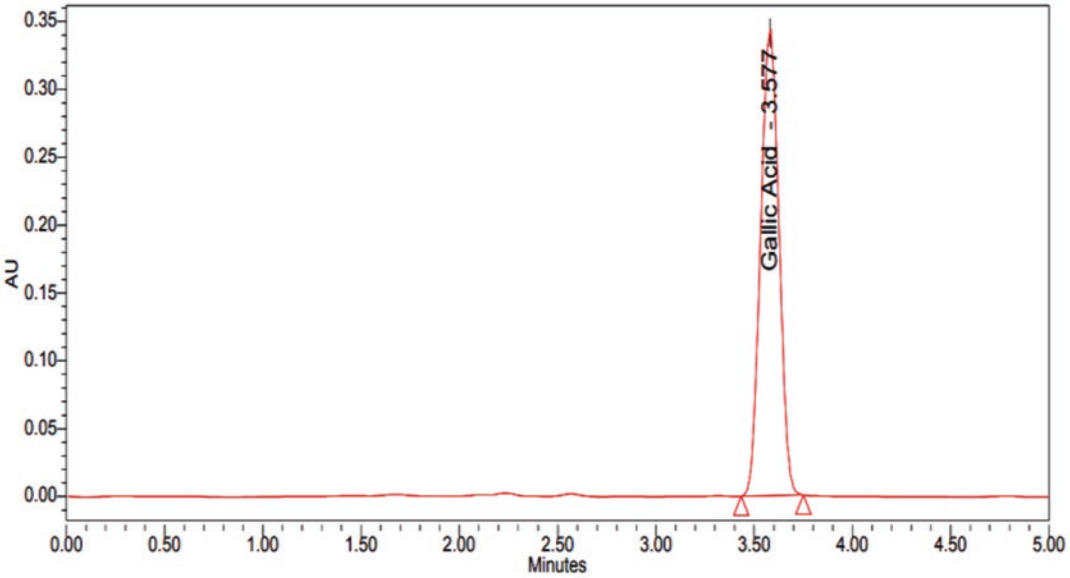


Fig. 51.9 Chromatogram of method precision

Table 51.5 Intermediate precision for gallic acid by RP-HPLC method

	Area for gallic acid	
Injection	Day-1	Day-2
Intermediate precision-1	2,034,786	2,002,841
Intermediate precision-2	2,002,367	2,030,823
Intermediate precision-3	2,021,542	2,029,252
Intermediate precision-4	2,018,143	2,016,210
Intermediate precision-5	2,026,357	2,026,629
Intermediate precision-6	2,012,687	2,010,798
Average	2,019,314	2,019,426
Standard deviation	11193.210	11297.543
%RSD	0.55	0.56

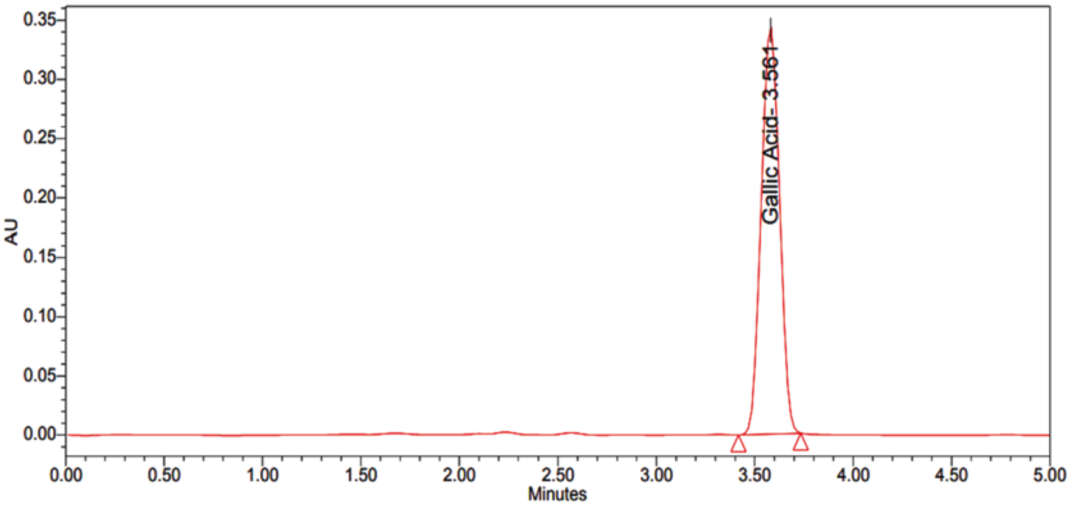


Fig. 51.10 Chromatogram of intermediate precision

Table 51.6 Robustness results of gallic acid by RP-HPLC

	Gallic acid					
Parameter	Condition	Retention time (min)	Peak area	Resolution	Tailing	Plate count
Flow rate change (mL/min)	Less flow (0.9 mL)	3.955	2,241,736		1.05	6056
	Actual (1 mL)	3.580	2,018,100		0.97	6021
	More flow (1.1 mL)	3.277	1,992,709		0.91	6012
Organic phase change	Less Org (27:73)	4.814	2,442,811		1.08	6078
	Actual (30:70)	3.584	2,012,025		0.95	6023
	More Org (33:67)	2.847	1,771,340		0.89	5984

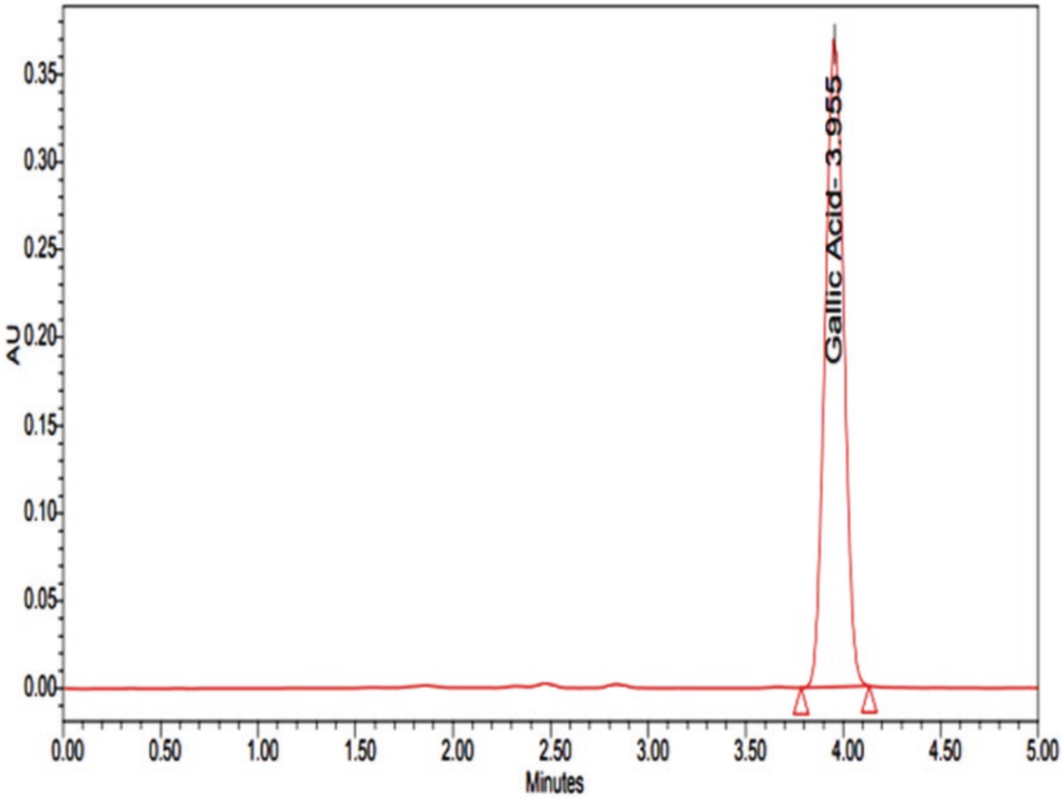


Fig. 51.11 Chromatogram for less flow rate (0.9 ml)

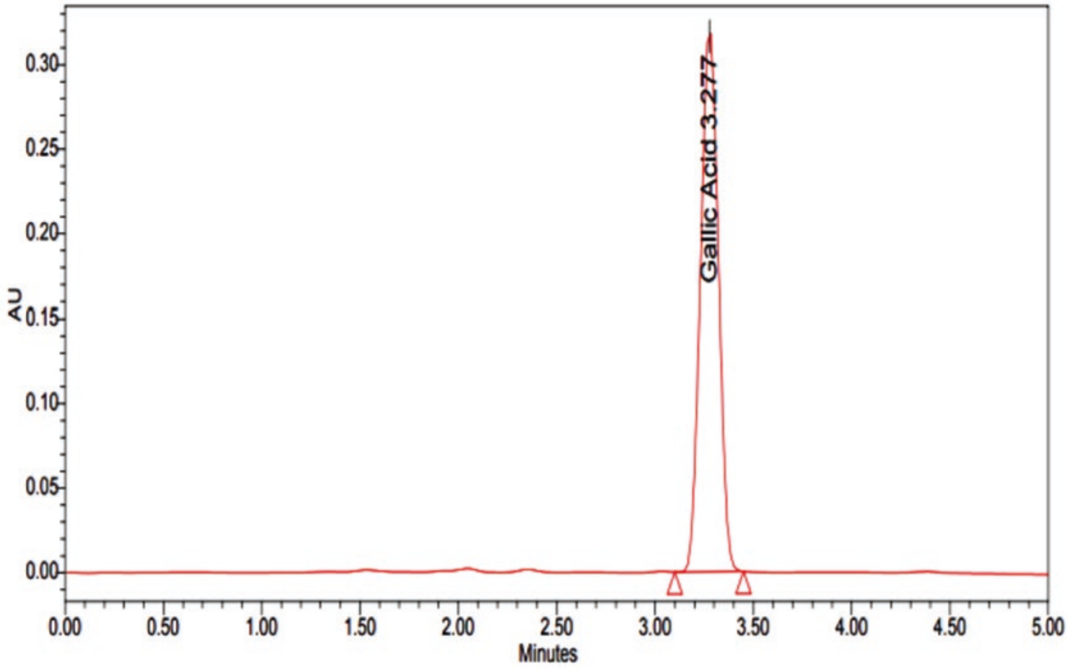


Fig. 51.12 Chromatogram for more flow rate (1.1 mL)

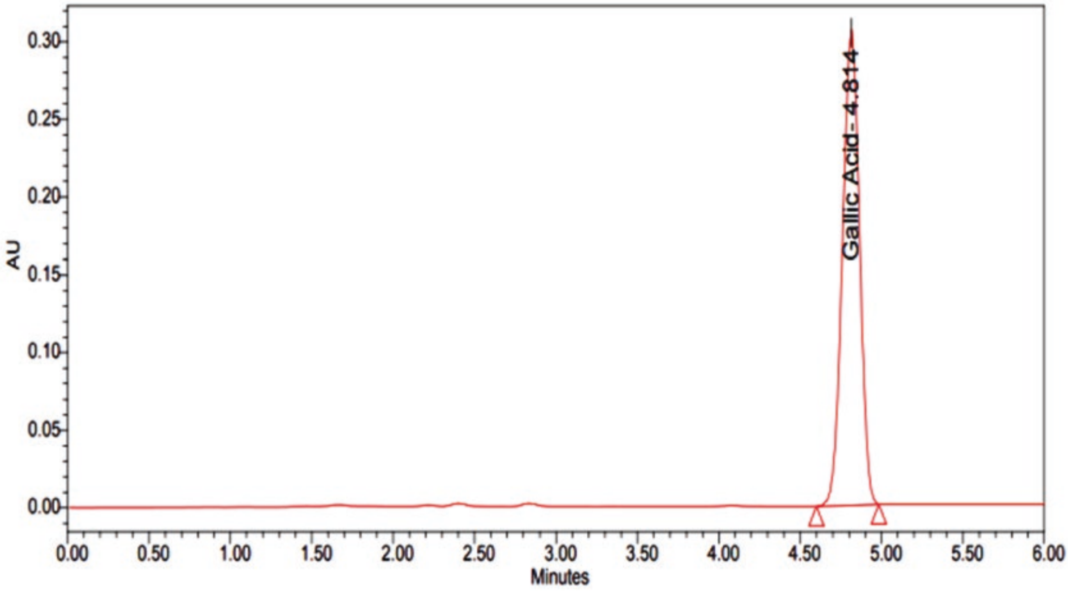


Fig. 51.13 Chromatogram for less organic phase (27:73)

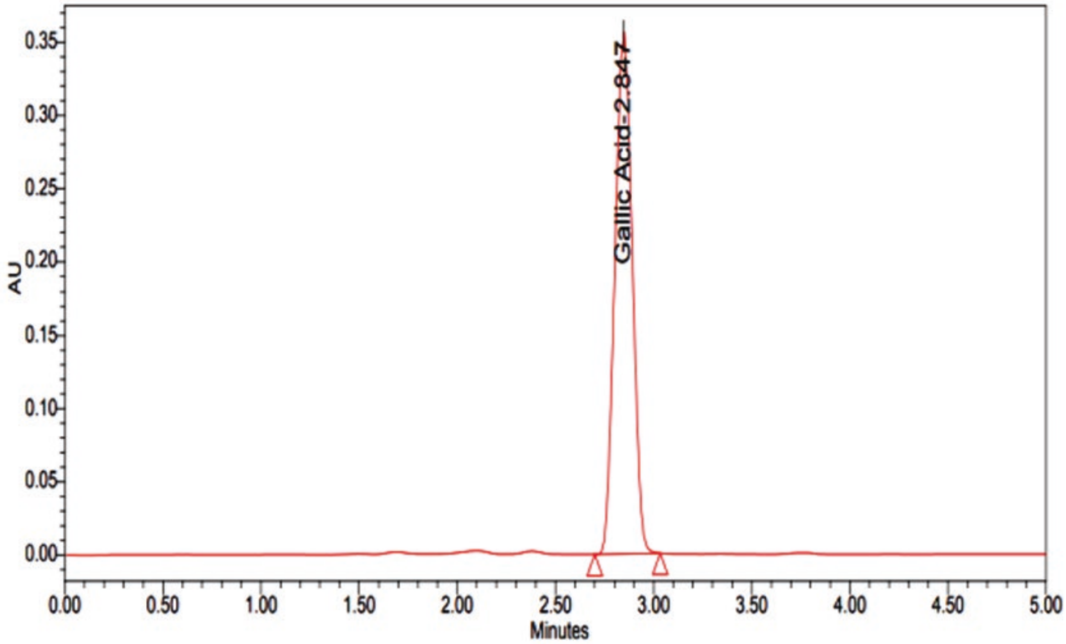


Fig. 51.14 Chromatogram for more organic phase (33:67)

Table 51.7 Sensitivity parameters (LOD and LOQ) by RP-HPLC

Name of drug	LOD (μg/mL)	LOQ (μg/mL)
Gallic acid	0.3	1

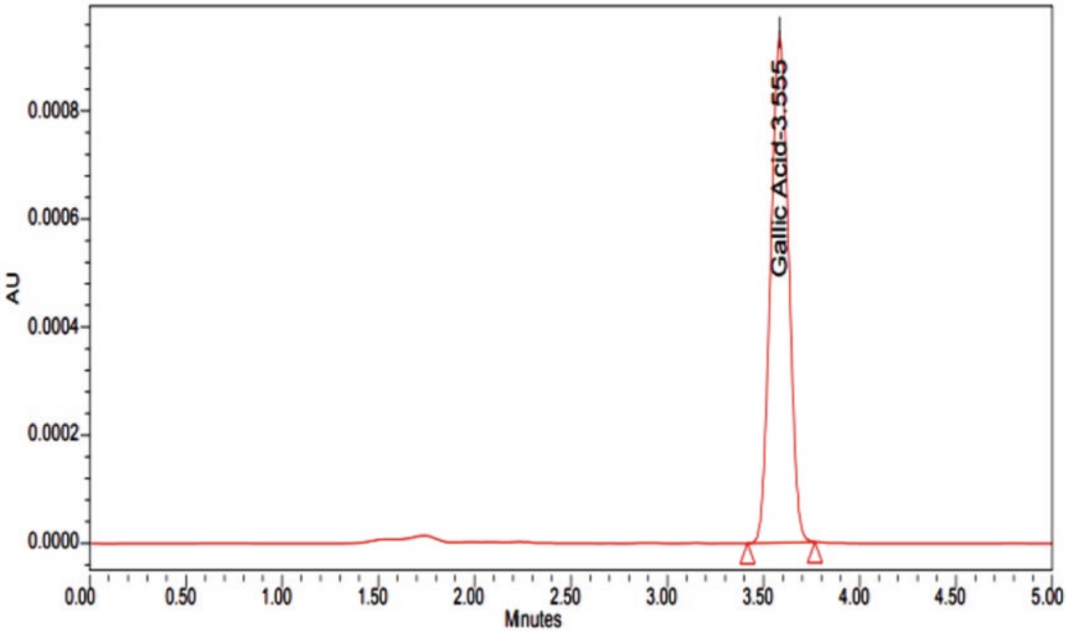


Fig. 51.15 Chromatogram of LOD

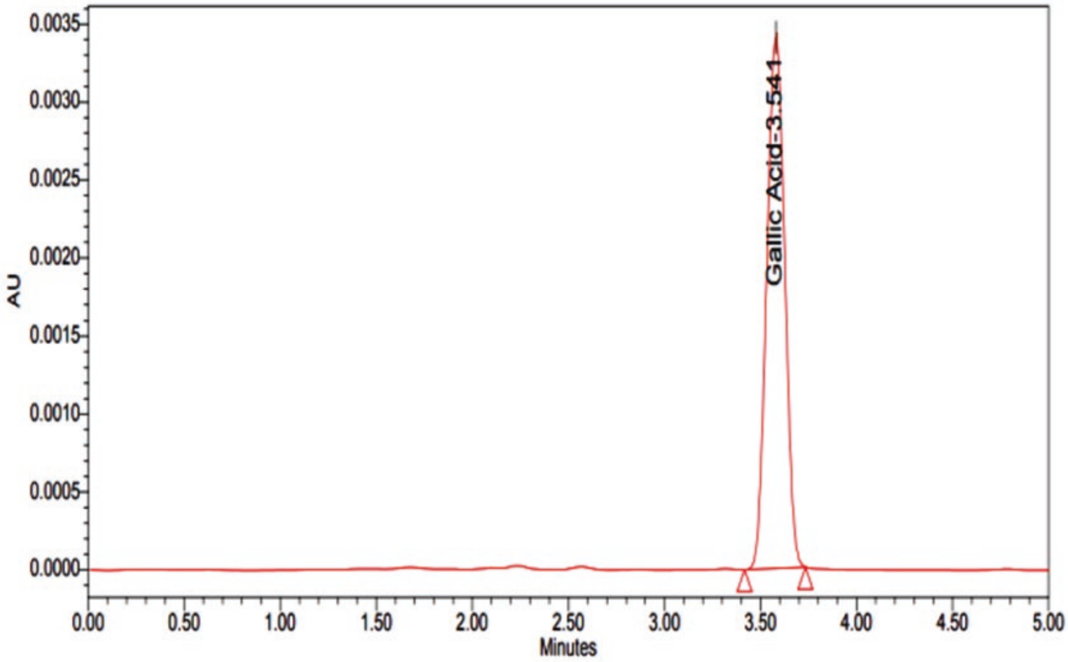


Fig. 51.16 Chromatogram of LOQ

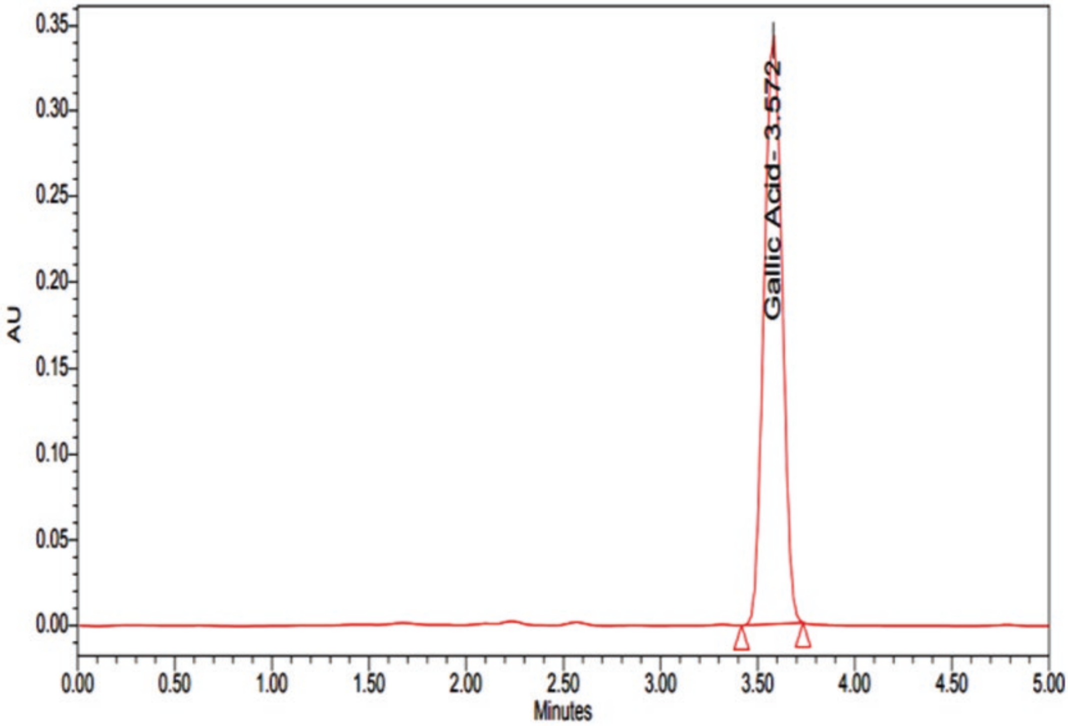


Fig. 51.17 Chromatogram of control degradation

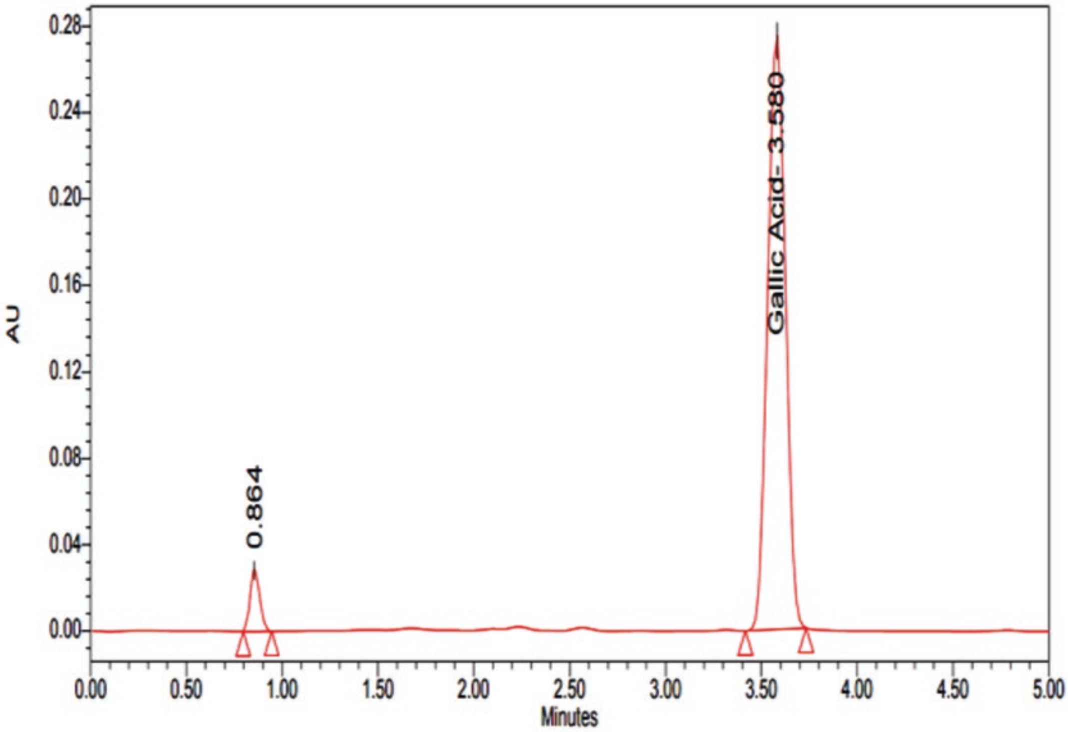


Fig. 51.18 Chromatogram of acid degradation

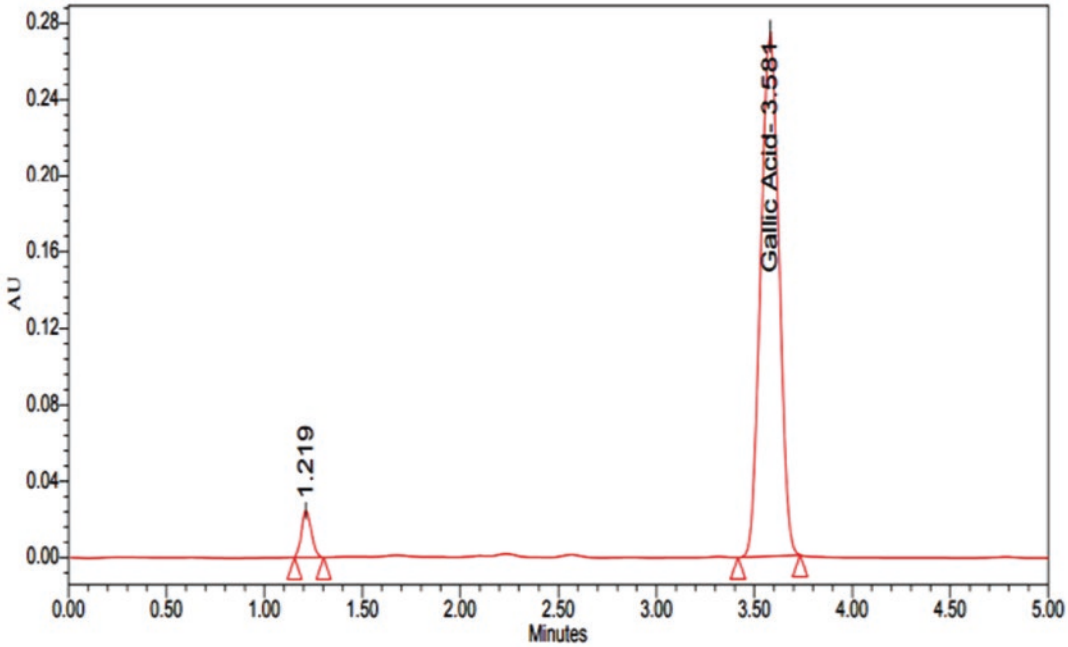


Fig. 51.19 Chromatogram of alkali degradation

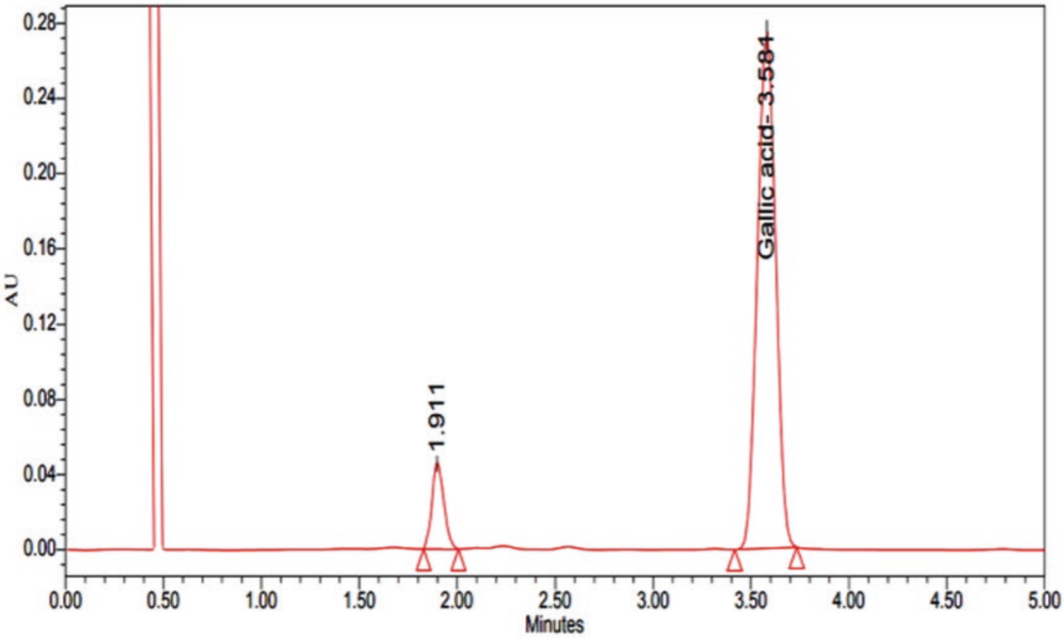


Fig. 51.20 Chromatogram of peroxide degradation

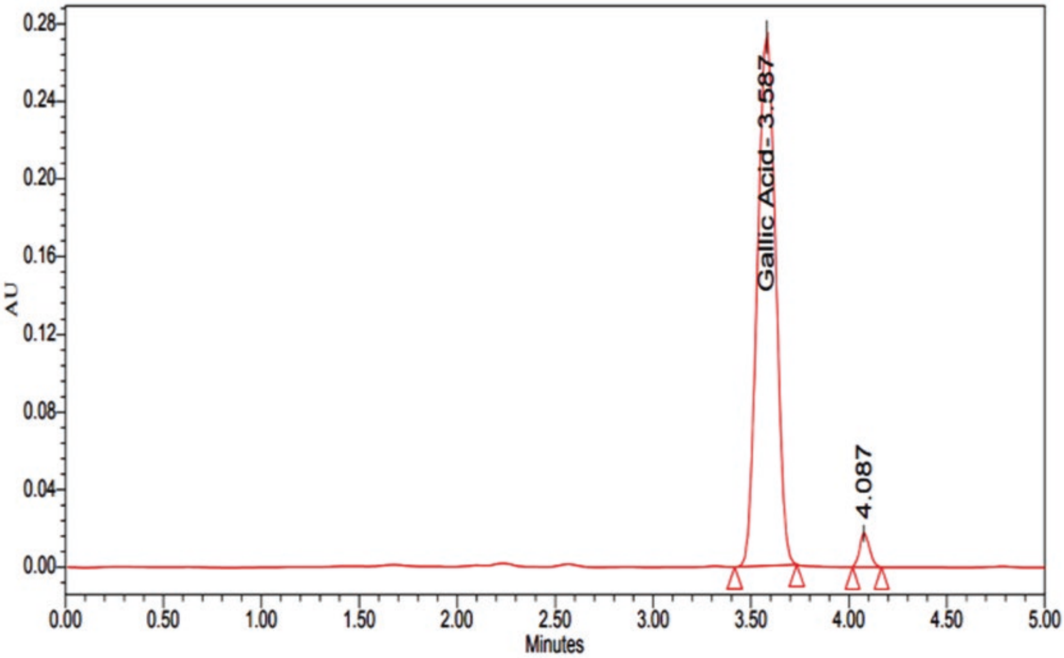


Fig. 51.21 Chromatogram of reduction degradation

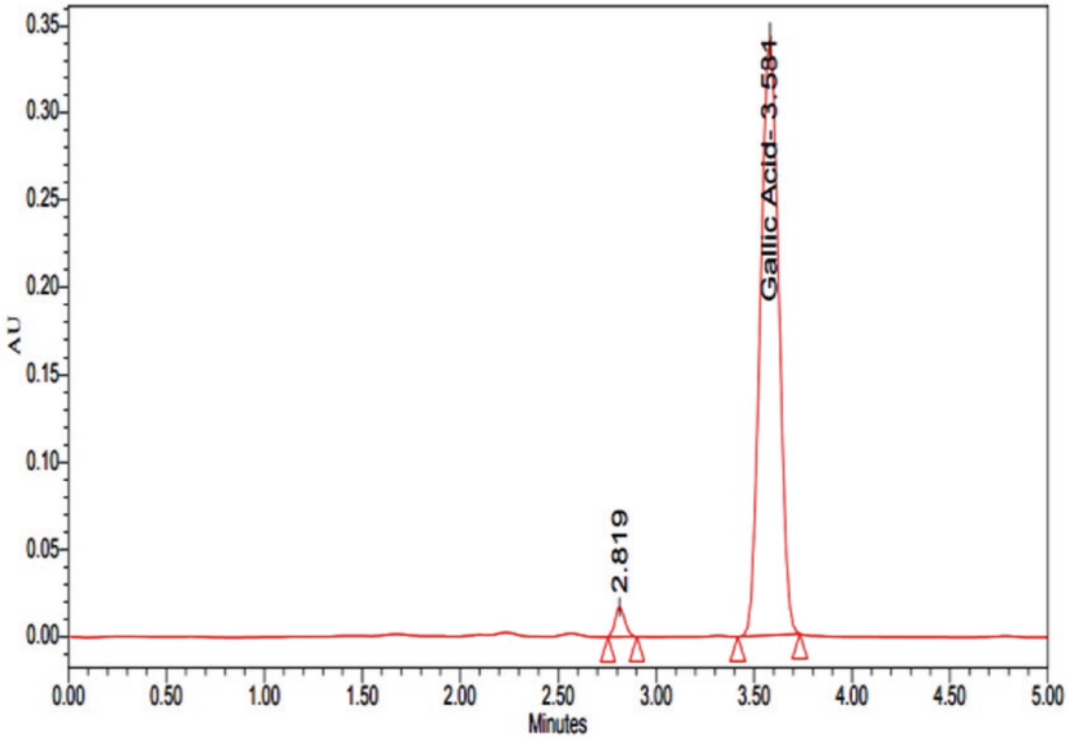


Fig. 51.22 Chromatogram of thermal degradation

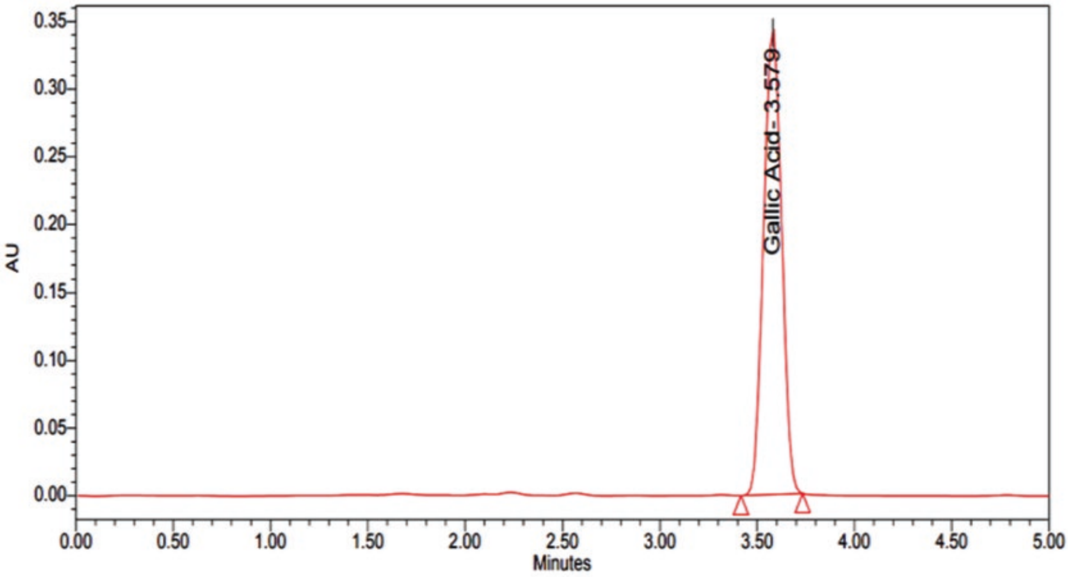


Fig. 51.23 Chromatogram of hydrolysis degradation

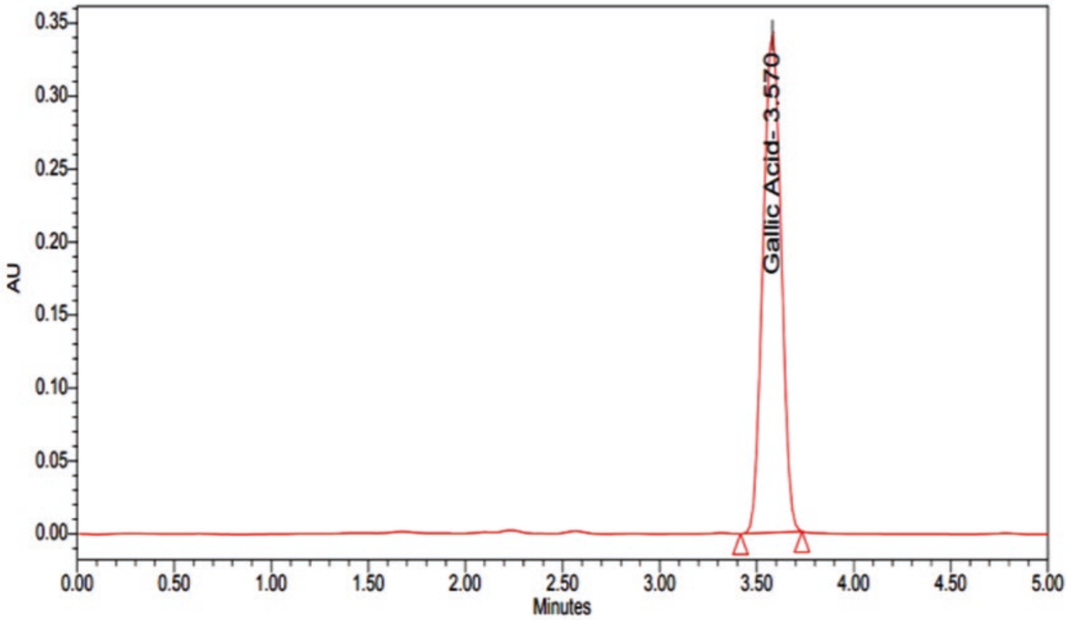


Fig. 51.24 Chromatogram of photolytic degradation

Table 51.8 Forced degradation results for gallic acid

	Gallic acid	
Results: % degradation results	Area	% Degradation
Control	2,015,530	0
Acid	1,724,763	14.4
Alkali	1,732,274	14.0
Peroxide	1,690,715	16.1
Reduction	1,775,289	11.9
Thermal	1,802,177	10.6
Photolytic	1,991,436	1.2
Hydrolysis	2,006,401	0.4

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Investigating Physical Activity Habits and Sleep Disorders in the Nursing Staff of Greece During the COVID-19 Pandemic: A Multicenter Cross-Sectional Correlational Study

Evgenia Polydoropoulou, George Intas,
Charalampos Platis, Pantelis Stergiannis,
and George Panoutsopoulos

Abstract

Introduction: The social isolation (lockdown) used worldwide as a measure to effectively prevent the infection of COVID-19 has been shown to be responsible for the high prevalence of depression, anxiety, insomnia, and post-traumatic stress symptoms. The aim of this study was to investigate the physical activity habits and sleep disorders in the nursing staff.

Methodology: This is a multicenter cross-sectional correlational study. The study population consisted of nurses and nursing assistants. Data were collected using the Greek version of the Pittsburgh Sleep Quality Index, the Fear of the COVID-19, and the Physical exercise questionnaire of the American College of Sports Medicine. Statistical analysis of data was done with IBM SPSS v. 22.0.

Results: A total of 1710 nursing personnel aged 42.3 ± 9.1 years were included. At the beginning of the COVID-19 pandemic, 190 (11.1%) participants were physically active, and 2 years after the beginning of the COVID-19 pandemic, active were 130 (7.6%) participants. Both at the beginning and two years after the beginning of the pandemic, the sleep dimensions that scored higher were subjective sleep quality (1.98 ± 0.2 vs. 1.98 ± 0.3), sleep onset latency (1.89 ± 1.5 vs. 1.64 ± 1.6), and sleep duration (1.55 ± 0.9 vs. 1.65 ± 0.8). The total sleep score was 8.64 ± 3.1 at the beginning of the pandemic and 8.11 ± 3.7 two years after the beginning of the pandemic.

Conclusions: Nurses and nurses' assistants had less physical activity habits, slept less, and had more sleep disorders 2 years after the beginning of the pandemic in relation to the beginning of the pandemic.

Keywords

Exercise · Physical activity · Sleep · Insomnia · COVID-19 · Pandemic · Nurses

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E. Polydoropoulou (✉) · G. Intas
General Hospital of Nikea "Agios Panteleimon", Nikea, Greece

C. Platis
Greek DRG Institute SA, Athens, Greece

P. Stergiannis
Department of Nursing, National and Kapodistrian University of Athens, Athens, Greece

G. Panoutsopoulos
Department of Nutrition and Dietetics, University of Peloponnese, Kalamata, Greece
e-mail: gpanouts@uop.gr

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52.1 Introduction

The first case of pneumonia caused by SARS-CoV-2 was reported and recorded in Wuhan, a city in southern China [13, 14]. The virus that causes the infection is highly contagious, can spread between people by indirect, direct, or close contact, through nasal and oral secretions, and is released when an infected person talks, coughs, or sneezes [5]. Considering the absence of valid medical treatment (vaccines have been available since December 2020), many countries have opted for strict exclusion measures. During the quarantine period, the population had to stay at home and go out only in close proximity for basic needs, limiting social gatherings and physical activity. For some categories of jobs, excluding core sectors (e.g., food, pharmaceuticals), telecommuting has been encouraged in order to limit the spread of the virus [20].

The social isolation (lockdown) used worldwide as a measure to effectively prevent the infection of COVID-19 has been shown to be responsible for the high prevalence of depression, anxiety, insomnia, and posttraumatic stress symptoms [12]. A study conducted in São Paulo, Brazil in 2013, immediately after the SARS pandemic, in 1101 adults, found that the prevalence of objective insomnia detected by a sleep study was 32%, while the subjective prevalence of insomnia symptoms was 45% and the subjective prevalence of insomnia identified according to Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV) criteria was 15%. Women had a greater insomnia problem. Overall, 5% of participants with insomnia symptoms used sleep-inducing medications [6].

In addition to exposure to the COVID-19 virus, sedentary behavior increases the propensity for morbidity and mortality associated with cardiovascular disease, cancer, and increased incidence of type 2 diabetes mellitus [17]. Through scientific and governmental organizations (American Heart Association, American College of Sports Medicine, and WHO), various measures have been proposed to address physical inactivity through telecommunications, educational materials, and various actions, due to the negative effects of physical inactivity related to the cardiovascular system [18].

After a thorough search in the international and Greek literature, no studies were found that investigate the sleeping, eating, and physical activity habits of the nursing staff as a whole. In Greece, no similar studies have been done, with the exception of one study that was done during the SARS epidemic of 2002, a previous pandemic, in the general population and it was found that 37.6% of the Greek population, not health professionals, suffer from insomnia with a higher risk for women and urban dwellers [22]. This large gap in the Greek and International literature is called upon to be covered by the present study, investigating the lifestyle and the prevalence of sleep disorders in nursing staff.

52.2 Materials and Methods

52.2.1 Aim

The aim of this study was to investigate the physical activity habits and sleep disorders in the nursing staff.

52.2.2 Study Design

This was a multicenter cross-sectional correlational study.

52.2.3 Participants

The sample of the study was the nursing staff working in the Greek public hospitals, regardless of education level and years of service.

52.2.4 Tools

52.2.4.1 Pittsburg Sleep Quality Index (PSQI)

The Pittsburgh Sleep Quality Index (PSQI) questionnaire was used for sleep quality. The PSQI is an 18-item questionnaire designed to assess overall sleep quality over 1 month. The questionnaire results in 7 dimensions: (1) sleep quality, (2) sleep latency, (3) sleep duration, (4) sleep performance, (5) sleep disturbance, (6) medication use, and (7) dysfunction during the day. Higher scores represent poorer sleep quality. The PSQI has been validated for Greece and is considered to have the required validity and reliability [19].

52.2.4.2 The Fear of the COVID-19 (FCV-19S)

Nursing staff's fear of the COVID-19 pandemic will be assessed with the fear of the COVID-19 (FCV-19S) questionnaire. The FCV consists of seven questions related to the different dimensions of fear. It is reliable and valid in assessing the fear of COVID-19 as it has a stable unidimensional structure with strong psychometric properties [1].

52.2.4.3 Physical Exercise

In order to assess physical activity habits, participants were asked: (a) “How many days a week do you exercise?”, (b) “For how long do you exercise?”, (c) “How long have you been engaged in this physical activity?”, (d) “What is the intensity of physical activity?”, (e) “What kind of exercise do you do?”. Those participants who achieved 150 min or more of moderate-intensity physical activity (MVPA) were considered “physically active,” while those who exercise less than 150 min were considered “inactive” [3].

52.2.5 Statistical Analysis

First, descriptive statistics were made. Qualitative variables were calculated in frequencies and percentages, while quantitative as means±standard deviation. T-test and one-way ANOVA analyses were performed to compare variables. Statistical analysis of data was done with IBM SPSS v. 22.0. A *p*-value of less than 0.05 indicates a significant statistical difference.

52.3 Results

The present study included 1710 nursing personnel aged 42.3 ± 9.1 years. Demographic and occupational data of the participants are presented in Table 52.1.

Of all participants, 400 (23.4%) had contracted COVID-19, while 1370 (80.1%) participants reported that a colleague had contracted COVID-19 and 560 (32.7%) had a relative contracted COVID-19.

52.3.1 Physical Exercise

Of the total number of participants, 870 (50.9%) participated in sports. At the beginning of the

Table 52.1 Demographic and occupational data of the participants

Variables		N	%
Gender	Males	390	22.8
	Females	1320	77.2
Family status	Married	1130	66.1
	Singles	420	24.6
	Divorced/widowed	160	9.4
Children		1150	67.3
Educational level	Master/PhD	990	57.9
	University	110	6.4
	Technological institution	460	26.9
	High school	150	8.8
Employment relationship	Permanent	1480	86.5
	No permanent	230	13.5
Work years	17.2 ± 9.4		
Job position	Nurse	1460	85.4
	Supervisor	180	10.5
	Director/head of department	70	4.1
Work in shifts		1120	65.5

COVID-19 pandemic, participants exercised 1.6 ± 1.5 days per week, and 2 years after the pandemic they exercised 1.3 ± 1.5 days per week. At the beginning of the COVID-19 pandemic, 540 (31.6%) participants did the low-intensity physical activity, 560 (32.7%) did moderate-intensity physical activity, and 340 (19.9%) did high-intensity physical activity. Two years after the beginning of the COVID-19 pandemic, 560 (32.7%) participants engaged in low-intensity physical activity, 540 (31.6%) in moderate-intensity physical activity, and 280 (16.4%) participants in vigorous-intensity physical activity.

According to the frequency of physical activity performed by the participants per week, it was found that at the beginning of the COVID-19 pandemic, 190 (11.1%) participants were physically active, and 2 years after the start of the COVID-19 pandemic, 130 (7.6%) participants. At the beginning of the COVID-19 pandemic, 780 (45.6%) participants did 0–30 min/MVPA, 440 (25.7%) did 31–90 min/MVPA, 300 (17.5%) did 91–150 min/MVPA, 180 (10.5%) did 151–300 min/MVPA and 10 (0.6%) participants did more than 300 min/MVPA. Accordingly, 2 years post-pandemic, 920 (53.8%) participants did 0–30 min/MVPA, 420 (24.6%) did 31–90 min/MVPA, 260 (15.2%) did 91–150 min/MVPA, 100 (5.8%) did 151–300 min/MVPA, and 10 (0.6%) participants did more than 300 min/MVPA.

52.3.2 Sleep Habits

The Cronbach index of the questionnaire was found to be 0.887. At the start of the pandemic, participants reported sleeping 6.2 ± 1.6 h at night, while two years after the start of the pandemic, they slept 5.9 ± 1.4 h at night.

Both at the start of the pandemic and two years after the start of the pandemic, the sleep dimensions that scored higher were subjective sleep quality (1.98 ± 0.2 vs. 1.98 ± 0.3), sleep onset latency (1.89 ± 1.5 vs. 1.64 ± 1.6), and sleep duration (1.55 ± 0.9 vs. 1.65 ± 0.8). The score on the dimensions of the PSQI questionnaire at the start of the pandemic and two years later is presented in Table 52.2. The total sleep score was 8.64 ± 3.1 at the start of the pandemic and 8.11 ± 3.7 two years after the start of the pandemic.

Table 52.2 PSQI dimension scores at the start of the pandemic and two years later

Variables	Begging of pandemic	2 years after
Subjective sleep quality	1.98 ± 0.2	1.98 ± 0.3
Sleep latency	1.89 ± 1.5	1.64 ± 1.6
Sleep duration	1.55 ± 0.9	1.65 ± 0.8
Sleep efficiency	0.39 ± 0.8	0
Sleep disturbance	0.91 ± 0.8	0.91 ± 0.8
Use of sleep medication	0.89 ± 0.9	0.96 ± 0.9
Daily dysfunction	1.02 ± 0.8	0.96 ± 0.9
Global PSQI score	8.64 ± 3.1	8.11 ± 3.7

52.3.3 COVID-19 Fear Scale

The Cronbach index of the questionnaire was found to be 0.889. The COVID-19 fear scale score at the beginning of the pandemic was 19.2 ± 6.8 and two years after the start of the pandemic it decreased to 15.6 ± 6.6.

52.3.4 Nurses vs Nursing Assistants

Nurses vs. nurse assistants had significantly better subjective sleep quality (1.99 ± 0.2 vs. 1.87 ± 0.3, $p < 0.05$) and significantly less sleep latency at the start of the pandemic (1.85 ± 1.5 vs. 1.53 ± 1.3, $p < 0.05$). Also, nurses vs. nurse assistants sleep significantly more hours per night (6.1 ± 1.4 vs. 5.8 ± 1.1, $p < 0.05$) and have significantly better subjective sleep quality (2 ± 0.3 vs. 1.87 ± 0.3, $p < 0.05$) and fewer sleep disturbances 2 years after the onset of the pandemic (0.9 ± 0.8 vs. 0.87 ± 0.6, $p < 0.05$). Nursing assistants compared to nurses did significantly more moderate-intensity physical exercise both at the beginning of the pandemic (70 ± 83.5 vs. 48.5 ± 57.4, $p < 0.05$) and 2 years later (81 ± 115.5 vs. 39.5 ± 56.4, $p < 0.05$), exercised significantly more days per week at the beginning of the pandemic (2.07 ± 2.4 vs. 1.57 ± 1.5, $p < 0.05$), had significantly better sleep efficiency (0.53 ± 0.9 vs 0.39 ± 0.8, $p < 0.05$) and total sleep

Table 52.3 Differences between participants according to staff category

Variables	Nurses	Nursing assistants	*p*-value
MVPA, the beginning of pandemic	48.5 ± 57.4	70 ± 83.5	0.001
MVPA, 2 years later	39.5 ± 56.4	81 ± 115.5	0.001
How many days a week did you exercise at the start of the covid-19 pandemic?	1.57 ± 1.5	2.07 ± 2.4	0.001
Subjective sleep quality, beginning of pandemic	1.99 ± 0.2	1.87 ± 0.3	0.001
Sleep latency, beginning of a pandemic	1.85 ± 1.5	1.53 ± 1.3	0.011
Sleep efficiency, beginning of pandemic	0.39 ± 0.8	0.53 ± 0.9	0.017
PSQI, beginning of pandemic	8.65 ± 2.1	8.7 ± 2.6	0.004
How long (in minutes) did it take you to fall asleep each night 2 years later?	21.4 ± 22.7	25.1 ± 22.7	0.001
How many hours do you actually sleep at night, 2 years later	6.1 ± 1.4	5.8 ± 1.1	0.026
Subjective sleep quality, 2 years later	2 ± 0.3	1.87 ± 0.3	0.001
Sleep latency, 2 years later	1.61 ± 1.6	1.73 ± 2.1	0.001
Sleep duration, 2 years later	1.63 ± 0.9	1.80 ± 0.7	0.001
Sleep disturbances, 2 years later	0.9 ± 0.8	0.87 ± 0.6	0.005
Use of sleep medication, 2 years later	0.9 ± 0.9	1.33 ± 1.1	0.005
Daily dysfunction, 2 years later	0.9 ± 0.9	1.33 ± 1.1	0.005

score at the start of the pandemic (8.7 ± 2.6 vs 8.65 ± 2.1, $p < 0.05$). Also, nursing assistants vs. nurses needed significantly longer time to fall asleep each night (25.1 ± 22.7 vs. 21.4 ± 22.7, $p < 0.05$), significantly longer sleep latency (1.73 ± 2.1 vs. 1.61 ± 1.6, $p < 0.05$), they had significantly greater sleep duration (1.80 ± 0.7 vs. 1.63 ± 0.9, $p < 0.05$) and use of sleep medications (1.33 ± 1.1 vs. 0.9 ± 0.9, $p < 0.05$) and significantly greater daytime dysfunction 2 years after the onset of the pandemic (1.33 ± 1.1 vs. 0.9 ± 0.9, $p < 0.05$). Correlations between participants according to staff category are presented in Table 52.3.

52.3.5 Shift Work Versus Non-shift Work

Participants working non-shift vs those with shift work did significantly more moderate-intensity physical exercise at the start of the pandemic (57.9 ± 69.3 vs. 46.5 ± 55.3, $p < 0.05$), and 2 years later (49.6 ± 68.5 vs. 40.7 ± 64.2, $p < 0.05$), and they had a significantly longer sleep latency at the beginning of the pandemic (2.02 ± 1.4 vs. 1.82 ± 1.6, $p < 0.05$). Furthermore, participants who worked non-shift vs those with shift work had significantly longer time to fall asleep each night (26.1 ± 27.2 vs. 20.1 ± 19.9, $p < 0.05$), and significantly longer sleep latency 2 years after the onset of the pandemic (1.78 ± 1.6 vs. 1.56 ± 1.6, $p < 0.05$), and were significantly more fearful of COVID-19 both at the onset of the pandemic (20.6 ± 7.4 vs. 18.4 ± 6.4, $p < 0.05$), as well as two years later (17.2 ± 7.3 vs. 14.9 ± 5.9, $p < 0.05$). Correlations between participants according to their type of work are presented in Table 52.4.

52.3.6 Exercise Intensity (Inactive Vs. Active)

Participants who were inactive versus those who were physically active at the start of the pandemic had significantly better subjective sleep quality at the start of the pandemic (1.99 ± 0.2 vs.

Table 52.4 Differences between participants according to shift work

Variables	Non-shift work	Shift work	*p*-value
MVPA, beginning of pandemic	46.5 ± 55.3	57.9 ± 69.3	0.001
MVPA, 2 years later	40.7 ± 64.2	49.6 ± 68.5	0.008
How many days a week did you exercise at the start of the covid-19 pandemic?	6.3 ± 1.7	6 ± 1.4	0.001
Subjective sleep quality, beginning of pandemic	1.99 ± 0.3	1.97 ± 0.2	0.032
Sleep latency, beginning of a pandemic	1.82 ± 1.6	2.02 ± 1.4	0.011
Sleep efficiency, beginning of pandemic	0.46 ± 0.9	0.27 ± 0.7	0.001
Use of sleep medication, beginning of pandemic	0.93 ± 0.9	0.83 ± 0.8	0.034
How long (in minutes) does it take you to fall asleep each night, 2 years later?	20.1 ± 19.9	26.1 ± 27.2	0.001
Subjective sleep quality, 2 years later	2 ± 0.3	1.95 ± 0.2	0.001
Sleep latency, 2 years later	1.56 ± 1.6	1.78 ± 1.6	0.010
Sleep disturbances, 2 years later	0.95 ± 0.8	0.83 ± 0.7	0.002
Fear of COVID-19 scale, beginning of pandemic	18.4 ± 6.4	20.6 ± 7.4	0.001
Fear of COVID-19 scale, 2 years later	14.9 ± 5.9	17.2 ± 7.3	0.001

Table 52.5 Differences between participants according to exercise intensity two years after the start of the pandemic

Variables	Inactives	Actives	*p*-value
How many hours do you really sleep at night at the beginning of the pandemic?	6.1 ± 1.4	6.7 ± 2.9	0.001
Subjective sleep quality, beginning of pandemic	1.99 ± 0.2	1.92 ± 0.3	0.002
Sleep duration, beginning of pandemic	1.56 ± 0.9	1.38 ± 1.1	0.026
Sleep disturbances, beginning of pandemic	0.92 ± 0.8	0.77 ± 0.7	0.031
Subjective sleep quality, 2 years later	1.99 ± 0.3	1.92 ± 0.3	0.010

1.92 ± 0.3, $p < 0.05$), significantly longer sleep duration at the beginning of the pandemic (1.56 ± 0.9 vs. 1.38 ± 1.1, $p < 0.05$), significantly less sleep disturbances at the beginning of the pandemic (0.92 ± 0.8 vs. 0.77 ± 0.7, $p < 0.05$) and significantly better subjective sleep quality two years after the onset of the pandemic (1.99 ± 0.3 vs. 1.92 ± 0.3, $p < 0.05$). Correlations between participants according to exercise intensity two years after the onset of the pandemic are presented in Table 52.5.

52.3.7 Beginning of the Pandemic Versus Two Years After the Beginning of the Pandemic

Participants at the beginning of the pandemic versus two years after it did significantly more moderate-intensity physical exercise (50.4 ± 60.7 vs. 43.8 ± 65.8, $p < 0.05$), needed significantly longer to fall asleep each night (23.4 ± 24.2 vs. 22.2 ± 22.8, $p < 0.05$), slept significantly more

Table 52.6 Differences between the beginning of the pandemic and two years later

Variables	Beginning	2 years later	*p*-value
MVPA	50.4 ± 60.7	43.8 ± 65.8	0.001
How long (in minutes) does it take you to fall asleep each night?	23.4 ± 24.2	22.2 ± 22.8	0.027
How many hours did you actually sleep at night?	6.2 ± 1.6	5.9 ± 1.4	0.001
Subjective sleep quality	1.98 ± 0.2	1.68 ± 0.3	0.001
Sleep latency	1.89 ± 1.5	1.64 ± 1.7	0.001
Sleep duration	1.55 ± 0.9	1.65 ± 0.9	0.001
Sleep disturbances	0.91 ± 0.8	0.71 ± 0.8	0.001
Use of sleep medication	0.89 ± 0.9	0.96 ± 0.9	0.001
Daily dysfunction	1.02 ± 0.8	0.96 ± 0.9	0.001
PSQI	8.6 ± 3.1	8.1 ± 3.7	0.001
Fear of COVID-19 scale	19.2 ± 6.8	15.6 ± 6.6	0.001

hours per night (6.2 ± 1.6 vs. 5.9 ± 1.4, $p < 0.05$), had significantly worse subjective sleep quality (1.98 ± 0.2 vs. 1.68 ± 0.3, $p < 0.05$), significantly longer sleep latency (1.89 ± 1.5 vs. 1.64 ± 1.7, $p < 0.05$), significantly more sleep disturbances (0.91 ± 0.8 vs. 0.71 ± 0.8, $p < 0.05$), significantly more daytime dysfunction (1 0.02 ± 0.8 vs. 0.96 ± 0.9, $p < 0.05$), significantly higher global PSQI score (8.6 ± 3.1 vs. 8.1 ± 3.7, $p < 0.05$) and were significantly more afraid of COVID-19 (19.2 ± 6.8 vs. 15.6 ± 6.6, $p < 0.05$). Participants two years after the onset of the pandemic compared to participants at the beginning of the pandemic had significantly shorter sleep duration (1.65 ± 0.9 vs. 1.55 ± 0.9, $p < 0.05$) and significantly more use of sleep medications (0.96 ± 0.9 vs. 0.89 ± 0.9, $p < 0.05$). Differences between the beginning of the pandemic and two years later are presented in Table 52.6.

52.4 Discussion

The aim of the present study was to investigate the physical activity habits and sleep disorders in the nursing staff. We found that 50.9% of the participants participated in sports and that they reduced the frequency of exercise 2 years after the start of the pandemic. The percentage of participants who were physical active was also reduced 2 years after the start of the COVID-19 pandemic. At the beginning of the pandemic, participants were sleeping more than two years after the beginning of the pandemic. Participants had worse sleep at the beginning of the pandemic than two years after the pandemic began.

A study conducted on healthcare professionals in Brazil, with only 13.5% of the sample consisting of nursing staff, found that approximately 70% of healthcare professionals had some insomnia-related complaint, such as difficulty falling asleep, staying asleep, or problems waking up too early [16]. High prevalence rates related to insomnia during the COVID-19 pandemic have also been found in other studies in China. In a study involving 60 physicians working on the front line, they had insomnia with 61.67% of them having moderate insomnia [13, 14]. In another study, 58.9% of physicians surveyed in Wuhan City and 24.97% in Ningbo City were found to have some degree of insomnia [13, 14]. A lower prevalence of insomnia was reported in another study, in which 34% of physicians and nurses had insomnia [12]. Similar rates of insomnia were reported among physicians and nurses at both the adult hospital in Wuhan [25] and the pediatric hospital in Wuhan [23]. A similar prevalence of insomnia among health professionals was observed in Hong Kong (34.2%) [9] and Taiwan (37%) [21].

Nurses have been found to have a higher prevalence and severity of insomnia compared to physicians. In this study, doctors and nurses were mostly dissatisfied with their sleep. Insomnia among physicians was mostly mild, while among nurses, it was moderate, with some difficulty falling asleep and staying asleep. Although physicians have reported greater problems in their daily activities, nurses report greater stress related to these problems [25]. Other studies in previous outbreaks found higher levels of stress in nurses than physicians and a greater likelihood of increased workload in nurses than in physicians [11, 24]. Doctors work mainly during the day, so they can sleep well at night, while nurses'night shifts are longer and more frequent, resulting to poor sleep [10]. Another study showed that the more contact health professionals have with patients with severe illness, the worse they sleep [15]. Doctors generally have less contact with patients than nurses. Considering that there are more women than men in nursing, nurses are more susceptible to insomnia [13, 14, 25].

In accordance to the results of the present study, a study conducted in the United States on obese individuals during social isolation due to the COVID-19 pandemic showed that 47.9% of these individuals reduced the frequency of physical activity and 55.9% reduced its intensity [2]. Another study conducted in West Asia, North Africa, and Europe showed a 38% reduction in physical activity among people experiencing social exclusion [4].

Participating in regular physical activity is important, especially during the current pandemic. Regular physical activity during COVID-19 is essential to maintain health [7]. Men are more likely to have regular physical activity [8]. With the restrictions in place, gyms were closed and activities such as team sports and football were restricted. Men mainly participate in these forms of physical activity. In addition, moderate-intensity physical activity associated with domestic services [3] increased, which disproportionately affects women and leads to increased levels of physical activity in this group.

52.5 Conclusions

The pandemic affected negatively the nursing staff in Greece. Nurses and nurses' assistants had less physical activity habits, slept less, and had more sleep disorders 2 years after the beginning of the pandemic in relation to the beginning of the pandemic.

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A Systematic Review on the Adult Alpha Brainwave Activity After Essential Oil Inhalation

Asimina Komini, Ioulia Kokka, Dimitrios Vlachakis,
George P. Chrousos,
Christina Kanaka-Gantenbein,
and Flora Bacopoulou

Abstract

Aroma extracts from plant species have been utilized since ancient times for a variety of discomforting circumstances. Aromatherapy is a recognized complementary therapeutic treatment performed in various ways such as massage or dermal application, with its main uses involving relaxation, pain relief, and stress management. Several studies have outlined that inhalation of fragrance may influence the brain function since their components can cross the blood-brain barrier and interact with central nervous system receptors. The aim of this review was to systematically present findings regarding alpha brain wave activity reported exclusively by electroencephalography. The study was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. The PubMed and Scopus databases were screened for relevant papers, based on specific eligibility criteria. The final step of the process resulted in 13 studies published between 1998 and 2021, using different essential oils. Most of the studies revealed the increase of alpha brainwave activity post-essential oil inhalation. Given the proven positive outcomes of increased alpha wave activity on several

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A. Komini
Medical School, National and Kapodistrian University of Athens, Athens, Greece

I. Kokka
Outpatient Specialty Clinic for Obsessive Compulsive and Related Disorders, First Department of Psychiatry, Medical School, National and Kapodistrian University of Athens, Athens, Greece

D. Vlachakis
Laboratory of Genetics, Department of Biotechnology, School of Applied Biology and Biotechnology, Agricultural University of Athens, Athens, Greece
e-mail: dimvl@aua.gr

G. P. Chrousos
University Research Institute of Maternal and Child Health and Precision Medicine, Medical School, National and Kapodistrian University of Athens, Athens, Greece
e-mail: chousgr@med.uoa.gr

C. Kanaka-Gantenbein
First Department of Pediatrics, Medical School, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece
e-mail: ckanaka@med.uoa.gr

F. Bacopoulou (✉)
Center for Adolescent Medicine, and UNESCO Chair in Adolescent Health Care, First Department of Pediatrics, Medical School, National and Kapodistrian University of Athens, Aghia Sophia Children's Hospital, Athens, Greece
e-mail: fbacopoulou@med.uoa.gr

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domains such as cognitive performance and better mental state, further research on the impact of essential oil inhalation is warranted.

Keywords

Aromatherapy · Essential oils · Brain waves · Alpha waves · EEG · Electroencephalography

53.1 Introduction

Aromatherapy is a recognized complementary therapeutic treatment in many countries [1], with its main implementations involving relaxation, pain relief, and stress management [2]. Nonpharmacological complementary methods are often preferred due to their reduced side effects [3]. Aromatherapy is an easily performed method of low cost and high accessibility to large populations. Aromatherapy is defined as the use of essential oils as therapeutic agents [4]. These oils are extremely concentrated and complex mix of aromatic components deriving from different parts of a plant. Research has shown that over 17,000 plant species may produce essential oils [5]. The oils' components can be classified into two different groups, depending on their biosynthesis; terpenes and aromatic compounds, with the first constituting the largest groups of natural fragrancies. Terpenes include alcohols, ketones, aldehydes, acids, esters, ethers, and oxides with several therapeutic properties [6]. In aromatherapy, the main medicinal plants used are bergamot, caraway, eucalyptus, geranium, juniper, lavender, lemon, lemongrass, mint, orange, peppermint, pine, rosemary, sage, tea tree, thyme, and ylang-ylang [7]. Aroma extracts from natural components have been utilized for a variety of discomforting situations and circumstances, and for the healing process of several mental and physical disorders (headaches, pain, insomnia, eczema, stress-induced anxiety, depression, and digestive problems) over the centuries [8, 9]. A body of evidence has shown that stimulating the olfactory tract by the inhalation of fragrancies may provoke specific human psychophysiological responses. This stimulation can be achieved with various methods, such as inhalation, massage, dermal application, or even by oral intake [10, 11].

Smell, which is the most primitive of all senses, may provoke immediate body changes [12]. A number of studies have outlined that inhalation of fragrance may influence the brain function since their components have the ability to cross the blood-brain barrier and interact with central nervous system (CNS) receptors [13]. Once the essential oil molecules reach the odorant receptors through inhalation, they activate the G-protein-coupled receptors (GPCRs), which in turn activate synaptic transmission to the CNS. Brain regions that are responsible for autonomic homeostasis and other higher brain functions receive the signal input [14]. Olfactory stimuli direct the information to the amygdala which responds immediately. The amygdala is crucial for combining emotions, while the hypothalamus is for presenting the outcomes of emotions [15]. Pharmacological actions due to odorant molecules can possibly be caused as a result of agents' absorption into the blood circulation [16]. The fragrance signals that are transmitted through the olfactory system cause neuronal activity. This neuronal activity can be identified by several physiological markers such as blood pressure, muscle tension, pupil dilation, skin temperature, pulse rate, and brain activity [11, 17, 18].

A variety of methods have been developed to monitor brain activity. Alterations regarding behavioral patterns and physiological responses post-essential oil inhalation can be assessed by electrophysiological methods, such as electroencephalography (EEG), functional magnetic resonance imaging (fMRI), and near-infrared spectroscopy [19, 20]. Among these methods, EEG is considered the most suitable one with respect to temporal responses of CNS after exposure to inhalation of essential oil odor. Studies have shown that EEG successfully captures spontaneous brain activation and cognitive function induced by odors [21, 22]. Human brainwaves during active and resting states are classified into five major groups of frequencies: delta [0–4 Hz], theta [4–8 Hz], alpha [8–13 Hz], beta [13–30 Hz], and gamma [>30 Hz] waves [7]. Alpha brainwaves have been linked to perception, purposeful movement [23], as well as basic cognitive processes, which enable selective knowledge access, and spatial and contextual orientation [24]. They are considered as an almost pure cognitive signal [25] and are among the most important factors that affect functioning, association, and communication between different brain areas [26]. Findings have suggested an association between alpha brainwaves and creative ideation [27], while research outcomes have described alpha wave activity as an indicator of mental stress, and brain inertia [28].

The aim of this review was to systematically appraise findings regarding alpha brain wave activity, as this has been reported exclusively by EEG, stimulated by essential oil inhalation. To our knowledge, no relevant systematic review has been conducted to date.

53.2 Materials, Methodologies, and Techniques

This systematic review investigated the possible effects of aromatherapy via essential oil inhalation on alpha brainwaves. The research procedure included an extensive search of the existing evidence, evaluation of data, and presentation of the main results. The study was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (PRISMA) [29], to identify papers relevant to the topic. The research phases were hypothesis development, a comprehensive search of existing scientific research, data analysis, and presentation.

53.2.1 Inclusion and Exclusion Criteria

Studies eligible for inclusion were original research articles, investigating the effect of aromatherapy through inhalation on the brain activity of healthy adults, mentioning which essential oil was used, and reporting on the results of brainwave activity pre- and post-exposure to the oil. The studies had to be published in the English language, in peer review journals. Studies had to refer pre- and post-exposure results and alpha brainwave measurements via EEG. Studies were excluded during the screening procedure if they were irrelevant to the topic, animal studies, and if the oil used was not reported. Studies were also excluded if aromatherapy was performed in a different manner than inhalation (e.g., massage). Articles in another language apart from English were also excluded. Other reviews or research protocols without providing adequate results were also excluded.

53.2.2 Search Strategy

A thorough search of PubMed and Scopus databases was conducted to identify all relevant articles. Literature research was conducted by one investigator using the following search terms: "*aromatherapy*" OR "*essential oils*" AND "*brain waves*" OR "*alpha waves*" AND "*EEG*" OR "*electroencephalography*". All titles, keywords, and abstracts were examined according to these search terms.

53.2.3 Data Extraction

Data extracted from each included study involved the type of study, its country of origin and year of publication, the sample size and its basic demographic characteristics (age and gender), the essential oil that was inhaled by the studies' samples, the EEG measurements, and the main results regarding alpha brain wave activity.

53.3 Results

53.3.1 Study Selection

The initial databases' search resulted in 79 original articles that were screened by title and abstract. After excluding irrelevant papers and

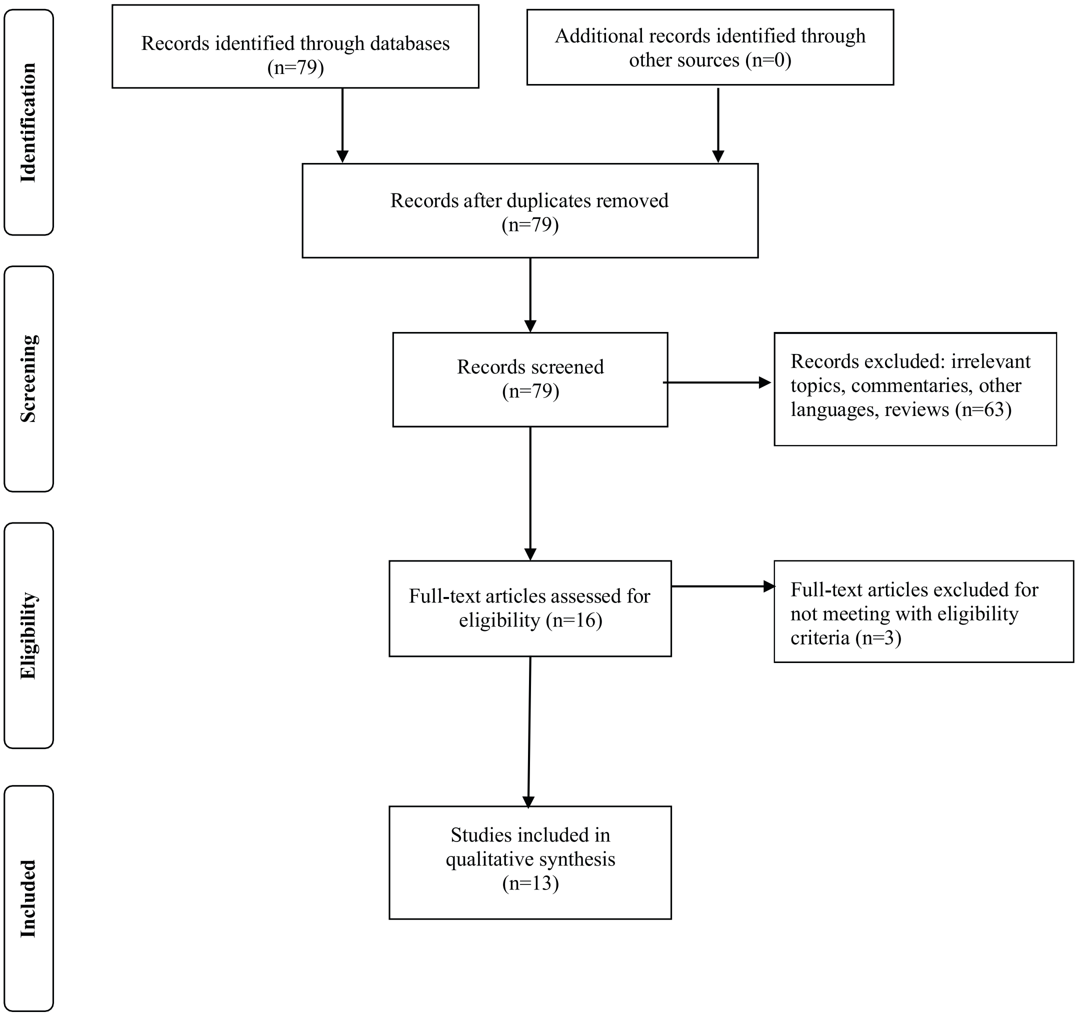

Fig. 53.1 Flow diagram of the included studies

those matching to the subject but not complying with the eligibility criteria, the final step of the screening process resulted in 13 studies. The flow chart of study selection is presented in Fig. 53.1.

53.3.2 Basic Characteristics of Included Studies

All the included studies reported on alpha brainwaves before and after exposure to the agent. All of them were clinical trials published between 1998 and 2021 in peer-reviewed journals in the English language. Eleven of them were conducted in Asian countries, one in Europe, and one in the USA. A total of 254 healthy adults were recruited in all studies.

With respect to samples' demographic characteristics, four of them reported solely the age range (19–30 years), two of them did not provide the relevant information, while for the remaining seven, the age was 27.1 years. Regarding sex distribution, the mean percentage of females was 60% across ten of the included studies, while one of them did not report the relevant information. The largest sample size was $n = 40$, whereas the smallest was $n = 5$.

Twenty different aromatic agents were used across all studies. The essential oils used were coffee aroma [30], eugenol [31], and linalool oil [32]. Lavender was implemented in 29.41% of studies [18, 20, 30, 31, 33] and rosemary in 11.76% [18, 20]. The essential oils abies koreana [34], black pepper [35], cannabis sativa [18], chamomile [31], chrysanthemum indicum linee [34], inula helenium root [32], michelia alba [32], peppermint [30], Sandalwood [31] and tangerine [36], were used one study each. In 69.23% of the studies, only one aromatic agent was used. Two agents were used in 15.38% of the studies, while three agents were used in 7.69% of the studies. Lastly, the remaining 7.69% of the studies used four agents.

Regarding the main research question of this review and whether inhalation of essential oils alters alpha brain wave activity, results were contradicting. In almost half of the included studies results reported that essential oil inhalation significantly increases alpha brain waves [7, 20, 34, 35, 37, 38]. In almost one-fourth (23%) of the studies, alpha brainwaves decreased after exposure to the essential oil [33, 36, 39]. In 23% of the studies, the results were contradicting, given that different essential oils were used and each resulted in different outcomes [18, 30, 31]. One study showed increased fast alpha brainwaves and decreased slow alpha brainwaves [26]. Basic characteristics and main results of each study that was included in this systematic review are presented in Table 53.1.

53.4 Discussion

Essential oils have been used as therapeutic agents for thousands of years for the treatment of a variety of disorders. Preclinical and clinical research findings have highlighted their impact on the nervous system, resulting in anxiolytic, antidepressant, sedative, and anticonvulsant function [40]. Studies in animal models have revealed the relation of essential oils and multiple neurotransmissions, resulting in physiological brain effects that can be measured with EEG. This systematic review aimed to investigate the effects of aromatherapy via essential oils' inhalation on alpha brainwaves. All the studies reported shifts in alpha brainwaves after aromatherapy session, with the majority reporting an increase in brainwave activity. EEG power analysis shows that there is a link between specific aromas and alpha brainwaves. This effect indicated that this particular method of aromatherapy could become a potentially useful intervention for enhancing alpha brainwaves.

Increased alpha brain wave activity has been shown to be related to improved cognitive performance [41]. This has been also supported by research that investigated the brain activity of individuals with depression. Researchers concluded that increased alpha wave activity was related to better cognitive performance [42]. In addition, research has shown that increased alpha waves are present during creative ideation, which reflects an "internally oriented attention that is characterized by the absence of external bottom-up stimulation and, thus, a form of top-down activity" [43]. Furthermore, it could be supported that certain memory processes are involved. Other research findings have supported that increased alpha wave activity is related to the improved pain experience, even though this relation was weak [44]. Given the positive outcomes in elevated alpha brainwave activity, and the fact that essential oils' inhalation results in increased alpha waves, aromatherapy could become a useful tool as a complementary therapeutic treatment in various circumstances.

This study bears certain limitations that should be addressed. First, since this systematic review was conducted on a limited number of studies, results should be interpreted with caution. Although this is the first systematic review on the subject, further meta-analytic work is required to quantify findings in this relatively newly introduced research area. Furthermore, the included studies lacked randomization of their participants. However, designing blinded experiments on aromatherapy could be considered as a challenging task given the difficulty to find a suitable placebo sharing a similar odor to the aroma of interest [45]. Last, among the included studies different essential oils were used, and thereby, a

Table 53.1 Basic characteristics of the included studies

Study [author, year, country]	Study design	Sample size [n]	Sample's age in years [mean-SD/ range]	Gender distribution [% females]	Essential oil	EEG measurements	Main results
Chandharkool et al., 2020, Thailand	Clinical trial	20	19–25	50	Tangerine	Slow Alpha waves [8–11 Hz] – Fast Alpha waves [11–13 Hz]	Slow and fast alpha wave powers were reduced by undiluted tangerine oil. Inhalation of threshold concentration effectively decreased alpha wave powers. Female alpha wave power responses to the oil were higher than males.
Park et al., 2019, Korea	Clinical trial	12	31.2	100	Lavender, Peppermint, Coffee aroma	Alpha waves [8-13 Hz]	Inhalation of peppermint significantly decreased the alpha wave value in the almost all the lobe regions [except Fp1] and the average. Inhalation of coffee decreased significantly the alpha wave value in almost all the lobe regions [excepted P4] and the average. Inhalation of lavender, significantly increased the alpha wave value in the F3, P3, P4, and average.
Seo et al., 2016, Korea	Clinical trial	20	20–30	50	Abies Koreana	Absolute Alpha [8–13 Hz] – Absolute fast Alpha [11–13 Hz]	The absolute alpha [left frontal and right parietal] and absolute fast alpha [right parietal] values significantly increased during the binasal inhalation of the oil.
Masago et al., 2000, Japan	Clinical trial	13	21	100	Lavender, Sandalwood, Chamomile, Eugenol	Alpha 1 [8–10 Hz], Alpha 2 [10–13 Hz]	Alpha 1 [8–10 Hz] of EEG at parietal and posterior temporal regions significantly decreased soon after the onset of inhalation of lavender oil [$p < 0.01$]. Significant changes of alpha 1 were also observed after inhalation of eugenol or chamomile. The change after inhalation of sandalwood was not significant. These results showed that alpha 1 activity significantly decreased under odor conditions in which subjects felt comfortable, and showed no significant change under odor conditions in which subjects felt uncomfortable.
Sayorwan et al., 2012, Thailand	Clinical trial	20	21 ± 2.97	50	Rosemary	Alpha1 [8–10.99 Hz], Alpha2 [11–12.99 HZ]	The analysis of EEGs showed a reduction in the power of alpha1 [8– 10.99 Hz] and alpha2 [11–12.99 Hz] waves.

Siripornpanich et al., 2012, Thailand	Clinical trial	20	23.25 ± 4.52	50	Lavender	Alpha [8–13 Hz]	Lavender oil increased the power of alpha [8–13 Hz] brain activities. The topographic map showed obviously more scattering power in alpha range waves particularly in bilateral temporal and central area.
Kim et al., 2018, Korea	Clinical trial	10	N/A	N/A	Chrysanthemum indicum Linné	Alpha [8–12 Hz]	Statistically significant increase in alpha waves ruing relaxation.
Koomhin et al., 2020, Thailand	Clinical trial	20	N/A	50	Michelia Alba, Linalool oil	Slow Alpha wave [9 Hz] – Fast Alpha wave [12 Hz]	The results demonstrated that michelia leaf oil provoked fast alpha wave statistically increased activity.
Kim et al., 2019, Cambodia	Clinical trial	40	20–30	50	Black pepper	Alpha [8–13 Hz]	The EEG oil exhibited different brain wave activity according to gender. A significant increase of spectral edge frequency 50% of alpha at C4 region was observed in females, while for males, spectral edge frequency 50% of alpha significantly increased during the exposure of black pepper essential oil.
Sowndhararajan et al., 2016, Korea	Clinical trial	20	20–30	50	Inula helenium root	Absolute Alpha [8–13 Hz] – Absolute Fast Alpha [11–13 Hz]	Spectral edge frequency 50% of alpha [P4] significantly increased during the inhalation of I. helenium essential oil.
Ko et al.,2021, Taiwan	Clinical trial	9	22 ± 2.0	48	Lavender	Alpha [8–12 Hz]	Upon lavender aroma releases, alpha wave in wake stage was reduced.
Gulluni et al., 2018, Italy	Clinical trial	5	40.8 ± 12.19	48	Cannabis Sativa	Alpha [8–13 Hz]	EEG showed a significant increase in the mean frequency of alpha [8–13 Hz], and increased power, relative power, and amplitude of alpha brain waves activities.
Diego et al, 1998, USA	Clinical trial	40	30.9	75	Rosemary	Alpha [8–12 Hz]	Results reported significantly decreased frontal alpha power, suggesting increased alertness.

SD standard deviation, *EEG* electroencephalography, *Hz* hertz direct comparison of findings was not feasible. In addition, their manufacturing processes were not standardized, thus the active ingredients may vary across the essential oils [46].

Despite the fact that complementary and alternative therapies are popular and flourishing methods [47], there is a lack of specific research on the field. Aromatherapy is among the principal complementary therapies executed by healthcare practitioners in Europe, North America, and Australia. Given the fact that inhalation of essential oils is an easy accessible and affordable procedure [48], it could be performed as a complementary method in hospitals, and by individuals at home under scientific instructions. Further blinded studies with neuroimaging technology could determine more specifically the effect of aromatherapy on alpha brainwaves.

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Perceptions of Teamwork and Knowledge Attitudes of Hemodialysis Unit Nurses on Infection Prevention

Evangelia Prevyzi, Stavros Patrinos,
Georgios Intas, Ioannis Elefsiniotis,
Emmanouil Velonakis, and Eirini Grapsa

Abstract

Introduction The Nurses of Hemodialysis Units: it is necessary to face HAIs (hospital-acquired infections) as a "well-tuned" teamwork. The aim of this study was to investigate the perceptions of the teamwork as well as the knowledge attitudes of the nurses of hemodialysis units on infection prevention in Greece.

Methodology A cross-sectional survey was conducted with a sample of 1018 HCWs (health care workers) of hemodialysis units in Greece. The questionnaires used were: Teamwork Perceptions Questionnaire (T-TPQ) TeamSTEPPS®-Instructor Manual, and questionnaire APPENDIX A.

Results The majority of them were nurses (69.45%) and nurse assistants (23.87%). About teamwork perceptions per factor, we observed uniformity in their responses with very high rates of agreement. The attitudes of nurses of hemodialysis units on the prevention of infections were distinguished in particularly high rates of compliance with a high perception of the risk of transmission of infections with better compliance being that of women. Also, women seem to be more knowledgeable about diseases that mostly affect the pediatric population. It seemed that level of knowledge between the two sexes did not differ regarding HBV (63.16% vs. 66.71%, $p = 0.430$), HCV (63.91% vs. 66.71%, $p = 0.553$), HIV infec-

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E. Prevyzi (✉)
Public Institute of Vocational Training «Tzaneio»,
General Hospital of Piraeus «Tzaneio»,
Piraeus, Greece

S. Patrinos
National and Kapodistrian University of Athens,
Athens, Greece

G. Intas
Department General Hospital of Nikaia "Agios
Panteleimonas", Professor member of SEP, DMY 50,
Hellenic Open University, Patra, Greece

Metropolitan College, Athens, Greece

I. Elefsiniotis
Nursing School of Athens, National and Kapodistrian
University of Athens, Athens, Greece

University Clinic – Hepato-Gastroenterology
Laboratory, General Oncology Hospital "Agioi
Anargyri", Kifissia, Greece
e-mail: ielefs@nurs.uoa.gr

E. Velonakis
Nursing School of Athens, National and Kapodistrian
University of Athens, Athens, Greece
e-mail: evelonak@nurs.uoa.gr

E. Grapsa
Medical School of Athens, National Kapodistrian
University of Athens, Athens, Greece

Hemodialysis Unit, "Aretaeio" Regional General
Hospital of Athens, Athens, Greece
e-mail: egrapsa@aretaieio.uoa.gr

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tion (78.95% vs. 81.76%, $p = 0.471$), and influenza (55.64% vs. 59.61%, $p = 0.394$).

Conclusions This study highlighted for the first time the high level of perceptions of teamwork of the HCWs of the hemodialysis units in Greece. It is recommended to investigate the correct application of prevention measures and to detect the causes of deviation from good practices with subsequent investigations on hemodialysis units of Greece.

Keywords

Perceptions · Attitudes · Knowledge · Teamwork · Hemodialysis unit · Nurses · Infection · Prevention

54.1 Introduction

The health professionals of the hemodialysis units are called upon to provide care to hemodialysis patients who have various comorbidities and problems. To be effective, the prevention and treatment of their often-complex problems need to be done by a "well-tuned" workgroup. Perceptions of the work group are very important for the functioning of the group, the role of leadership, for the present situation, the existence of mutual support between the members of the groups as well as the achievement of communication between them. According to the literature and clinical experience, a large percentage of the smooth operation of a hemodialysis unit is due to the good cooperation and cohesion of the work team [21, 23, 31].

Manser T's systematic review examined the necessity of teamwork in particularly dynamic areas of health care, such as surgeries, intensive care units (ICUs), emergency departments (EDs), trauma units, and resuscitation departments. The data obtained from the research support that there is a significant relationship between teamwork and patient safety. More specifically in studies that investigated the factors that contribute to the development of critical incidents with undesirable outcomes, it was found that teamwork played an important role in both causing and preventing these outcomes [17].

Also, in research that focused on nurses' perceptions of teamwork, staff perceptions of teamwork were found to be related to both the safety staff felt in the workplace and the quality of patient care. Perceptions of teamwork and leadership style were associated with staff well-being, which may affect their ability to provide safe patient care. Even observational studies have shown that the behaviors of team members associated with high clinical performance are due to the leadership's implementation of communication and coordination patterns that support effective teamwork [17].

HAIs are another serious issue for nursing. The research by Do A.N et al. concerned occupationally acquired human immunodeficiency virus (HIV) infection. It relied on National Surveillance Systems based on voluntary reporting of incidents. The sample was HIV-infected healthcare workers. Of the 57 healthcare workers with documented occupational acquisition of HIV infection, 86% were exposed to blood, and 88% had subcutaneous wounds. Circumstances varied among 51 percutaneous injuries, with the largest proportion (41%) occurring after a procedure, 35% occurring during a procedure, and 20% occurring during sharps disposal. Unforeseen circumstances that are difficult to predict during or after procedures accounted for 20% of all injuries. 69% of the workers were infected with HIV while 11% were HIV carriers. Healthcare workers should be educated on HIV prevention measures. Technological advances can further enhance security in the healthcare space. Similar are the conclusions of Beltrami M et al., and Winchester SA et al., on the prevention of the blood-borne infections in healthcare workers [3, 8, 32].

Health and safety conditions in the hospital and especially in the hemodialysis units are also important. The existence of the infection control department that takes care of the recording of infections, the information of the staff about the infections as well as the check-vaccination of the employees are cornerstones of the orderly operation of the hospital units. Also necessary is the existence of an occupational doctor to investigate the health of the members of the hospital units and to provide similar instructions. The existence of the security technician to solve serious operational problems as well as to supervise the proper operation of the hospital units is deemed imperative. It goes without saying that all of the above ensure appropriate health and safety conditions for the hemodialysis units as well [10, 18, 19].

54.2 Materials and Methods

54.2.1 Aim

The aim of the present study was to investigate the perceptions of the teamwork as well as the knowledge attitudes of the health professionals of hemodialysis units for the prevention of infections in Greece.

54.2.2 Study Design

This was a cross-sectional survey.

54.2.3 Participants

The sample of the study consisted of 1018 HCWs of hemodialysis units in Greece.

54.2.4 Tools

54.2.4.1 Teamwork Perceptions Questionnaire (T-TPQ) TeamSTEPPS®, Instructor Manual

The Teamwork Perceptions Questionnaire (T-TPQ) TeamSTEPPS®, Instructor Manual includes questions about the five key teamwork that are relevant: its functioning, leadership, current situation, mutual support, and communication [4, 5].

54.2.4.2 Questionnaire APPENDIX A

The investigation of the knowledge and attitudes of HCWs of the hemodialysis units of Greece regarding the prevention of infections was done with a questionnaire APPENDIX A regarding the level of knowledge and attitudes of them about infections which includes five appendices that examine: the demographic characteristics, the knowledge, the attitudes, the behaviors, and finally the information of the participants about the infections [20, 29].

54.2.4.3 Demographic Data

The determination of the health and safety conditions of the hospital to which hemodialysis units belong was done with a form for recording demographic data concerning: the existence of a security technician, occupational doctor, hospital infections department, methods of accident management, vaccination program, the percentage of HCWs of hemodialysis units with positive Australian antigen, the existence or not of educational programs against biohazards [10, 18, 19].

54.2.5 Methodology

The questionnaires were sent to all hemodialysis units in Greece by the postal company. In the file of each hemodialysis unit, there were the questionnaires according to the strength of the hemodialysis unit, a letter to the head-nurse of the department, and a special postal envelope for the return of the questionnaires with an inscription on it of the postal delivery company and the telephone number of the branch in the corresponding area.

54.2.6 Statistical Analysis

The analysis was parametric (×2 and one-way ANOVA with Bonferroni as a post-hoc test). Controls were two-sided. P-values <0.05 were considered statistically significant. There were no missing values. Analysis was performed with the statistical package STATA v12.

54.3 Results

The present study involved 1018 HCWs (out of 1100 questionnaires send, with a response rate of 92.55%) from 80 hemodialysis units of Greek, as shown in Table 54.1.

Clarifying the professional qualities, we mention that the two people who were in the other category were rural doctor and a health visitor. Regarding the family status, out of the 54 people in the unspecified category, 45 are divorced and 9 are widowed. The median number of people living together was 3 people with a range of 0–7 people. In the majority of them (615 people, 60.4%) they lived together with 2–3 people. The median total years of work time was 21 years, working in the hemodialysis unit 15 years, and the number of patients per day in the hemodialysis unit was 30 patients. The working hours per week are 40 for all the health professionals of HCWs of the study.

The level of knowledge of HCWs of hemodialysis units in matters of HAIs shows a relatively wide range (Table 54.2). At this point, it is worth noting that the level of knowledge about HBV and HCV, as well as about HIV infection, is 20 percentage points lower than the corresponding rate of transmission from the patient to the HCWs. Therefore, the average value of correct answers is reduced to 67%. The level of knowledge about the severity of HAIs also has a wide range (Table 54.2).

Table 54.1 Demographic – social data

	N	*%*
Gender		
Men	164	16.11
Women	854	83.89
Marital status		
Marital status	748	73.48
Unmarried	216	21.22
Other	54	5.30
Profession		
Doctor	43	4.22
Doctor taking a specialty	23	2.26
Nurse	707	69.45
Assistant nurse	243	23.87
Other	2	0.20
Education level		
PhD	10	0.98
MsC	87	8.55
University	70	6.88
Technological Educational Institutions	608	59.72
Vocational schools	243	23.87

Table 54.2 Level of knowledge of HCWs about HAIs

Correct answers	N	%
HAIs can be transmitted from the patient to the HCWs		
Hepatitis B	879	86.35
Hepatitis C	870	85.46
HIV	861	84.58
Influenza	948	93.12
Measles	589	57.86
Mumps	516	50.69
Rubella	515	50.59
Tetanus	947	93.03
Tuberculosis	738	72.50
Varicella	609	59.82
HAIs can be transmitted from the HCWs to the patient		
Hepatitis B	684	67.19
Hepatitis C	654	64.24
HIV	657	64.54
Influenza	952	93.52
Measles	585	57.47
Mumps	512	50.29
Rubella	517	50.79
Tetanus[a]	933	91.65
Tuberculosis	719	70.63
Varicella	606	59.53
HAIs can be serious		
Hepatitis B	672	66.01
Hepatitis C	671	65.91
HIV	833	81.83
Influenza	596	58.55
Measles	289	28.39
Mumps	255	25.05
Rubella	251	24.66
Tetanus[a]	247	24.26
Tuberculosis	481	47.25
Varicella	259	25.44
HAIs control measures		
Hands hygiene after removing gloves	950	93.32
Changing mask before going to another patient	624	61.30
Wearing gloves, mask, and protective eyewear	910	89.39
Risk factors for HAIs		
Invasive procedures	967	94.99
Hand hygiene as a means of transmission	999	98.13

[a] Tetanus is not transmitted from person to person and therefore the negative answer is considered correct

The attitudes of HCWs of hemodialysis units on the issues of HAIs were distinguished in particularly high rates of compliance together with a high perception of the risk of transmission of HAIs. More specifically, 96.56% agree that the use of the guidelines for HAIs reduces the risk of their transmission. 95.87% agree that hand hygiene measures reduce the risk of transmission of HAIs between patients. 92.24% agree that hand hygiene measures reduce the risk of transmission of HAIs among HCWs of hemodialysis units. Finally, on a scale from 1 to 10 of the risk of HAIs transmission, the median value was 8.

HAIs that can be transmitted from the patient to the HCWs of hemodialysis units by gender differ in terms of the level of knowledge in some cases by gender as shown in Table 54.3. The differences were nonexistent with the level of knowledge being essentially that mentioned above in Table 54.2.

The same picture and with similar percentages emerge regarding the level of knowledge of transmission of HAIs from the HCWs of hemodialysis units to the patient by gender. Regarding the severity of HAIs, it seemed that the opinions between the two sexes did not differ. Regarding control measures and risk factors of HAIs by gender, a difference was found only in the use of mask, gloves, and protective glasses (Table 54.3).

Nurses' attitudes regarding HAIs differ between the two genders, with better compliance being that of women. Nurses' teamwork in healthcare enables safer, high-quality care behavior in practical issues of avoiding HAIs differ by gender in some cases despite the very small apparent differences as shown in graph 3.1.

Table 54.4 describes the factors of the Task Team Perceptions Questionnaire (T-TPQ). In between the table, all the questions per factor are examined (TPQ1 – TPQ35) and we observe uniformity in the responses with very high rates of agreement. Particularly noteworthy are the results of Table 54.5 regarding the nurses' perceptions of the team work. With reference to the recording of the health and safety conditions of the hospital to which hemodialysis units belong, the results showed the following.

During the analysis, it emerged that there is a security technician in all hospitals, with the year of attendance being in the period 1980–2015, with a median value of 1997. Also, it was found that there is an occupational doctor in only 48 (60%) hospitals with a median value of the year of attendance in 2003. An infection control department exists in all hospitals (median: 2000). In all hospitals also, the accident management procedure (median value: 2000) is applied, as well as the information or training program on prevention issues against biological hazards. The implementation of the HBV vaccination program is carried out in all hospitals, while the percentage of those who are immune is 98±1.98% (92–100%, median value: 98%).

54.4 Discussion

The level of knowledge of HCWs of hemodialysis units in matters of HAIs shows a relatively wide range in this study. According to Kofi M et al., also their study led to a high range of values. They screened 1534 HCWs in various high-risk departments using a data collection form. Specifically the hemodialysis units found that the highest proportion of nursing staff immunized was against rubella (97.5%). On the other hand, the hemodialysis unit was found to have the highest percentage of nonimmune staff against measles (35.6%), mumps (39%), and varicella (56.3%). In the opposite of our study, the level of knowledge about rubella's transmission from the patient to the HCWs and vice versa was respectively 50.59% and 50.79%. Also, our results are higher than theirs for measles and varicella.

The results were respectively for measles 57, 86% and 57, 47% and about varicella were respectively 59.82% and 59.53% [15].

Çiftci et al. [6] studied specifically influenza prevention in relation HCWs's knowledge of transmission from them to the patient. The level of knowledge of the 470 HCWs showed that the rates are low in the whole sample, with doctors having a slightly better rate than others. Contrary to our study showed that the rate was high in the whole sample (93.52%).

Table 54.3 Level of knowledge of HCWs about HAIs

		Men	Women
Correct answers		N (%)	N (%)
HAIs can be transmitted from the patient to the HCWs			
Hepatitis B	($p = 0.689$)	116 (87.22)	699 (85.56)
Hepatitis C	($p = 0.689$)	116 (87.22)	699 (85.56)
HIV	($p = 0.696$)	115 (86.47)	691 (84.58)
Influenza	($p = 0.587$)	122 (91.73)	760 (93.02)
Measles	($p = 0.006$)	61 (45.86)	482 (59.00)
Mumps	($p = 0.062$)	56 (42.11)	417 (51.04)
Rubella	($p = 0.009$)	52 (39.10)	422 (51.65)
Tetanus[a]	($p = 0.717$)	125 (93.98)	758 (92.78)
Tuberculosis	($p = 0.009$)	84 (63.16)	607 (74.30)
Varicella	($p = 0.216$)	72 (54.14)	491 (60.10)
HAIs can be transmitted from the HCWs to the patient			
Hepatitis B	($p = 0.324$)	93 (69.92)	532 (65.12)
Hepatitis C	($p = 0.209$)	91 (68.42)	512 (62.67)
HIV	($p = 0.080$)	94 (70.68)	512 (62.67)
Influenza	($p = 0.192$)	120 (90.23)	765 (93.64)
Measles	(p = 0.014)	62 (46.62)	477 (58.38)
Mumps	($p = 0.020$)	53 (39.85)	415 (50.80)
Rubella	($p = 0.005$)	51 (38.35)	423 (51.77)
Tetanus[a]	($p = 0.866$)	123 (92.48)	747 (91.43)
Tuberculosis	($p = 0.010$)	81 (60.90)	591 (72.34)
Varicella	($p = 0.087$)	69 (51.88)	491 (60.10)
HAIs can be serious			
Hepatitis B	($p = 0.430$)	84 (63.16)	545 (66.71)
Hepatitis C	($p = 0.553$)	85 (63.91)	545 (66.71)
HIV	($p = 0.471$)	105 (78.95)	668 (81.76)
Influenza	($p = 0.394$)	74 (55.64)	487 (59.61)
Measles	($p = 0.175$)	30 (22.56)	234 (28.64)
Mumps	($p = 0.384$)	28 (21.05)	205 (25.09)
Rubella	($p = 0.100$)	24 (18.05)	204 (24.97)
Tetanus[a]	($p = 0.052$)	24 (18.05)	213 (26.07)
Tuberculosis	($p = 0.009$)	49 (36.84)	403 (49.33)
Varicella	($p = 0.104$)	25 (18.80)	209 (25.58)
HAIs control measures			
Hands hygiene after removing gloves	($p = 0.767$)	123 (92.48)	763 (93.39)
Changing mask before going to another patient	($p = 0.327$)	85 (63.91)	492 (60.22)
Wearing gloves. mask. and protective eyewear	($p = 0.029$)	113 (84.96)	736 (90.09)
Risk factors for HAIs			
Invasive procedures	($p = 0.381$)	123 (92.48)	778 (95.23)
Hand hygiene as a means of transmission	($p = 0.173$)	128 (96.24)	803 (98.29)

[a] Tetanus is not transmitted from person to person and therefore the negative answer is considered correct

Regarding the level of knowledge about the severity of HAIs shows a relatively wide range in this study. Especially for tetanus, the correct answers were in 24.26 % of HCWs. Sagheb et al. [25] have similar findings as ours, referring in their research specifically to diphtheria and tetanus protection in hemodialysis.

Regarding HBV, Pappas [19] stated that the level of knowledge about its severity is high (66.01%). Also, he found that the level of knowl-

Table 54.4 Teamwork perceptions questionnaire (T-TPQ)

	Median	Average	Dev. V.	Min	Max
Team function	*31*	*30.89*	*3.30*	*17*	*35*
TPQ1	5	4.43	0.688	1	5
TPQ2	5	4.55	0.571	1	5
TPQ3	4	4.34	0.713	1	5
TPQ4	4	4.32	0.705	1	5
TPQ5	4	4.37	0.682	1	5
TPQ6	4	4.41	0.630	1	5
TPQ7	5	4.46	0.623	1	5
Leadership	*31*	*30.89*	*3.98*	*11*	*35*
TPQ8	4	4.35	0.732	1	5
TPQ9	5	4.43	0.697	1	5
TPQ10	4	4.36	0.732	1	5
TPQ11	5	4.47	0.617	1	5
TPQ12	4	4.37	0.730	1	5
TPQ13	5	4.45	0.697	1	5
TPQ14	5	4.47	0.654	1	5
Situation monitoring	*30*	*30.31*	*3.40*	*17*	*35*
TPQ15	4	4.18	0.823	1	5
TPQ16	4	4.19	0.754	1	5
TPQ17	4	4.28	0.714	1	5
TPQ18	4	4.37	0.673	1	5
TPQ19	5	4.47	0.576	2	5
TPQ20	4	4.46	0.563	2	5
TPQ21	4	4.37	0.656	1	5
Mutual support	*30*	*30.07*	*3.37*	*15*	*35*
TPQ22	5	4.53	0.583	2	5
TPQ23	5	4.47	0.621	1	5
TPQ24	5	4.52	0.618	1	5
TPQ25	4	4.36	0.675	1	5
TPQ26	4	3.79	1.033	1	5
TPQ27	4	4.25	0.711	1	5
TPQ28	4	4.14	0.813	1	5
Communication	***31***	***30.73***	***3.46***	***18***	***35***
TPQ29	4	4.45	0.580	2	5
TPQ30	4	4.43	0.616	1	5
TPQ31	4	4.36	0.686	1	5
TPQ32	4	4.42	0.602	2	5
TPQ33	4	4.37	0.676	1	5
TPQ34	4	4.30	0.722	1	5
TPQ35	4	4.40	0.667	1	5

Table 54.5 Teamwork perceptions questionnaire (T-TPQ) nurses' per gender

	Median	Average	Deviation V.	Min	Max	p-value
Team function	30/31	30.24/30.99	3.04/3.33	23/17	35	0.0150
Leadership	30/32	30.21/31.05	4.15/3.94	12/11	35	0.0238
Situation monitoring	29/31	29.74/30.44	3.47/3.36	21/17	35	0.0261
Mutual support	29/30	29.83/30.08	3.20/3.41	21/15	35	0.4225
Communication	29/31	30.02/30.88	3.78/3.38	18/19	35	0.0079

edge about the risk of transmission of HBV from a patient to HCWs (and vice versa) was very interesting. The percentages we found, respectively, in our study are 86.35% and 67.19% agree with his.

HCW's level of knowledge about HBV, HCV, and HIV in our study ranged at good levels. We mention indicatively the level of knowledge about their severity, which ranged for HBV 66.01%, HCV 65.91%, and HIV 81.83%. Winchester et al. [32] conducted a study on HCWs' perceptions of these viruses and found that 86% were concerned about contracting them. However, their perception of the severity of them varied, respectively, for HCV 69%, HBV 53%, but was much lower for HIV 13%.

For the attitudes of HCWs on the issues of HAIs, the results of Kingston's et al. [14], research, are similar to ours. 98.13% of HCWs agreed in our study that hand hygiene measures reduce the risk of transmission of HAIs between patients. Hand hygiene is emerging as the cornerstone of the prevention HAIs and control practices for them too. They investigated and compared hand hygiene practices and attitudes in Ireland between 2007 and 2015. Mainly positive and improving attitudes and practices were observed. 86% complied with hand hygiene before patient contact in 2015, compared to 58% in 2007. Totally, 91% complied with hand hygiene during patient contact in 2015, compared to 76% in 2007. Implementation of hand hygiene guidelines appears to have positively influenced practice. However, there is room for substantial improvement [14].

Women have better knowledge of the transmission HAIs from patient to them, as we found especially for tuberculosis (74.3%). This is in agreement between Poduval & Hammes [22] and us, regarding the importance of a high level of knowledge of tuberculosis transmission. There is a high prevalence of positivity among dialysis patients.

In contrast, Amrani et al. [2], regarding the level of knowledge of HCWs about the severity of tuberculosis, did not find a difference between genders. We found that women (49.33%) had a higher level of knowledge about the severity of tuberculosis. But also, reported that it is much more common in patients undergoing hemodialysis than in the general population. The telltale signs are nonspecific. Prognosis is closely related to early diagnosis and treatment [2].

We showed the same picture and with similar percentages regarding the level of HCWs's knowledge of transmission HAIs from them to patient by gender. Women had a higher level of knowledge about pediatric diseases (measles 59.00%, mumps 51.04%) and tuberculosis (74.30%). Ahmed et al. [1] also studied the knowledge, attitudes, and perceptions about tuberculosis of HCWs. Their results are consistent in terms of gender with the present research, since 76% were women with a higher level of knowledge about tuberculosis.

Regarding the level of knowledge about the severity of HAIs, especially for HBV and HCV, our results showed, respectively, for men 63.16% and 63.91% and for women 66.71% for both viruses. It appeared that there was no difference in views between the two genders in the present survey. This conclusion also agrees with the study of Elamine, who emphasized that the level of knowledge about the severity of HBV and HCV must be high in all HCWs as they are one of their transmission factors [9].

Nurses' attitudes regarding HAIs control measures, differed between the two genders, with women have better compliance in the present study. The results between genders about wearing gloves, mask, and protective eyewear showed that 90.09 were women. Garthwaite et al. [12], however, may not have clarified in their research whether nurses' attitudes differed between the 2 genders but they are in agreement with us in the positive attitude of HCWs in the use of clinical practice guidelines for the management of bloodborne viruses in the hemodialysis units.

Also, Elamin et al. [10] assessed HCWs' knowledge in hemodialysis units in Khartoum, compliance with infection control recommendations, and transmission rates of HBV and HCV. The results were positive since HCWs achieved a median score of 81% on the knowledge assessment (range 44–100%). Our results showed correct answers about knowledge of

HBV' transmission from the HCWs to the patient 67.19%, and of HCV' 64.24%. Also our results showed correct answers for HBV' transmission from the patient to the HCWs 86.35% and for HCV' 85.46%. Hand hygiene recommendations were strictly followed in 15% of hemodialysis units in Khartoum. In contrast, our study showed that in 80 hemodialysis units in Greece, hand hygiene recommendations were followed in 98.13% of HCWs.

Specifically in our study, we found that the level of knowledge of control measures was regarding hand hygiene after removing gloves 93.32%, changing mask before going to another patient 61.30%, wearing gloves, mask, and protective eyewear 89.39 %. Also, the percentage for risk factors for HAIs for invasive procedures was 94.99%. The behavior of nurses in practical matters of avoiding HAIs, such as hand hygiene before each activity, changing gloves before the next patient, and using scalpels with a protective cover was also the subject of research by Flodgren et al. [11]. They assessed the effectiveness of various interventions, individually or in combination, aimed at preventing HAIs. They concluded that healthcare professionals should adhere to infection control guidelines, which they find agreeable to us if we had a high level of knowledge of the correct processes [11].

The results of the first study by Scheithauer et al. [28] on the compliance of HCWs for hand hygiene in hemodialysis units showed a significant increase in hand hygiene compliance observed (30–62%) but lower than our results (98.13%). The greatest improvement was observed before aseptic operations (21–52%) also lower than ours (94.99%).

Similarly in the subsequent study by Scheithauer et al. [27], overall compliance was 55%, which was significantly higher than that at the end of the first study (62%, $p < 0.0001$), but still significantly higher than that in the initial and intermediate phase of the first study (37% and 49%, $p < 0.0001$), however again the results were lower than ours.

Hand hygiene and the use of gloves by the nursing team in hemodialysis unit were also the subject of the study. Regarding the use of gloves, there was correct use in 45%, reuse in 25%, and absence of gloves in 29% of cases. Their conclusions regarding the absence of gloves and their reuse find us at a better level of compliance (use of gloves 98.13%) [7]).

The factors of the Task Teamwork Perceptions per factor, we observed uniformity in their responses with very high rates of agreement as the average values of the scores are particularly high 30–31/35 [30]. Rosen et al.'s [24] review of the task force came to the same results. Teamwork in healthcare enables safer, high-quality care. In particular, they highlighted the positive attitude of HCWs in the items concerning the relationship between teamwork and multilevel outcomes, effective teamwork behaviors, knowledge, skills, and attitudes based on effective teamwork in the health professions.

The review by Sangaleti et al. [26] showed that HCWs experience teamwork as a positive process in primary healthcare settings as in our study. This review has also identified potential actions that could improve the implementation of teamwork in primary healthcare.

Kim and Jeong [13] concluded that leadership is a fundamental factor in the functioning of teamwork as we do. In fact, they concluded that they can use transformational leadership to improve nurses' empowerment, nursing performance, job satisfaction, and organizational commitment. This study empirically demonstrated the importance of transformational leadership in nursing leaders. This finding could be used as evidence to develop strategies to enhance transformational leadership, empowerment, nursing performance, job satisfaction, and organizational commitment in nursing science and practice.

Finally, Lindberg et al. [16] concluded that the positive attitude of nurses of hemodialysis units toward teamwork and their proper information and training about HAIs can lead to their reduction, as was also seen in our own research. The reported incidence of all infections decreased from 2.04 per 100 patients ($p = 0.03$) after the implementation of interventions to promote teamwork and infection education. Adherence rates increased significantly in 4 of the 5 categories of infection prevention measures [16].

54.5 Conclusions

This study highlighted for the first time the high level of perceptions of teamwork of the HCWs of the hemodialysis units in Greece. Also, this study identified for the first time their high level of HAI's knowledge and attitudes. It is recommended to investigate the correct application of prevention measures and to detect the causes of deviation from good practices with subsequent investigations on hemodialysis units of Greece.

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Noninvasive Brain Stimulation in Primary Progressive Aphasia: A Literature Review

Konstantinos Papanikolaou, Grigorios Nasios,
Anastasia Nousia, Vasileios Siokas,
Lambros Messinis, and Efthimios Dardiotis

Abstract

Primary progressive aphasia (PPA) is a gradually progressive clinical syndrome in which the first and predominant symptoms involve language and/or speech production that interfere with daily activities. Transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS) appear to have a beneficial impact on many neurodegenerative pathologies. The current review investigated the impact of rTMS and tDCS on PPA patients. English language articles that have been published in the databases PubMed, and Scopus from 2007 to 2022 were included. Fifteen single-case or small-group studies were analyzed and presented. The majority of the literature findings point toward that the application of rTMS or tDCS may have a positive effect in improving symptoms such as verb production, action naming, phonemic-verbal fluency, grammatical comprehension, written spelling, and semantic features. In conclusion, our review provides additional evidence supporting that both types of stimulation may improve linguistic deficits, especially if they combined, speech therapy.

Keywords

Non-invasive brain stimulation · rTMS · tDCS · Primary progressive aphasia · Speech therapy

55.1 Introduction

Primary progressive aphasia (PPA) is a gradually progressive clinical syndrome in which the first and predominant symptoms involve difficulties in naming, grammar, semantic comprehension, and speech production, interfering with daily activities [1, 2]. On this basis, three major PPA variants have been defined: (a) nonfluent/agrammatic PPA (nfvPPA), (b) logopenic variant PPA (lvPPA), and (c) semantic variant primary progressive aphasia (svPPA). The main characteristic of the disease is cortical atrophy and neuron loss, which depends on underlying pathology [1]. Current studies show us that most patients with PPA have been found to have tauopathy, ubiquitin/TDP43-positive frontotemporal lobar degen-

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K. Papanikolaou
Neurological Institute of Athens, Athens, Greece

G. Nasios · A. Nousia (✉)
Department of Speech and Language Therapy, School of Health Sciences, University of Ioannina, Ioannina, Greece

V. Siokas · E. Dardiotis
Department of Neurology, Faculty of Medicine, School of Health Sciences, University of Thessaly, Larissa, Greece

L. Messinis
Lab of Cognitive Neuroscience, School of Psychology, Aristotle University of Thessaloniki, Thessaloniki, Greece

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eration (FTLD) pathology [1, 3, 4], or Alzheimer disease pathology. According to clinical studies, nonfluent progressive aphasia has been linked to tau-positive pathology [1, 5, 6] semantic variant of PPA to ubiquitin-positive, TDP43, positive pathology [5–7], and the logopenic variant of PPA to AD pathology [6].

Transcranial magnetic stimulation (TMS) is noninvasive brain stimulation (NIBS) method used to initiate currents within neural networks through the application of a magnetic field that traverses the skull and reaches the brain. A TMS device is usually consisted of one or two coils that produce brief (100–400 μs) magnetic pulses reaching to an estimated depth of 2–2.5 cm from the scalp surface and inducing neuronal discharges in the underlying neurons. It is a relatively safe noninvasive method used for the treatment and especially rehabilitation of several neurologic deficits [8]. Transcranial direct current stimulation (tDCS) is another NIBS method with similar properties to those of rTMS and it is used to trigger neuroplasticity for therapeutic reasons in neuropsychiatric diseases. It consists in injecting low-intensity electrical currents (typically 1–2 mA) via sponge electrodes attached to the scalp that induces polarization in neural tissue. Anodal polarization is thought to induce excitation (depolarization) and the cathodal polarization induces inhibition (hyperpolarization) [9–11].

Until today, only one comprehensive critical review [12] investigates the effect of NIBS in eight of the most prevalent neurodegenerative pathologies (among them the PPA). They found that personalized NIBS-based electroceuticals have the ability to drive improvements in memory, attention, and language in patients with neurodegenerative diseases. For this reason, the present review explores the beneficial impact of rTMS, and tDCS in linguistics deficits in patients of PPA.

55.2 Materials and Method

55.2.1 Literature Search

We searched PubMed and Scopus using the keywords primary progressive aphasia, PPA, transcranial magnetic stimulation, TMS, transcranial direct current stimulation, tDCS, as free words. There was no restriction on the year of publication. We included articles written in English language.

55.2.2 Eligibility Criteria

Articles that met the following criteria were considered for inclusion in the present review: (1) they were classified as PPA (2), both pre- and postintervention data were presented. Studies were excluded according to the following criteria: (1) review, meta-analysis, (2) study protocols, (3) conference abstracts, (4) studies performed in animals, (5) reports not published in English, (6) retracted papers, (7) articles assessing different interventions (not NIBS), as well as (8) studies that also included participants with other neurological conditions (e.g., traumatic brain injury).

55.2.3 Data Extraction

The following data were extracted according to standardized data extraction forms: author, year of publication, number of participants, PPA, interventions assessed, duration and frequency of the intervention, and results. Two independent reviewers (Κ.Π.) and (A.N.) conducted the literature search and data extraction independently.

55.3 Results

A total of nine studies were derived from the PubMed database, two from Scopus. The application of the aforementioned eligibility criteria resulted in a total of five studies.

55.3.1 rTMS Studies in PPA

In all studies, participants underwent NIBS programs which lasted for a period of time ranging between 7 and 69 days. The number of patients varied from 1 to 14. The frequency of stimulation pulses was 20 Hz in all studies. The pulse intensity varied from 90% to 100% of RMT and the targets of stimulations were the inferior frontal gyrus and dorsolateral prefrontal cortex in the left hemisphere. However, in some instances, the homotopic regions of the right hemisphere were also stimulated (see Table 55.1 for details). No rTMS study involved behavioral speech therapy. The general trend of the results of these studies points to the usefulness of rTMS in reducing linguistic dysfunction in PPA patients. Clinical studies concerning rTMS in PPA are presented in Table 55.1.

55.3.2 tDCS Studies in PPA

A total of 21 studies were derived from the PubMed database, seven from Scopus. The application of the aforementioned eligibility criteria resulted in a total of 10 studies.

The available tDCS studies involved between 1 and 36 PPA patients. The current parameters were: Duration between 20 and 25 min and intensity between 1.2 and 2 mA. Sessions varied from study to study between 10 and 15 number of sessions. The stimulation electrode was placed in the speech areas of the left hemisphere and the reference electrode was placed either in the right hemisphere or in noncephalic region (see Table 55.2 for details). Some studies involved behavioral speech therapy in addition to neurostimulation. Although the trend of results was positive with respect to symptom reduction, the additional speech therapy was tented to enhance these results. Clinical studies concerning tDCS in PPA are presented in Table 55.2.

55.4 Discussion

To the best of our knowledge, the present review is the first one to focus on the impact of NIBS in individual patients or in groups, with PPA only. Our findings provide that the rTMS or tDCS combined with speech production have a positive effect in linguistic domains, such as verb production, reducing agrammatism, naming, and semantic task.

Specifically, with rTMS, it appeared that stimulation of the left hemisphere, targeting areas related to speech production has a positive effect in improving symptoms in individual linguistic capacities, such as verb production, reducing agrammatism, and improving performance in naming and semantic tasks. In addition, neuronal stimulation with electrical transcranial stimulation, with 1.5–2 mA anodal currents and targeting nodal areas of speech networks in the left hemisphere, the improved linguistic performance of aphasic patients in both oral and written speech production, verbal recall, and the semantic word tasks. The effectiveness of tDCS in most studies reviewed was enhanced by simultaneous speech therapy intervention.

Several limitations of the current study need to be acknowledged. First, the number of rTMS studies that report positive results is very small and it is not known how many studies were performed that did not have positive results and they were not published. Moreover, all studies involved excitatory stimulation (high-frequency pulses) especially in the left hemisphere but there is an absence of studies of inhibitory, low-frequency stimulation in the opposite hemisphere, where several studies have shown positive results on aphasics with left hemisphere strokes [28, 29].

Furthermore, many of the studies reviewed did not include in their protocol speech therapy which might have helped in consolidating the improvements over long time periods. Fourth, by and large, the positive effects were short-lived. Finally, the lack of a standard instrument for assessing the severity of the neurodegeneration and the quality of life of the patients following interventions makes impossible to ascertain that patients are actually helped not only in their language and cognitive skills but also in their daily lives, which is, after all, the goal of therapeutic interventions.

Moreover, future studies should focus more and present subgroup analyses based on the subtype of PPA (i.e., nfvPPA, lvPPA, svPPA) to better reflect the clinical im-portance-relevance of potential benefits for each subtype.

Table 55.1 Clinical studies concerning rTMS in PPA

Studies	N	Type of PPA	Stimulation parameters	Stimulation target	Sham	Main results	Other therapy	Comment
Finocchiaro et al. [13]	1	Unspecified	HF 20 Hz, 90% of RMT	Left IFG	Yes	Statistical improvement on performance of only the task involving verbs	No	The improvement noted could very well be independent of rTMS
Cotelli et al. [14]	1 4	Nonfluent/agrammatic PPA	HF 20 Hz, 90% of RMT	Left and right DLPFC	Yes	Action-naming performance during stimulation of left and right DLPFC was better than the placebo stimulation	No	The fact that there was stimulation of both the left and the right DLPFC and it was effective raises some questions regarding the form of functional reorganization of the brain of PPA patients
Trebbastoni et al. [15]	1	Logopenic PPA	HF 20 Hz,100% of RMT	Proximity of MFG and IFG	Yes	Highly but temporarily significant improvement in phonemic verbal fluency, and a high reduction in grammatic and semantic errors in writing speech	No	Significant improvement in phonemic verbal fluency in lvPPA, suggest the efficacy of high-frequency excitatory rTMS to the MFG and IFG of the left hemisphere
Bereau et al. [16]	1	Logopenic PPA	Hf 20 Hz, 100% of RMT	Left DLPFC	No	Significant improvement in speed of processing in the Picture naming test	No	We are not sure about the stimulation effect because the patient was assessed by the same materials so maybe the improvements were due to learning
Margolis et al. [17]	6	Logopenic PPA	HF 20 Hz, 90% of RMT	Left or right DLPFC	Yes	Significant improvement in action naming	No	The duration of the protocol and the total number of sessions are insufficient to allow drawing of a proper about the effects of left DPFC rTMS in patients with PPA.

Abbreviations: *N* number, *PPA* primary progressive aphasia, *RMT* resting motor threshold, *DLPFC* dorsolateral prefrontal cortex, *IFG* inferior frontal gyrous, *HF* high frequency

Table 55.2 Clinical studies concerning tDCS in PPA

Studies	N	Type of PPA	Stimulation parameters	Stimulation target	Sham	Main results	Other therapy	Comment
Wang et al. [18]	1	Nonfluent/ agrammatic PPA	Anodal, 1.2 mA	PTR & Broca's area	Yes	Significant improvement in four subtests after the first treatment of anodal tDCS	No	tDCS was reported to have a positive effect in the specific patient but it is not certain if that was the result of the stimulation of Broca's or Wernicke's area or of both
Cotelli et al. [19]	16	Nonfluent/ agrammatic PPA	Anodal, 2 mA	Left DLPFC	Yes	Both groups showed significantly improvement in naming accuracy, however the real tDCS group was significantly more improved than the sham stimulation-group	Speech therapy	The fact the stimulation resulted in greater the improvement shows that the combination of the two therapeutic(tDCS and SLT) approaches is preferable
Gervits et al. [20]	6	Logopenic PPA & Nonfluent/ agrammatic PPA	Anodal, 1.5 mA	Left FTR	Yes	Significant improvement in speech production and grammatical comprehension that was maintained after 3 months	No	This study also supports the hypothesis that neurostimulation does improve performance at least initially
Tsapkini et al. [21]	6	Nonfluent/ agrammatic PPA & Logopenic PPA	Anodal, 2 mA	Left IFG	Yes	There were improvements in written spelling that was maintained after 2 months	Speech therapy	Effectiveness of combined speech therapy and neurostimulation in logopenic and agrammatic aphasia is clear but temporary
Tsapkini et al. [22]	36	Nonfluent/ agrammatic PPA & Logopenic PPA & Semantic PPA	Anodal, 2 mA	Left IFG	Yes	There were improvements in written spelling for both trained and untrained items, that were maintained for 2 months for nf and lv PPA. No effect was found for sv PPA patients	Speech therapy	Effectiveness of combined speech therapy and neurostimulation in logopenic and agrammatic aphasia is clear but temporary
Fenner et al. [23]	11	Aprosdioristo	Anodal, 2 mA	Left IFG	Yes	The real stimulation condition showed significant results in the trained items	Speech therapy	Effectiveness of combined speech therapy and neurostimulation in logopenic and agrammatic aphasia is clear but temporary
Roncero et al. [24]	10	Logopenic PPA	Anodal, 2 mA	Left IPL	Yes	Improvement in picture naming for trained items and a less significant improvement for untrained items lasting at least for 2 weeks	Speech therapy	Behavioral may consolidate the gains from the neurostimulation in this specific language domain

(continued)

Table 55.2 (continued)

Studies	N	Type of PPA	Stimulation parameters	Stimulation target	Sham	Main results	Other therapy	Comment
Hung et al. [25]	5	Logopenic PPA & Semantic PPA	Anodal, 1.5 mA	Left temporopariental region	Yes	Improvement in semantic features tasks for trained items only	Speech therapy	Temporoparietal stimulation may also result in improvement as does frontal stimulation
Roncero et al. [26]	12	Nonfluent/ agrammatic PPA & Logopenic PPA & Semantic PPA	Anodal, 2 mA	Left IPTL	Yes	Improvement in picture naming for trained items after both types of stimulation	Speech therapy	Behavioral may consolidate the gains from the neurostimulation in this specific language domain
Teichmann et al. [27]	12	Semantic PPA	Anodal and Cathodal, 2 mA	Left and Right Temporal lobe	Yes	Improvement in the semantic task immediately after the stimulation treatment in both excitatory and inhibitory condition	No	There were six conditions in this study. In a situation like this it is very difficult to interpret the reported improvement

Abbreviations: *N* number, *PPA* primary progressive aphasia, *RMT* resting motor threshold, *DLPFC* dorsolateral prefrontal cortex, *IFG* inferior frontal gyrous, *HF* high frequency

55.5 Conclusion

In conclusion, the present review retrieved all available articles of PPA patients that used rTMS and tDCS. We found a general trend of linguistics symptom improvement due to neurostimulation with either rTMS or tDCS especially, when they were paired with speech therapy.

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The Regulatory Landscape of New Health Technologies and Nanotechnologies: The Role of Complexity of Nanosystems

Nikolaos Naziris and Costas Demetzos

Abstract

Herein we present the modern issue of new health technologies that emerge in Medicine and Therapeutics, with regard to their development, regulatory framework, approval, and post-approval monitoring. The European law and legislation distinguish the various subcategories of health technologies in medicinal products, medical devices, biotechnological products, advanced therapy medicinal products, and nanomedicinal products. Each of these categories presents its own distinctive characteristics, based on principles that regard the development technology and intended therapeutic use, and, as a result, is defined by a unique regulatory framework inside the European legislation environment. New health technologies are a key of twenty-first-century knowledge, science, and economy and a part of society growth and economic development, while at the same time they present significant challenges, mainly through matters that regard their safety, efficacy, and value for the public. In this environment, the concept of complexity of living and artificial systems arises, as part of their nature, but also as a perspective that will give answers regarding their dynamic behavior, evolution, and overall quality.

Keywords

New health technologies · European regulation · Advanced therapies · Nanomedicines · Complex systems

56.1 Introduction to New Health Technologies (NHTs)

The global community is going through a period in which health and treatment concepts are constantly being revised and evolved. The reason for this is the incessant discovery of new and advanced approaches to diseases, which is fueled by the invention of new technologies with application in the field of health. Some very popular examples that one may come across while exploring the web are medical devices, telehealth, digital therapeutics, health wearables, three-dimensional (3-D) printing of artificial organs or bio-printing, virtual medicine, bioinformatics, robotic surgery, artificial intelligence (AI), precision and personalized medicine, and clustered regularly interspaced short palindromic repeats (CRISPR). Many of these technologies, if not all, are already present in clinical applications, on early or more advanced stage [1–3].

N. Naziris (✉) · C. Demetzos
Section of Pharmaceutical Technology, Department of Pharmacy, School of Health Sciences, National and Kapodistrian University of Athens, Athens, Greece
e-mail: niknaz@pharm.uoa.gr

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Inside this vast field of new technologies, there is also a new generation of therapeutics under the term "new health technologies" (NHTs). Those include medicinal products, medical devices, biotechnological products, advanced therapy medicinal products (ATMPs), and nanomedicinal products. Each class, of course, is further categorized into more specific applications. For example, ATMPs include gene therapy, somatic cell therapy, and tissue engineering. NHTs are here to provide improved quality of life, by preventing and treating diseases, but also by managing and alleviating disabilities [4, 5].

But what is the European strategy on NHTs and nanotechnologies? Is there a distinct European way of promoting and regulating NHTs and what is the role of the cycle of innovation in this regard? In any case, NHTs are an important subfield within the larger regulatory enterprise. In addition, there is the ethical aspect of developing and authorizing NHTs. There is the example of human embryonic stem cell research and the ongoing discussion on its necessity and legitimacy. A range of opinions are expressed by groups of researchers, religionists, patients, bioethicists, etc. Is it immoral? Should Europe lean toward a restrictive or a more encouraging regulatory environment? This depends also on the society, where in some cases NHTs are more controversial and provoke deep value differences. In the end, two main concerns are raised, one being the incompatibility between research and clinical practice due to controversies and the other, what we generally consider as "acceptable" health care techniques and technologies [4].

Two examples of the role of European Medicines Agency (EMA) in promoting the concept of NHTs are initiatives related to ATMPs and innovation in medicines. Concerning the first, the European Commission (EC) and the EMA published in 2017 a joint action plan on ATMPs, aiming to *"streamline procedures and better address the specific requirements of ATMP developers."* In addition, the Committee for Advanced Therapies (CAT) plays a key role in the scientific assessment of ATMPs, preparing draft opinions on the products that aid the Committee for Medicinal Products for Human Use (CHMP), which in turn recommends or not their authorization by the EC. Finally, it is important to note that all ATMPs go through a single central authorization procedure, which facilitates their approval process, while the EMA assists developers build pharmacovigilance and risk management systems, in order to monitor the post-authorization safety of these products. As for innovation in medicines, there is the European Union (EU) Innovation Network, which aims to strengthen early regulatory support for innovation, as well as the Innovation Task Force (ITF), a multidisciplinary group that holds scientific, regulatory, and legal competences and provides early dialogue with applicants on matters of medicinal innovation [6, 7].

Health is a matter of fundamental importance. It is a human right in itself and also a factor in a productive workforce and as a result, health economy. Advanced approaches in health care and medical treatment are presented every day in the news from all across the world. Those developments are indeed a very exciting topic and their place inside the National and European law (EL) must be defined, where scientific, economic, sociological, constitutional, and many other issues are raised.

What is the role and importance of the EL in NHTs? In order to guard society against possible dangers and to maximize the benefits from NHTs, each European government regulates their development, marketing, and public financing. Undoubtedly, these arrangements are in line with European history on health, experimentation, innovation, economic model, and human right issues. Generally, there should be something distinctive about the European way of regulating NHTs, based on our society's shared history, culture, and institutions. As a result, the European governments regulate NHTs within a European context that includes common legislation and institutions, making the law on NHTs an EL. In this setting, some of the relevant institutions are the EU, the Council of Europe (CoE), the Organization for Economic Co-operation and Development (OECD), World Health Organization (WHO), and the European Patent Office (EPO) and by EL we do not only mean the law of the EU [4, 5].

In the next chapter, some of the defining features of the EL approach to NHTs are presented. In particular, the role of the cycle of innovation in designing a map for the EU regulatory approach on NHTs is discussed, while the importance of risks, ethics, human rights, and markets as frames of this regulation is highlighted. Afterward, two examples of NHTs with information from the EMA are presented, namely, ATMPs and nanomedicines. Both categories are in the market and discussed in Europe for a more consolidated regulatory approach. The concept of complexity of nanosystems is also discussed, in relation to current understanding of medicinal products, their properties, and biological behavior, as well as a tool to better control these aspects.

56.2 The European Approach on NHT Regulation

56.2.1 Definition and Approach

Concerning their definition, "health technologies" are not referred to as an independent regulatory category by the EU. The Patients' Rights Directive defines a health technology as "*a medicinal product, a medical device or medical and surgical procedures, as well as measures for disease prevention, diagnosis or treatment used in healthcare*" [8]. They are distinguished in "medicinal products" [9] and "medical devices" [10], based on the EU marketing legislation, and certain subcategories are found in the EL, including "biotechnology medicines" or "biotechnology-derived pharmaceuticals" [11], "advanced therapy medicinal products" (ATMPs) [12], and "nanomedicines" [13].

What are the features and significance of the EL approach to NHTs? How is this approach defined by the risks, ethics, rights, and markets? A map of the EU regulatory environment for an NHT could be based on the cycle of innovation, linking the innovative idea with research, preclinical and clinical stages, marketing, and finally, post-market regulation. The frame of the EU regulation for this approach is built on the four pillars of risks, ethics, human rights, and markets. Innovation is linked to each of these elements, as the EU always tries to encourage innovation in what concerns new technologies and especially health. A set of measures, comprising hard law, soft law, opportunities for funding, as well as judicial decisions that interpret these provisions, formulate the EU regulatory environment for NHTs [4].

56.2.2 The Map for Regulating NHTs

The "cycle of innovation" and its six stages help map the EU's regulation on NHTs (Fig. 56.1) [4].

Based on the cycle, seven broad types of EU regulation have been identified, which come from the EU measures that affect the map stages. These elements comprise the typology of the EU for new drug development or, more appropriate, for new medicinal product development. The types of regulation are:

1. Funding
2. Protection of intellectual property
3. Regulation of research processes
4. Data protection
5. Marketing and product safety legislation
6. Monitoring and surveillance
7. Pricing, reimbursement, and coverage in health care systems

Fig. 56.1 The cycle of innovation

The EU regulatory mode concerning funding is encouraging and the development of certain types of NHTs is supported in this regard. This tendency applies also through intellectual property, where there is particular sensitivity toward patent protection and keeping the manufacturing processes of NHTs a trade secret [4].

Considering the regulation of research processes, the EU legislation focuses on good laboratory practice (GLP) [14, 15] and good clinical practice (GCP) [16, 17]. In this regard, Member States are required to standardize the planning, performance, reporting, and archiving of research, as well as to establish monitoring and inspection systems. Apparently, the regulation here is more of a soft law, based on guidance notes, which are issued by the EMA and compliance is not mandatory [18]. However, such requirements should be fulfilled for studies to go into clinical trials or products to be markedly authorized, giving the seemingly soft law a relatively hard effect.

The EU legislation for data protection covers trials that involve human data [19]. As an example of nanotechnology, subcutaneous radio-frequency identification microchips, which are utilized to monitor the patient's health, operate by delivering data of the individual to an external device and, as a result, are subject to EU data protection law. The EU Directive on data protection, which refers directly the human rights law of the CoE and is based on the work of OECD, is associated with most of the described types of EU legislation [20–22]. Generally, health-related data may not be processed. Exceptions are cases of given consent or when the data processing is mandatory for the purposes of prevention, diagnosis, treatment, or management of health care services and, of course, under a regime of professional secrecy.

Of great significance for the EU, which is reflected on the established legislation, is the product safety of NHTs. Medicines and medical devices are sure not to reach the EU market, unless they have demonstrated an appropriate level of quality, including safety and efficacy. The rules for granting a marketing authorization in the case of NHTs are defined by the centralized procedure that involves the EMA [23]. For medical devices, EU legislation refers to them as "active implantable medical devices," utilized for prevention, diagnosis, monitoring, treatment, or alleviation of diseases and do not exhibit pharmacological, immunological, or metabolic action [24]. In vitro diagnostic medical devices are covered by a separate Directive [25].

EU legislation obliges Member States to run a pharmacovigilance system, which ensures post-market monitoring and surveillance. This involves health care professionals, who need to report on eventual adverse reactions, as well as the market authorization holders, who must undertake pharmacovigilance [9, 26, 27]. For the insurance of the follow-up quality and traceability of ATMPs, they additionally go through the "Eudravigilance" database, which Member States utilize to communicate pharmacovigilance information through the EMA and its Pharmacovigilance Risk Assessment Committee [28].

Finally, pricing is a matter of national competence, leading to significant deviations and, as a result, a non-uniform European market for NHTs. The Member States are only obliged to provide information on their national arrangements with companies and to authorize access to health care in other Member States. Overall, most of the regulation refers to the market, whether it is on the level of access to the market, research with a view to market, or safety when an NHT is on the market. As a result, market is considered the dominant frame in the EU NHT regulation [4].

56.2.3 The Frames of NHT Regulation

The European regulatory thinking, represented by the EU and the EC, is oriented toward the regional market for NHTs, accompanied by risk assessment, human rights, and ethics (Fig. 56.2) [4].

What is the role of risks, ethics, rights, and markets in framing the EU regulation on NHTs? It has been discussed that the European "internal market" and markets in general are the dominant frame. Risk is also important, since it is also linked to the market. Ethics and rights have the role of legitimating devices [4].

Fig. 56.2 The frames of the EU regulation on NHTs

Risk is related to patient/consumer safety, with regard to medicinal products, product liability, and post-approval regulation. It is a frame that supports the market [29]. This supportive role is distinctive in research funding, protection of intellectual property, and product safety [30]. The main point is to authorize products in a way that the consumer will have confidence in their quality, i.e., safety and efficacy. The modes of risk assessment, risk monitoring, licensing, and inspection by authorities of the EU are the main tools for regulation of research processes, while supporting innovation [31].

Concerning pre-clinical studies, NHTs must fulfil certain safety criteria and be based on clear scientific justification, based on the OECD's GLP and EMA's long list of "Non-clinical Guidelines" [18]. In addition, guidance in the form of soft law ensures risk regulation and helps companies fulfil their legal obligation [32]. Most importantly, the non-clinical studies should be adequate to foresee any potential adverse effects to be observed during clinical trials. Risk analysis, management, avoidance, and reduction are of primary importance in this regard [33]. Finally, clinical trials are subject to GCP and specific rules have been established by the EMA, which are in line with the International Council for Harmonisation (ICH) of Technical Requirements for Registration of Pharmaceuticals for Human Use harmonized standards [34].

Ethics and rights are connected with the rest of the frames and can be found inflecting and supporting all essential elements of NHTs and human therapeutic products in general, including funding and research, safety during the research processes and in the products, as well as consent in research. In any case, ethics and rights do not operate as a stand-alone frame, but more as a link for the other frames. A very interesting example concerns the patenting of biotechnological products, where the legislation states that the human body cannot be patented. Embryonic stem cell claims are banned in the EU, while the US law poses no morality-based barrier to patenting human stem cells [35]. On the other hand, patent claims on isolated genomic DNA are valid in Europe, while the U.S. Supreme Court has invalidated them [36].

56.3 Advanced Therapy Medicinal Products (ATMPs)

56.3.1 Definition and Elements of ATMPs

According to the EMA and the EC, the term "advanced therapies" or "advanced therapy medicinal products" (ATMPs) refers to medicines for human use, based on the very latest advances in gene therapy, somatic cell therapy, and tissue engineering. Certain ATMPs may contain one or more medical devices as integral parts of the medicine and such products have been assigned the term combined ATMPs. These products may be utilized in difficult medical conditions, to which the conventional methods fail to offer treatment, and promise innovative approach on dealing with diseases, injuries, and disabilities [6].

According to the EMA: *"Advanced therapy medicinal products (ATMPs) are medicines for human use that are based on genes, tissues or cells. They offer groundbreaking new opportunities for the treatment of disease and injury"* [6]. According to the EC: *"Advanced therapy refers to new medical products that use gene therapy, cell therapy, and tissue engineering. They can be used to treat diseases or injuries, such as skin in burns victims, Alzheimer's, and cancer or muscular dystrophy, and have huge potential for the* *future of medicine"* [37]. ATMPs have their own legislation inside the European regulatory framework. They are authorized centrally via the EMA and from a single evaluation and authorization procedure.

The European legal framework for ATMPs includes the Directive 2001/83/EC, the Commission Directive 2009/120/EC, the Regulation (EC) No 726/2004, and the Regulation (EC) No 1394/2007 [9, 12, 28, 38]. The EU regulation on ATMPs facilitates their access to the EU market, allows the free movement of the products within Europe, and encourages competitiveness between companies in the field, while it ensures health protection for patients. Its main elements are:

- Centralized procedure for marketing authorization
- Multidisciplinary CAT
- Specific technical requirements, adapted to the properties of these products
- Special incentives for small and medium-sized enterprises

In some cases, combination products are developed, which combine both biological materials and other elements, such as metal implants or polymeric scaffolds. In these cases, an adapted regulatory approach is required [28, 37]. The European Commission (EC) has adopted guidelines on both good manufacturing practice (GMP) and GCP, which are adapted to ATMP characteristics [39, 40].

CAT is the EMA's committee that is responsible for assessing the quality, safety, and efficacy of ATMPs and to follow the latest scientific developments in the field [41]. It is a multidisciplinary committee that consists of some of the best experts available in Europe, involving experts from each EU Member State, members from the CHMP, patients, clinicians, and members from Iceland and Norway. It was established in accordance with Regulation (EC) No 1394/2007 [28]. Among its responsibilities, the CAT prepares a draft opinion on any submitted ATMP, before the CHMP decides on its authorization. In addition, it can prepare an opinion on any ATMP-related scientific matter, upon the request of the EMA's Executive Director or the EC. Development of guidance documents, simplification of procedures and requirements for ATMPs, organization of scientific workshops, and interaction with stakeholders are also some of the CAT's activities.

The EMA follows ATMPs post-authorization, in order to monitor their safety and efficacy while in the market. To this end, it also provides scientific support to the developers for building pharmacovigilance and risk management systems [6].

56.3.2 Classification of ATMPs

Developers may consult the EMA in order to determine whether their product, which contains genes, cells, or tissues, meets the scientific criteria to be an ATMP. The three categories of ATMPs are defined as follows (Fig. 56.3) [9, 28, 42, 43]:

Fig. 56.3 Classification of ATMPs

- *Gene therapy medicinal products*: These are medicines that contain "recombinant" genes with the purpose of a prophylactic, diagnostic, or therapeutic effect. They are used to treat genetic disorders, cancer, or long-term diseases.
- *Somatic-cell-therapy products*: These are medicines that contain cells or tissues with altered biological characteristics or not intended to be used for the same essential functions in the body. They may prevent, diagnose, or cure diseases.
- *Tissue-engineered products*: These are medicines that contain cells or tissues that have been modified to repair, regenerate, or replace human tissue.

The classification criteria are different between the EU and the United States. Generally, for both regions, the ATMP regulatory framework falls under the framework of biological products. In the EU, ATMPs are classified into four groups, including the group of combined ATMPs. The main criteria that will determine the inclusion or exclusion of a medicinal product from one of the four categories are the nature of its active substance and its therapeutic purpose [44].

Stem cells are an essential tool for producing ATMPs and the EMA monitors their research very closely. They can be ingredients of somatic-cell-therapy medicines or tissue-engineered medicines after substantial manipulation or when utilized for different functionalities. A reflection paper on stem-cell-based medicines points out the responsibility of the developers for ensuring the consistency and reproducibility of the products [45]. Stem cellular properties need to be taken into consideration during pre-clinical and clinical studies, with regard to tumor development and possible rejection from the body, so that the products are safe and efficient for the patients.

56.3.3 Authorized ATMPs

As of March 2018, ten ATMPs have received marketing authorization in the EU (Table 56.1). From these, Chondrocelect (TiGenix, Belgium), Glybera (UniQure, Netherlands), and Holoclar (Chiesi, Italy) are the first products in cell, gene, and stem cell therapy, respectively, to receive authorization [46]. Currently, Chondrocelect, Glybera, MACI, and Provenge are not present in the market, since they were withdrawn due to pricing and reimbursement issues, as well as competition from conventional therapies [47].

A survey-based study among commercial ATMP developers revealed the challenges faced during various development phases [48]. These were regarding scientific, technical, clinical, financial, regulatory, and other issues. Multi-level regulations, requirements in manufacturing and quality assurance, translational uncertainties, financing and commercialization, and, finally, clinical implementation and acceptance are the most important hurdles in ATMP development, based on the study. One very characteristic example is the issue in finding volunteers for a clinical trial of an ATMP for a rare and previously untreated disease. The EMA provides support for ATMP developers, through advisory services, incentives, and also through the ITF, which gives the opportunity for an early informal dialogue that may guide their regulatory strategy. Developers must be aware of the legislation covering the different development stages of an ATMP, including GLP, GMP, and GCP [49].

The EU and the EC have addressed the term "similar medicinal product" in the Commission Regulation (EU) 2018/781, including also considerations for ATMPs. In this document, it is stated whether two products containing cells, genes, or genetically modified cells are considered similar. The differences are regarding the starting materials, composition, and manufacturing technology for cell-based medicinal products and the therapeutic sequence, viral vector, transfer system, regulatory sequences, and manufacturing technology for gene therapy medicinal products, always with regard to biological characteristics, activity, and final therapeutic effect and safety of ATMPs [50].

Table 56.1 List of EMA-authorized ATMPs

Name	Indication	Approval date	Status
Alofisel	Perianal fistulas in Crohn's disease	March 2018	Approved
Spherox	Cartilage defects in the knee	May 2017	Approved
Zalmoxis	Stem cell transplantation in high-risk blood cancer	June 2016	Approved
Strimvelis	Adenosine deaminase-severe combined immunodeficiency (ADA-SCID)	April 2016	Approved
Imlygic	Melanoma	October 2015	Approved
Holoclar	Severe limbal stem cell deficiency in the eye	March 2015	Approved
Zynteglo	Beta-thalassemia	June 2019	Approved
Luxtuma	Retinal dystrophy	March 2019	Approved
Yescarta	B-cell lymphoma	August 2018	Approved
Provenge	Metastatic prostate cancer	October 2013	Withdrawn in 2015
MACI	Cartilage defects in the knee	July 2013	Withdrawn in 2014
Glybera	Lipoprotein lipase deficiency (LPLD)	November 2012	Withdrawn in 2017
Chondrocelect	Cartilage defects	November 2009	Withdrawn in 2016

56.4 Nanomedicines and Nanosimilars

56.4.1 Definition and Elements of Nanomedicines

The EMA defines nanotechnology as: *"The use of tiny structures less than 1,000 nanometres across, which are designed to have specific properties"* [51]. The EC has provided a recommendation for the definition of a nanomaterial as: *"a natural, incidental or manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for 50 % or more of the particles in the number size distribution, one or more external dimensions is in the size range 1 nm-100 nm"* [52].

Nanomedicine utilizes entities at the nanoscale that may exhibit chemical, physical, or biological effects. However, there is still no official definition of nanomedicines in EU pharmaceuticals legislation. The initial role of engineered nanoparticles was to improve the properties of certain drug molecules, such as their solubility or stability, and serve the purpose of targeted delivery, with specific spatiotemporal features, altering the pharmacokinetic profile of drugs and reducing their side effects. A lot of drug delivery nanosystem (DDnS) products have been authorized until today (Fig. 56.4). Nowadays, nanotechnology promises a plethora of novel NHT applications in the imaging, diagnosis, and therapy of diseases, regenerative medicine, tissue engineering, surgery, and organ replacement, with self-assembling, biomimetic, and functional materials that are tailor-made to meet the needs in each of these cases [4].

Nanomedicines have gained much attention, owed to their potential in leading to new therapeutic applications. However, due to their complexity and very small size, they cannot be fully characterized or copied, while minor deviations in their manufacturing may influence their final properties, biological interactions, therapeutic profile, and, as a result, their quality, including their efficacy and safety. Nanomedicines and their follow-on products "nanosimilars" may be approved on a national level or via the EMA centralized procedure. An ad hoc CHMP expert group was established on 2009, which is supported by the ITF, whose role is to issue recommendations on the approval or rejection of nanomedicines in the EU [54].

56.4.2 Types of Nanoparticles and Authorized Nanomedicines

There are many types of nanoparticles that are utilized for drug delivery and other therapeutic applications. Those include nanocrystals, polymeric nanoparticles, micelles, dendrimers, liposomes, magnetic nanoparticles, gold

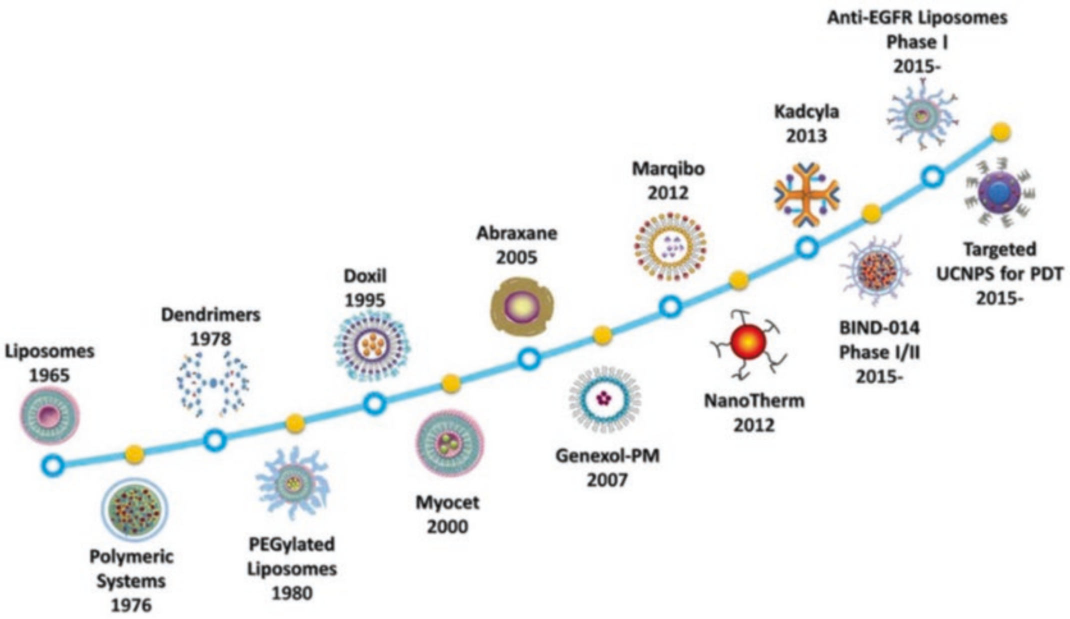

Fig. 56.4 Timeline of the development of DDnSs for cancer therapy. (Adapted from Ref. [53])

nanoparticles, mesoporous silica nanoparticles, carbon nanotubes, and quantum dots. Their advantages are numerous, depending on their nature. For example, polymeric nanoparticles offer improved thermodynamic stability of their cargo, multifunctional properties, and deep cell and tissue penetration, while gold nanoparticles are easy to synthesize, have a high drug loading capacity, low cytotoxicity, and their physicochemical properties, i.e., size and polydispersity, may be controlled easily [55]. Several suggestions have been made on the classification of nanosystems that are used in therapeutic applications. Concerning DDnSs, a proposal on their characterization regards the types of biomaterials, surface functionality, and controlled release mode that are combined in a single nanoplatform. Based on that review, nanosystems are distinguished in conventional DDnSs (cDDnSs) and advanced DDnSs (aDDnSs) and depending on the biomaterial diversity, in hybrid nanosystems, if the biomaterials are of the same type, or chimeric nanosystems, if the biomaterials are of different nature [56]. Stimuli-responsive nanosystems are state-of-the-art nanocarriers that offer appreciable biophysical behavior by responding to physiological or externally applied conditions, such as pH and temperature variations, light, and magnetic field, leading to the controlled release of therapeutic molecules in a spatiotemporal manner [57].

Examples of currently approved nanomedicines in the EU include nanoparticles, liposomes, nanocomplexes, nanoemulsions, nanocrystals, and polymer–protein conjugates with various indications, such as neoplasms, multiple sclerosis, infections, and iron deficiency (Table 56.2) [58].

56.4.3 The Follow-On "Nanosimilars"

Many years have passed since the authorization of the first nanomedicinal products. Apart from Ritalin (methylphenidate in nanocrystal form), which has been in the European market since the 1950s for the treatment of children aged 6 years or older and adolescents with attention deficit/hyperactivity disorder (ADHD), a plethora of nanoproducts have been authorized since the 1990s. Since those prod-

Table 56.2 Examples of EMA-authorized nanomedicinal products

Name	Nanomedicine class	Indication	Approval date
Abraxane®	Protein-based nanoparticles	Metastatic breast cancer	January 2008
Caelyx®	Liposomes	Breast neoplasms, multiple myeloma, ovarian neoplasms, Kaposi's sarcoma	June 1996
Mepact®	Liposomes	High-grade resectable non-metastatic osteosarcoma	March 2009
Ambisome®	Liposomes	Fungal infection	September 1998
Ferinject®	Nanocomplex	Iron deficiency	June 2007
Oncaspar®	Nanoemulsion	Acute lymphoblastic leukemia	January 2016
Xeplion®	Nanocrystals	Schizophrenia	March 2011
Emend®	Nanocrystals	Nausea and vomiting	November 2003
Pegasys®	Polymer–protein conjugate	Chronic hepatitis B and C	June 2002
Macugen®	Polymer conjugate	Wet macular degeneration	January 2006
Ferinject®	Inorganic nanoparticles	Iron deficient anemia	June 2013

ucts are now off-patent, their follow-on nanosimilar products are being developed and their therapeutic equivalence compared with the innovator product is called into question. It is of the essence to find ways of ascertaining the differences in quality of newly developed nanomedicines, in order to ensure therapeutic efficacy and patient safety and provide a regulatory framework [59].

An overview of the initiatives taken by the EU regulators in relation to the development and evaluation of nanomedicines and nanosimilars has been published [60]. The review work describes the regulatory challenges and perspectives in the field.

There are no guidelines on nanomedicines and nanosimilars by the EMA. However, in an attempt to address the lack of clear regulation on nanomedicines and to pave the way for nanosimilars, discussion is open and the agency is in search of an integrated regulatory approach on the subject, which will include classic and new analytical tools for the characterization of these products. To this end, a number of reflection papers have been adopted by the CHMP and published that regard various nanomedicinal products and the suggested strategy for their development or the development of their "copies":

- Intravenous liposomal products [61]
- Coated nanomedicine products [62]
- Block copolymer micelle medicinal products [63]
- Nanoparticle iron medicinal products [64]

These reflection papers refer to specific nanomedicine or nanosimilar products and have been released with a view to developing guidelines. In addition, in some of these documents that regard nanosimilar products it is mentioned that it is required to "*establish pharmaceutical comparability.*" This relates to the term "similarity" and "nanosimilarity," which is justified by delivering identical or close qualitative and quantitative characteristics. This is achieved only by performing quality characterization on both the newly developed nanoproduct and the reference innovator product. This characterization includes aspects of the product like its composition, impurities, drug-to-excipients ratio, physicochemical properties, polymorphs, morphology, stability on storage and during and after administration, and in vitro release.

Concerning nanoparticles and especially self-assembled supramolecular complexes, such as liposomes, niosomes, polymersomes, micelles, and dendrimers, surface properties arising from self-assembly mechanics of the molecules composing them can never be identical from one product to another, not even between batches. This is owed to the incredible complexity in the process parameters, combined with the chaotic nature of these nanoformulations. That is why they are instead called "similar," which means "very close to" and cannot be proved with classic bioequivalence studies. Nanosimilarity is nowadays a demand and sophisticated and effective analytical tools must be employed to deliver it. The minimum requirements of nanosimilars are highly similar physicochemical characteristics (i.e., size, size distribution, ζ-potential). However, other approaches and basic principles have been also discussed for their value in the concept of "nanosimilarity," including biophysics, thermodynamics, and fractals [65–67].

56.5 The Concept of Complexity

Syukuro Manabe, Klaus Hasselmann, and Giorgio Parisi received the Nobel Prize in Physics in 2021, for their work on complexity and complex systems. Apart from Physics, such an approach applies in all other scientific fields. The main questions that arise are "*how shall we define a complex system?*," "*what is the emergence between emergence and complexity?*," and "*how shall we interpret causal relationships in complex systems?*." The first two questions have been thoroughly considered; however, the third one has yet to be understood and relates to current issues in the development of advanced therapeutics. For example, during the development of a pharmaceutical form, the formulation parameters, such as excipient properties and concentration, can greatly affect the final system properties.

Systems in nature, including biological systems and artificial biosystems, exhibit dynamical and complex behavior. The question was whether these systems are deterministic, stochastic, or chaotic in nature, which defines how they will self-assemble and behave under certain environmental conditions/parameters. It appears that most biological systems are deterministic chaotic, which means that their evolution depends on specific parameters; however, the route of evolution is dynamic and not easy to predict by conventional physical or mathematical tools. Non-linear dynamics is a tool that might contribute to this direction, while other approaches, such as network theory, can shed light on the complex nature and information distribution in these systems [68]. It is important to note at this point that the absorption, flow, and management of information, also in the form of energy, are important for a system's evolution and can be expressed as the information-to-entropy balance of that system. According to Shannon and the *Information Theory*, information and entropy are two directly linked terms. In addition, biological systems and their models are governed by an increase in entropy, and therefore loss of information, throughout their lifespan [69–71].

An example of complex artificial systems is colloidal nanoparticles, of lipidic or polymeric nature. Such systems are studied for their stability and biological behavior based on classic approaches and theories, one of which is the Derjaguin, Landau, Verwey, and Overbeek (DLVO) theory. In certain cases, however, the system stability cannot be predicted or controlled by applying these theories, due to its complexity and interactions with other communicating systems. A recent study revealed the deterministic chaotic nature of developed liposomal nanosystems, which is reflected on their physicochemical stability and properties [68]. Therein, it was found that the systems could be described by five state variables (first-order differential equations), information loss was established through the Kolmogorov entropy, and a higher value of the correlation dimension v was associated with a higher degree of adaptability to external stimuli. The latter was the case for the more stable system in terms of physicochemical properties. Such approaches can assist in delineating the dynamic nature and behavior of complex nanosystems, and chaotic evaluation can serve as a prediction tool for their stability and in vivo behavior, which are of the utmost importance for their utilization in biomedical applications.

Another example of complex systems are viruses and especially those that mutate very quickly and produce new pathogenic variances, such as the recent Sever Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2). Traditionally, older variants of the virus are studied in order to extract information on a molecular level and develop scientific tools that will aid the fight against future strains. It has been suggested that the properties of the new virus are the result of an information content that is correlated with its thermodynamic content, and its biophysical profile can be identified by utilizing mathematical tools, such as non-linear dynamics. Future approaches will orientate toward creating "decision-making" systems that will attack and neutralize the "epitopes" that carry critical information on the transmissibility and pathogenicity of viruses. Overall, viruses, and especially coronaviruses, could be characterized as "*digital hackers*," since they infiltrate the mammalian genetic code and produce new mutations, based on previous variant information [72].

56.6 Conclusions

The aim of this chapter was to emphasize and give attention to a new and emerging regulatory framework in the European landscape. Taking into consideration the new scientific terminology that gives rise to new regulatory demands, which in turn overcome the already existing directions and directives, we herein present the concept of new health technologies and new therapeutic approaches. Based on this approach, we recommend that more light is shed on new therapeutic platforms, which apart from the ones discussed in this chapter include digitalized directions, advanced decision-making platforms, bioinformatics, artificial intelligence, and personalized and precision medicine. The recent COVID-19 pandemic could be the driving force for utilizing new health technologies in a manner that may provide new communication paths between nations, including knowledge, generous funding by the governments, and innovative research projects, while solidarity should become the massive core for effectively shielding the health of societies.

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Octenidine Versus Dispase Gels for Wound Healing After Cryosurgery Treatment in Patients with Basal Cell Carcinoma

Nektarios Stratidakis, Anna Tagka,
Styliani A. Geronikolou,
Efstathios Giannakopoulos,
Antonios Panagiotopoulos, Evdokia Malachia,
Andreas Vitsos, Evangelos Karalis,
Paraskevas Dallas, Alexandros Stratigos,
and Michail Rallis

Abstract

For a specific group of patients with basal cell carcinoma (small, low risk), cryosurgery could be the suggested treatment, which results in the formation of an ulcer in the lesion area. The proteolytic enzymes' contribution to the wound healing is an ongoing research goal. Preclinical animal experiments in the Laboratory of the Pharmaceutical Technology Department of the National and Kapodistrian University of Athens have showed that a dose of 5 U/mL of dispase gel after the formation of tissue rashes, significantly promoted wound healing. Herein, a feasibility study in 16 patients enrolled by the First Department of Dermatology of Andreas Syggros Hospital was designed: 5 U/mL of dispase gel (once every 3 days) versus a drug reference containing octenidine (daily administration). The evaluation of the healing effect, safety, and tolerance was done on days 1 (cryosurgery), 2, 7, 21, and 60. The study end point was considered either the ulcer complete healing or the eighth week since treatment initiation. Wound healing was faster with dispase gel and hemoglobin reduced rapidly after the seventh day. Yet, hydration was higher in the control group. Our non-parametric analysis provides evidence that the dispase gel shows faster healing compared to the reference drug,

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Authors Nektarios Stratidakis and Anna Tagka have equally contributed to this chapter.

N. Stratidakis (✉) · E. Giannakopoulos · A. Vitsos ·
E. Karalis · P. Dallas · M. Rallis
Division of Pharmaceutical Technology, School of Pharmacy, National and Kapodistrian University of Athens, Athens, Greece
e-mail: nek.st@hotmail.co.uk; vkaralis@pharm.uoa.gr; dallas@pharm.uoa.gr; rallis@pharm.uoa.gr

A. Tagka (✉) · A. Panagiotopoulos · E. Malachia ·
A. Stratigos
First Department of Dermatology and Venereology, "Andreas Syggros" Hospital, National and Kapodistrian University of Athens, Medical School, Athens, Greece
e-mail: annatagka1@gmail.com

S. A. Geronikolou
University Research Institute of Maternal and Child Health and Precision Medicine, National and Kapodistrian University of Athens, Medical School, Athens, Greece
e-mail: sgeronik@bioacademy.gr

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in humans, meriting further investigation in larger human sample sizes before massive production of the product.

Keywords

Wound healing · Debridement · Enzymes · Clinical trial · Octenidine · Dispase · Skin pharmacology

57.1 Introduction

Non-melanoma skin cancers (NMSCs) are common malignancies amid Caucasians. Unfortunately, they are misreported in most European countries, where its individual types are not determined in the relevant national cancer registries [1]. Their incidence is gradually rising, while the ratio of NMSCs to cutaneous cancer is 19:1 [2]. Actually, basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) represent almost 99% of all NMSCs, [3] while the BCC to SCC ratio varies from 1:1 to 10:1, contingent on ethnicity, age and, gender [1]. Chronic ultraviolet (UV) radiation exposure, phototype, age, gender, hereditary components, smoking, and immunosuppression consist the main etiopathological factors of this morbid entity [1, 4–7]. Cryosurgery therapy (CT) is an effective alternative treatment according to the tumor's anatomical site, age of patient, and comorbidities with contradiction to other therapies considering practice guidelines [8]. It is feasible for small histologically confirmed BCCs, with good cure rates when performed by experienced surgeons, [8, 9] and non-feasible for high-risk tumors. The common clinical practice consists of two freeze–thaw cycles of spraying using liquid nitrogen onto the lesion [10, 11]. It is considered a low-risk treating choice, with limited short-term adverse effects, mainly bulla formation and local edema. Long-term side-effects include lesioned hypopigmentation and/or peripheral hyperpigmentation [11, 12].

The inflammation, local dryness, scars, and keloids are major problems, which dermatologists are called to confront after cryosurgery. Cryosurgery with other therapies of choice for actinic keratosis like tirbanibulin, fluorouracil, imiquimod, diclofenac, and photodynamic therapy with aminolevulinic acid have the advantage of shortening skin restoration [13].

Octenidine dihydrochloride is a widely used antiseptic molecule, promoting skin wound healing accompanied with improved scar quality after surgical procedures [13]. Proteolytic enzymes (endopeptidase and exopeptidase) break down protein and reduce inflammation. It is believed to play important role in cell migration and collagen remodeling during tissue repair and regeneration [14]. Griffin and Fogarty have shown the enhanced proteolytic activity of dispase obtained by *Bacillus polymyxa* [15, 16].

Dispase is a *Bacillus*-produced neutral metalloprotease recommended for recovering cells, mainly because of its selectivity in dissecting epithelial–mesenchymal interactions [17]. The use of dispase as a debridement and wound-healing agent is not explored.

The scope of this study is to investigate the wound-healing efficacy of the enzyme dispase. It is realized, in comparison to a reference product containing octenidine, after cryosurgery of human volunteer BCC patients.

57.2 Materials and Methods

57.2.1 Subjects Enrolled and Study Design

Sixteen volunteers were selected from among the Cryosurgery Department patients of Andreas Syggros Hospital from November 2019 to February 2020 after approval by the Scientific Board of the Andreas Syggros Hospital. Inclusion criteria: Patients >18 years with clinically confirmed BCCs receiving cryosurgery first treatment cycle. The lesions were located in the scalp, nose, forehead, cheek, and nasal folds. All participants signed a written informed consent upon enrolment.

Exclusion criteria: Patients in pregnancy or breastfeeding, and/or undergoing concomitant chemotherapy, and/or immunosuppressive treatment, or any other therapy to the treated area, or suffering from other chronic skin diseases. This study was an open-label two-treatment clinical research trial, comparing the efficacy of dispase treatment versus a reference product, widely used in the clinical practice (octenidine). The patients were selected and randomly assigned to two groups, applying either a gel ($n = 8$) or octenidine gel ($n = 8$) on a daily basis. All patients were patch tested for hypersensitivity to the gels by applying a patch test of the products.

The study protocol was approved by the Scientific Committee of Andreas Syggros Hospital (protocol code 3343/06.11.19). All performed procedures were carried out in accordance with the Good Clinical Practice (GCP) guidelines established by the Directive 2001/20/EC, the Federal Code of Users of the USA (21 CFR Part 312), and the International Conference on Harmonization (ICH). The study was conducted in accordance with the principles of the Declaration of Helsinki (Directive 2001/83/EC; ICH Issue E9 1996; Directive 2001/20/EC; Directive 2002/98/EC; Directive 2003/63/EC; ICH E (6) R1; 21 CFR Part 312; WHO 2008).

The main clinical characteristics are summarized in Table 57.1.

57.2.2 Treatments

57.2.2.1 Cryosurgery Application

The patients received, with slight modifications to schema therapy depending on the case, local cryosurgery therapy with liquid nitrogen, including two cycles of 30 s. Between the two cycles, a pause of 5 min intervened, in order to maximize the effect of the treatment. Skin tissue temperature after freezing was measured at −54°C.

57.2.2.2 Treatments

The patients were instructed to apply to the treated area a thin layer of octenidine gel every day or a thin layer of dispase gel every 3 days until the wound healing.

(a) Dispase

The dispase gel was prepared at a concentration of 5 U/mL. The gel synthesis was Dulbecco’s phosphate buffered saline, polyacrylamide C13-14 isoparaffin Laureth-7 (7%), dispase. The product was stored at 4 °C.

(b) Octenidine

The ingredients of control gel are: Aqua purificata, Propylene Glycol, Hydroxyethylcellulose, and Octenidine HCl. It is non-irritating, non-sensitizing, and pain-free. Its application is well tolerated on chronic wounds.

57.2.3 Measurements

The efficacy of the two gels is denoted herewith.

57.2.3.1 The Skin’s Biophysical Parameters

Skin parameters, including hydration, transepidermal water loss (TEWL), erythema, and melanin, were evaluated using non-invasive biophysical methods after RT (day 1), on days 2, 7, 21, and 60 after CT. Hydration was measured using a Corneometer CM 820 (Courage + Khazaka electronic GmbH, Köln, Germany) through changes in the dielectric constant. The indications were recorded in arbitrary units. The barrier function of the skin was evaluated measuring TEWL with Tewameter TM 210 (Courage + Khazaka electronic GmbH, Köln, Germany) by the density gradient of the water evaporation from the skin.

The estimation was based on the mean value of the flux density of water (in g/m^2/h), which was obtained 1 min after the beginning of the measurement. Erythema and melanin were calculated using a Mexameter MX 18 (Courage + Khazaka electronic GmbH, Köln, Germany) by measuring absorption/reflection at three different light wavelengths. The indications were recorded in arbitrary units. Before each measurement, the treated area was cleaned with 0.9% sodium chloride solution and wiped with sterile gauze.

57.2.3.2 Antera 3D Image Analysis

The wounded area, hemoglobin concentration, elevation, and skin texture were evaluated by Antera 3D camera (Miravex, Dublin, Ireland) on the days 1, 2, 7, 21, and 60.

Table 57.1 Statistics of the main clinical characteristics

Octenidine ($n = 8$); Dispase group ($n = 8$)	Age	Weight	BMI	Length × width ulcer (mm^2)	Gender	Obese
Mean Octenidine group	66,33	77,11	25,6500	179,922	87.5% (male)	25% Yes
					12.5% (female)	75% No
Dispase group	**75,00**	**86,57**	**29,1886**	**174,157**	71.43% (male)	28.57% Yes
					28.57% (female)	71.43% No
Median Octenidine group	72,00	74,00	25,8000	119,600		
Dispase	**73,00**	**83**	**27,7500**	**81,4**		
Standard Deviation Octenidine	17,75	6,716	2,49178	149,6		
Dispase	**6,53**	**22,404**	**4,6263**	**161,7**		
Range Octenidine	60	19	7,27	361,3		
Dispase	**17**	**68**	**13,6**	**397,7**		
Minimum Octenidine	23	69	22,50	34,4		
Dispase	**66**	**67**	**25**	**23,5**		
Maximum Octenidine	83	88	29,77	395,7		
Dispase	**83**	**137**	**38,6**	**421,2**		

BMI body mass index

57.2.4 Data Analysis

Data are presented in means, medians, and 95% confidence intervals. As the samples are small (*n* = 8 per treatment), we performed nonparametric tests so as to evaluate the probability of each treatment (treatment 0 = octenidine, versus treatment 1 = dispase gel) effectiveness in wound healing after cryosurgery in basal cell carcinoma patients. As the outcome of interest is the time until healing occurs, a survival analysis was opted. This time to event analysis included five time points (days 1, 2, 7, 21, and 60) for the following separate clinical manifestations: hydration, transepidermal water loss (TEWL), erythema, melanin, hemoglobin, wound healing, elevation, and texture. Accordingly, we performed eight sub-studies, one for each clinical manifestation in six time points with Kaplan-Meier model. The differential responses (curves) of each group that received different treatment were evaluated by Cox-Mantel log-rank test. Notably, as the samples are small, we could not consider covariates as sex, age, etc. Kaplan-Meier and Cox-Mantel model comparisons were performed in SPSS 28.

57.3 Results

The time to event results of Kaplan-Meier and Cox-Mantel log-rank models are described in Tables 57.2 and 57.3, respectively. According to the initial Cox-Mantel test results described in Table 57.2, significant differential response has been observed in following three clinical manifestations: transepidermal water loss, hemoglobin, and wound healing ($p < 0.001$). Followingly, the tests were repeated for these specific manifestations, comparing each pairwise time points for each group and further comparing differentially these responses between the treatments. These latter results are described in Table 57.4, Fig. 57.1. In Table 57.3, the mean, median, and 95% confidence intervals for each pair of time points are presented.

Wound healing rate at days 7 and 21 was significantly higher in dispase treatment in relation to octenidine.

57.4 Discussion

The main clinical characteristics of volunteers testing dispase or octenidine gels showed no significant differences between the two treatments. Mean age, ulcer area, weight, body mass index (BMI), and obesity were similar for the two therapies (Table 57.1).

The parameters that were significantly different between the two treatments were transepidermal water loss, hemoglobin, and wound area (Table 57.2). Even though other parameters like melanin content, erythema, hydration, skin texture, and elevations were also evaluated, they are not presented and discussed in this study as no statistical differences were found between the two treatments ($p > 0.05$).

Wound healing was significantly enhanced with dispase treatment as on day 7 wound area was decreased in mean by 70% and on day 21 by 94%, while the corresponding decrease with octenidine was 26% and 61%. The decrease was statistically significant in both cases ($p < 0.05$; Table 57.3). On day 60 with both treatments wound healing was completed (Table 57.3). The wound-healing rate of dispase treatment was significantly higher in relation to octenidine in both days 7 and 21 (Fig. 57.1).

Previous preclinical studies in mice showed that applying dispase gel in the dose of 5 U/mL every 3 days significantly contributed to wound-healing acceleration (unpublished data). Following the same therapeutical schema after cryosurgery, the preclinical results were confirmed in humans.

Dispase significantly contributes to wound debridement and apparently its application every 3 days increases wound-healing rate (Fig. 57.1 and unpublished data). The enzyme contains zinc, which improves fibroblast mitosis rate [18–20]. Its debridement property is due to mild proteolytic activity, selectively cleaving type IV collagen, and fibronectin [16, 18]. Its application on mice wounds showed to prevent necrotic tissue creation (unpublished data). In our study, after cryosurgery in humans with dispase there was no formation of necrotic tissue. In contrast, with octenidine formation of necrotic tissue was observed.

Table 57.2 Log-rank Cox-Mantel overall comparisons between treatments

	Symptoms markers	Chi-square (χ^2)	*df*	*p*-Value
Bioengineering biophysical measurements	Hydration	0.844	1	0.358
	TEWL	17.056	1	**<0.001**
	Erythema	0.245	1	0.6279
	Melanin	1.907	1	0.167
3D digital imaging	**Hemoglobin**	11.024	1	**<0.001**
	Elevation	1.005	1	0.316
	Wound healing	29.599	1	**<0.001**
	Texture	0.048	1	0.827

Note: TEWL, hemoglobin, and wound healing areas (bold values) show significant differences between the two treatments ($p < 0.001$)
df degree of freedom, *TEWL* transepidermal water loss

Other proteolytic enzymes like bromelain and collagenase studied for their debridement properties and wound-healing efficacy showed like dispase encouraging activities.

Octenidine gel is often used after injury for its wound-healing properties that are based on octenidine antibacterial activity and gel hydration properties [21–23]. It consists a well-established wound-healing choice after cryosurgery.

Transepidermal water loss and hemoglobin in relation to wound-healing time (days 2, 7, and 21) showed no statistically significant differences (Tables 57.3 and 57.4). Only on day 60, statistical differences were obtained (Table 57.4). It seems that transepidermal water loss and hemoglobin significantly decreased after 2 months.

No side-effects were observed with both treatments. Both can be considered as safe to be used as wound-healing agents.

The main limitation of this study was the small sample of volunteers in both treatments. However, the significant wound-healing rate observed by dispase gel in all cases contributes to consider it as a promising wound-healing treatment.

Table 57.3 The markers measurements were adjusted for means and medians otreatment and time and are presented as mean, medians, 95% Confidence Intervals (95% CI). Only wound healing TEWL and haemoglobin were found significant

			Mean			Median		
Marker	Treatment	Time	Estimate	SE	95% CI	Estimate	SE	95% CI
TEWL	Octenidine	**1**	109.625	15.403	[79.435, 139.815]	95	26.163	[43.721, 146.279]
		2	104.375	22.428	[60.415, 148.335]	110	29.440	[52.297, 167.403]
		7	74.594	22.869	[29.771, 119.416]	62	31.053	[1.136, 122.864]
		21	90.500	24.517	[42.447, 138.553]	75	18.500	[38.740, 111.260]
		60	88.200	16.101	[56.642, 119.758]	74	5.477	[63.265, 84.735]
	Dispase Gel	**1**	73.571	11.227	[51.567, 95.576]	72	13.093	[46.338, 97.662]
		2	71.143	11.805	[48.005, 94.280]	82	44.516	[0.000, 169.252]
		7	55.857	8.573	[39.054, 72.660]	48	8.510	[31.319, 64.681]
		21	54.167	5.828	[42.745, 65.589]	57	9.186	[38.996, 75.004]
		60	101.667	8.333	[85.333, 118.000]	110	0.000	
Haem	Octenidine	**1**	1980.800	184.509	[1619.161, 2342.439]	1853	3.286	[1846.559, 1859.441]
		2	2839.800	161.024	[2524.193, 3155.407]	2730	73.395	[2586.146, 2873.854]
		7	2619.000	39.302	[2541.968, 2696.092]	2603	61.000	[2,483,440, 2722.560]
		21	1841.750	201.435	[1446.937, 2236.563]	1678	395.500	[902.820, 2453.180]
		60	1569.250	168.354	[1239.276, 1899.224]	1607	330.000	[960.200, 2253.800]
	Dispase Gel	**1**	2134.714	229.015	[1685.844, 2583.584]	2069	329.502	[1317.091, 2821.909]
		2	2612.714	217.777	[2185.872, 3039.556]	2658	383.627	[1983.078, 3332.922]
		7	2288.333	142.221	[2009.580, 2567.086]	2341	344.348	[1749.277, 2932.723]
		21	2057.333	117.611	[1826.816, 2287.851]	1966	301.900	[1809.968, 2122.032]
		60	1358.000	224.527	[917.927, 1798.073]	1229	79.608	[942.540, 1515.460]

(continued)

Table 57.3 (continued)

			Mean			Median		
Marker	Treatment	Time	Estimate	SE	95% CI	Estimate	SE	95% CI
Wound healing	Octenidine	**1**						
		2	0.00					
		7	26.080	8.263	[9.884, 42.276]	16.300	0.657	[15.012, 17.588]
		21	60.840	10.581	[40.102, 81.578]	50.700	3.177	[44.473, 56.927]
		60	100.000	0.000	[100.000, 100.000]	100.00		
	Dispase Gel	**1**						
		2	0.00					
		7	70	[57.530, 81.604]	67	6.430	[54.397, 79.603]	
		21	94.35	[91.060, 99.255]	95	1.047	[93.747, 97.853]	
		60	100.000	[100.000, 100.000]	100			

Note: Wound healing area value ranges did not overlap for dispase and octenidine gels on days 7 and 21. Dispase wound healing was significantly increased in relation to octenidine in both days 7 and 21. Hemoglobin and TEWL were not significantly different at treatment times days 7 and 21

SE standard error, *CI* confidence intervals, *TEWL* transepidermal water loss

Table 57.4 Log-rank Cox-Mantel time and marker comparisons within patients

Time			Day 1		Day 2		Day 7		Day 21		Day 60	
Marker	Treatment	Time (day)	X^2	*p*-value	X^2	*p*-value	X^2	*p*-value	X^2	*p*-value	X^2	*p*-value
TEWL	Octenicept	1			0.831	0.362	0.648	0.421	3.571	0.059	9.143	**0.002**
		2	0.831	0.362			0.249	0.618	2.153	0.142	10.696	**0.001**
		7	0.648	0.421	0.249	0.618			2.786	0.095	9.030	**0.003**
		21	3.571	0.059	2.153	0.142	2.786	0.095			3.671	0.055
		60	9.143	**0.002**	10.696	**0.001**	9.030	**0.003**	3.671	0.055		
	Dispasegel	1			1.342	0.247	0.333	0.564	2.481	0.115	2.649	0.104
		2	1.342	0.247			0.013	0.908	0.882	0.348	2.877	0.090
		7	0.333	0.564	0.013	0.908	5.990	**0.014**	2.877	0.090	5.990	**0.014**
		60	2.649	0.104	2.877	0.090			0.373	0.541	0.373	0.541
Haemoglobin	Octenicept	21	2.481	0.115	0.882	0.348	0.799	0.371				
		1			5.429	**0.020**	2.022	0.115	0.065	0.799	4.441	**0.035**
		2	5.429	**0.020**			2.592	0.107	9.030	0.033	9.030	**0.033**
		7	2.022	0.115	2.592	0.107			7.344	**0.007**	7.344	**0.007**
		21	0.065	0.799	9.030	**0.033**	7.344	**0.007**			1.229	0.268
		60	4.441	**0.035**	9.030	**0.033**	7.344	**0.007**	1.229	0.268		
	Dispasegel	60	3.719	0.054	7.945	**0.005**	6.616	**0.010**	6.616	**0.010**	3.719	0.054
		1			2.143	0.143	0.026	0.871	0.266	0.606		
		2	2.143	0.143			2.96	0.085	4.857	**0.028**	7.945	**0.005**
		7	0.026	0.871	2.96	0.085			1.692	0.193	6.616	**0.010**
		21	0.266	0.606	4.857	**0.028**	1.692	0.193			6.616	**0.010**
Woundhealing	Dispasegel	1										
		60					12.094	**<0.001**	4.50	**0.034**		
		2										
		7							3.623	0.057	7.914	**0.005**
		21					3.623	0.057			4.941	**0.026**
		60					7.914	**0.005**	4.941	**0.026**		
	Octenicept	1										
		2										
		7							9.787	**0.002**	12.094	**<0.001**
		21					9.787	**0.002**			4.500	**0.034**

Note: Wound healing area was significantly increased from day 7 to day 21 only for dispase treatment

TEWL transepidermal water loss

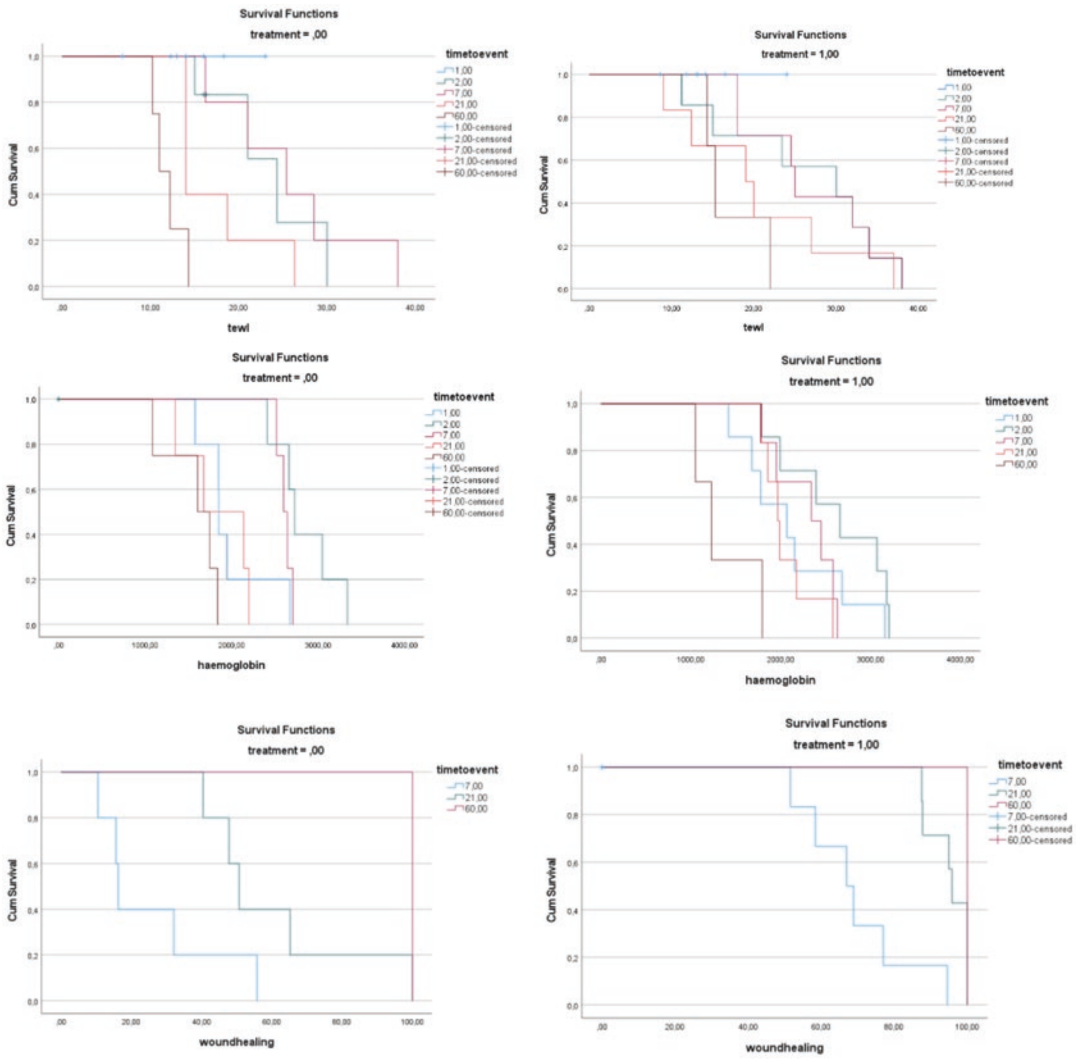

Fig. 57.1 Survival curves adjusted for treatment (treatment 0: octenidine; treatment 1: dispase gel) for the significantly altered markers studied (TEWL, Hemoglobin, Wound Healing) in time points day 1 (treatment), day 2, day 7, day 21, and day 60 (after treatment)

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Nurses' Knowledge Concerning Prevention and Treatment of Pressure Ulcers

Panagiota Eirinidou, Georgia Gerogianni,
Georgios Vasilopoulos, Ioannis Kalemikerakis,
Antonia Kalogianni, Evridiki Kaba, Georgia Fasoi,
Afroditi Zartaloudi, and Martha Kelesi

Abstract

Pressure ulcers have high prevalence in patients and can be prevented with proper nursing interventions. The aim of this study was to evaluate nurses' knowledge about prevention and treatment of pressure ulcers. The present study was conducted with 111 nurses working in a General hospital in Greece. In this study, nurses had adequate knowledge about prevention and treatment of pressure ulcers. Respondents answered correctly in questions about staging of pressure ulcers (98.2%, 98.2%, 99.1%, 97.3%, 93.7%), the role of changing position in prevention of pressure ulcer (97.3%), the use of foam mattress (85.6%) and stretched sheets (92.8%), the use of antiseptic solution (95.5%, 85.6%), and interventions to reduce pressure on patients' heels (88.3%). A number of participants had adequate level of knowledge in the questions about the role of diet in healing of pressure ulcers (71.2%), products or devices for prevention or treatment of pressure ulcers (61.3%, 36.9%), healing of pressure ulcers (58.6%, 46.8%), prevention of bone pressure ulcers (31.5%), cleaning of a pressure ulcer (52.3%), and the role of low blood pressure as a risk factor for pressure ulcer (55.9%). However, the development of educational programs can help nurses to improve their knowledge about prevention and treatment of pressure ulcers.

Keywords

Pressure ulcers · Knowledge · Nurse · Prevention · Treatment

58.1 Introduction

Pressure ulcers are injuries in the skin due to prolonged pressure, shear, or friction, which lead to decreased circulation and necrosis of soft tissues [1]. The local damages of the skin are often serious and life-threatening for patients [2]. Causes of pressure ulcers are peripheral vascular disease, diabetes mellitus, smoking, protracted immobility, low nutritional situation, incontinency, poor sensation, use of steroids, increased age, pressure, shear, friction, and moisture [3].

Despite the progress in technology, pressure ulcers have high prevalence in patients, ranging from 8.8% to 53.2%, and increased mortality, which vary in different countries [2]. Additionally, pressure injuries affect more than 1.3 million people worldwide annually [4]. It has been found

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P. Eirinidou · G. Gerogianni (✉) · G. Vasilopoulos
I. Kalemikerakis · A. Kalogianni · E. Kaba · G. Fasoi
A. Zartaloudi · M. Kelesi
Department of Nursing, University of West Attica, Athens, Greece
e-mail: ggerogiani@uniwa.gr

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that hospital admissions due to pressure ulcers are 75% higher than admissions for other medical problems. Additionally, patients with pressure injuries have a long stay in hospitals, increased pain, low quality of life, and increased risk for death due to different complications [5, 6]. Thus, the management of pressure ulcers is a significant burden for patients, health professionals, and the health care system because of the high cost of treatment [7]. Pressure ulcers are regarded as indicators of quality of nursing care and patients' safety in the health care setting, and can be prevented with proper interventions [8]. Prevention is dependent on knowledge about the causes of pressure ulcers, caring for and cleaning the skin, management of incontinence, changes in patients' position, practices that relieve pressure, suitable wheelchair, and nutritional habits [9]. Thus, it is of great importance for health care providers, and especially for nurses, to have high levels of knowledge about effective management of pressure ulcers [10].

However, research studies worldwide have found that nurses have insufficient knowledge about risk factors of pressure ulcer development, assessment, and prevention of them [2, 6]. The aim of this study is to evaluate nurses' knowledge concerning prevention and treatment of pressure ulcers.

58.2 Materials and Methods

This study was conducted in pathology and surgery clinics of a General Hospital in Athens, Greece. The study was carried out from May 2018 to July 2018. The study sample included 111 nurses working in pathology and surgery clinics of a General Hospital in Athens, after receiving informed consent from each participant. Inclusion criteria required all nurses working in pathology and surgery clinics where patients with pressure ulcers were mostly treated. Exclusion criteria were nurses and other health professionals working in other departments.

A pre-structured questionnaire developed by Gouda et al. [11] was utilized to evaluate nurses' knowledge about prevention and treatment of pressure ulcers. Reliability of this scale was high in Greek population [12]. The first part included personal and occupational data of participants, such as age, gender, education, working experience, and working department. The second part included 27 questions about the care of pressure ulcers. Each correct answer received a score of 1. In this study, the scale had Cronbach's alpha $a = 0.75$.

Participants were approached during their morning or afternoon shifts, provided with a verbal description of the study purpose, while anonymity was assured. They were asked to complete the questionnaire and were given one day to complete it.

58.3 Statistical Analysis

Data were analyzed using the SPSS-25 (IBM, Chicago, IL). Qualitative variables were described as n (%) whereas continuous variables were presented as mean ± standard deviation (SD; normally distributed) or as median (interquartile range) for the non-normally distributed data. To assess the differences in the demographic characteristics across variables of interest, the t-test for independent samples was used (for quantitative variables) and the Pearson's chi-square test (for the qualitative variables). Correct answers of the questionnaire were scored as 1 whereas the non-correct as 0. Total score of the questionnaire was calculated by summing the scores of each item. Internal consistency of the tool was assessed via Cronbach's alpha. The normality of distribution was assessed via the Lilliefors (Kolmogorov-Smirnov) test whereas the homogeneity of variances was tested by using the Levene's test. For the variables that met the assumptions of the parametric tests, differences in the means were assessed using t-test for independent samples.

For the variables that did not meet the assumptions of the parametric tests, the non-parametric equivalent was used or Mann–Whitney U-test. The association between the demographic characteristics and answers on each item was assessed by calculating the Pearson's chi-square. The significance level was set to $p < 0.05$.

58.4 Results

A total of 111 nurses participated in the study. The mean age of the respondents was 39.17 years, while their mean working experience was 13.09 years. Also, 5.4% (n = 6) of them were male and 94.6% (n = were female). Most of the respondents had higher education (70.3%; n = 78). Additionally, 48.6% (n = 54) were working in pathology clinics while 51.4% (n = 57) were working in surgery clinics (Table 58.1).

58.5 Nurses' Knowledge About Prevention and Treatment of Pressure Ulcers

Respondents answered correctly in questions about staging of pressure ulcers (98.2%, 98.2%, 99.1%, 97.3%, 93.7%), the role of changing position in prevention of pressure ulcer (97.3%), the use of foam mattress (85.6%) and stretched sheets (92.8%), the use of antiseptic solution (95.5%, 85.6%), and interventions to reduce pressure on patients' heels (88.3%). A number of participants had a lower level of knowledge in the questions about the role of diet in healing pressure ulcers (71.2%), products or devices for prevention or treatment of pressure ulcers (61.3%, 36.9%), healing of pressure ulcers (58.6%, 46.8%), prevention of bone pressure ulcers (31.5%), cleaning of a pressure ulcer (52.3%), and the role of low blood pressure as a risk factor for pressure ulcer (55.9%).

Table 58.1 Nurses' characteristics (N = 111)

	N (%)		
Gender			
Male	6 (5.4)		
Female	105 (94.6)		
Education			
Secondary	33 (29.7)		
Higher	78 (70.3)		
MSc-PhD	3 (2.7)		
Department			
Pathology clinic	54 (48.6)		
Surgery clinic	57 (51.4)		
	Mean ± SD	Min	Max
Age	39.17 ± 8.07	25	57
Working experience	13.09 ± 9.21	1	32

58.6 Correlation of Correct Answers with Nurses' Academic Education

Significant correlations in correct answers were observed in five questions. The percentage of nurses with higher academic education who answered correctly the following five questions about treatment and prevention of pressure ulcers was statistically significantly higher than the percentage of nurses with secondary education (Table 58.2).

58.7 Correlation of Correct Answers with Nurses' Working Department

Significant correlations in correct answers were observed in six questions. The percentage of nurses working in surgery clinics who answered correctly the following question was statistically significantly higher than the percentage of nurses working in pathological clinics. The question is as follows: "For each pressure ulcer it is true that it is colonized with pathogenic microorganisms, regardless of any other factor" (p = 0.03).

However, the percentage of nurses working in pathological clinics who answered correctly the following five questions was statistically significantly higher than the percentage of nurses working in surgical clinics. The questions are presented in Table 58.3.

58.8 Discussion

The findings of this study showed that nurses had adequate knowledge about treatment and prevention of pressure ulcers. Similarly, Tesfa et al. [13]

Table 58.2 Correlation of correct answers with nurses' academic education

Question	Higher	Secondary	χ^2 (*df*), *p*
Redness on the surface of the skin that, when we press and then remove the pressure, does not turn white for a while is a first-degree pressure ulcer	75 (100%)	31 (93.9%)	χ^2 (1) = 4.63, $\boldsymbol{p = 0.03}$
Partly thick skin deficit, for example damage to the skin and part of the skin (bubble creation), is a second-degree pressure ulcer	75 (100%)	30 (90.9%)	χ^2 (1) = 7.01, $\boldsymbol{p = 0.01}$
The best position to prevent bone pressure ulcers is the lateral position at 30°	29 (38.7%)	5 (15.2%)	χ^2 (1) = 5.88, $\boldsymbol{p = 0.02}$
Any patient can potentially develop pressure ulcer if they have aggravating factors and therefore there is a need for assessment of each patient within the first 6 h of admission	70 (93.3%)	25 (75.8%)	χ^2 (1) = 6.69, $\boldsymbol{p = 0.01}$
Is it necessary to change patients' position every 2 h to prevent pressure ulcers? (Yes, if his condition allows it)	75 (100%)	31 (93.9%)	χ^2 (1) = 4.63, $\boldsymbol{p = 0.03}$

The observed level of significance was set to 5%

found that the overall level of positive attitude toward prevention of pressure injuries was high.

However, in a study conducted by Sari et al. [14] nurses had inadequate knowledge but a positive attitude toward prevention of pressure injuries. They also indicated the need for further education of nurses in order to improve their basic knowledge on pressure injuries prevention. Similarly, Dalvand et al. [15] found that nurses' total knowledge on pressure injuries prevention was 53.1%, while in the study of Galvão et al. [16] it was found that nurses had inadequate knowledge on pressure injuries prevention, implying the necessity for further training [4].

Nurses working in clinical settings have a vital role in identification of patients at a risk for pressure ulcers due to their direct contact with them [17]. Factors affecting prevention knowledge about pressure injuries among nurses are their professional qualifications, heavy workload, and inadequate staff [13], as well as lack of pressure-relieving devices and absence of guidelines for the evaluation of risk and preventive practices of pressure ulcers [17]. Nurses who have heavy workload have a two-fold reduction in pressure ulcer prevention practices than nurses who have no workload in the working environment [13]. Additionally, an inadequate level of knowledge about pressure injuries prevention can be related to an absence of in-service training programs [18].

In the present study, the percentage of nurses with higher academic education who answered correctly five questions was statistically significantly higher than the percentage of nurses with secondary education. Similarly, in the study of Grešš Halász [2], a statistically significant difference was found between the mean knowledge of nurses with secondary nursing education and first-level university degree about prevention of pressure ulcers. According to Tesfa et al. [13], nurses who have qualifications of master's and above are twice as likely to have more knowledge about pressure ulcer prevention than nurses with diploma education. Similarly, Awoke et al. [17] found that nurses who had higher educational level (degree and above) were twice as likely to have good practices of prevention of pressure ulcers than nurses who had diploma. Finally, in the study of Hu et al. [18], it was found that nurses with bachelor's degrees had higher knowledge than those with junior college certifications.

Pressure injuries prevention is one of the vital roles of nursing profession and is affected by nurses' knowledge [19]. Thus, the development of educational programs can help nurses to improve their knowledge about prevention and

Table 58.3 Correlation of correct answers with nurses' working department

Question	Pathology	Surgery	χ^2 (*df*), *p*
For each pressure ulcer it is true that it is colonized with pathogenic microorganisms, regardless of any other factor	15 (27.8%)	27 (47.4%)	χ^2 (1) = 4.53, ***p* = 0.03**
Pressure ulcer with compact black necrosis without secretions. For the cover you will use hydrogel and hydrocolloid patch	40 (74.1%)	30 (52.6%)	χ^2 (1) = 5.47, ***p* = 0.02**
The best position to prevent bone pressure ulcers is the lateral position at 30°	23 (42.6%)	12 (21.1%)	χ^2 (1) = 5.96, ***p* = 0.02**
Placing a patient at a risk for pressure ulcer on a suitable support surface does not imply the abolition of the plan for position changes. (True)	49 (90.7%)	41 (71.9%)	χ^2 (1) = 6.40, ***p* = 0.01**
For faster healing of a pressure ulcer, the ulcer should be left open. (False)	32 (59.3%)	20(35.1%)	χ^2 (1) = 6.51, ***p* = 0.01**
Use of antiseptic solution is indicated in any form of pressure ulcer. (False)	45 (83.3%)	50 (87.7%)	χ^2 (1) = 0.43, *p* = 0.51
The cleaning of a pressure ulcer is achieved with gentle manipulations and the use of saline, N/S 0.9%	39 (72.2%)	19 (33.3%)	χ^2 (1) = 6.81, ***p* = 0.00**

The observed level of significance was set to 5%

treatment of pressure ulcers [20]. Additionally, Tesfa et al. [13] found that the use of pressure ulcer prevention guidelines had a significant association with nurses' knowledge about pressure injuries prevention. Finally, attention should be given on nurses who have less experience or skills about pressure injuries prevention knowledge [21].

58.9 Conclusions

The findings of this study showed that nurses had adequate knowledge about treatment and prevention of pressure ulcers. However, the development of educational programs can help nurses to improve their knowledge about prevention and treatment of pressure ulcers. Finally, the use of pressure ulcer prevention guidelines can have a significant effect on nurses' knowledge.

Limitations of the Study The sample of this study is a convenience sample since it comes from one general hospital in Athens, the capital city of Greece. Thus, the findings cannot be generalized.

Conflict of Interest The authors declare no conflict of interest.

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European Projects for Patients with Dementia and Their Caregivers

M. Tsolaki, M. Makri, M. Tsatali, and B. Teichmann

Abstract

As we all know there is no treatment that can stop or delay the progression of dementia. The treatment we use is only symptomatic. EFNS (European Federation of Neurological Societies) recommendations for dementia prevention by Sorbi et al. (2012) concluded that there is no treatment, no lifestyle, which could have an effect on prevention or delay of onset of different forms of dementia until today. The future studies in prevention must recruit younger people, larger sample, and for longer period. The last 10 years we have run, in collaboration with organizations in different European countries, many projects in order to support patients with neurodegenerative diseases, mainly patients with dementia and their caregivers. The first project was a 2-year prospective cohort study of antidementia drug non-persistency in mild-to-moderate Alzheimer's disease (AD) in Europe: predictors of discontinuation and switch in the ICTUS (Impact of Cholinergic Treatment USe) study, an FP5 project with 1380 patients. Five studies were published. The second project was DESCRIPA study, an FP5 project to DEvelopment of Screening guidelines and clinical CRIteria for Predementia Alzheimer's disease, with 881 patients with mild cognitive impairment (MCI). LLM (Long Lasting Memories) and VRADA (A virtual reality application for the exercise of dementia and Alzheimer patients) are two projects that include body and cognitive exercise for health for the elderly and patients with mild cognitive impairment. The next is the RECAGE (REspectful Caring for the AGitated Elderly) project (Horizon 2020), a prospective cohort study for coping with behavioral and psychological symptoms of dementia. With six European universities we finished a very interesting FP6 project, the AddNeuroMed one, which gives even now information about the progression of normal elderly MCI and AD patients, in collaboration with other consortia. A very interesting Innovative Medicines Initiative (IMI) project about digital biomarkers was entitled Remote Assessment of Disease and Relapse—Alzheimer's Disease (RADAR project). The main goal of this project was the development

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M. Tsolaki (✉) · M. Makri · M. Tsatali
Alzheimer Hellas, Thessaloniki, Greece

Laboratory of Neurodegenerative diseases, Center for Interdisciplinary Research and Innovation (CIRI-AUTh), Balkan Center, Aristotle University of Thessaloniki, Thessaloniki, Greece

B. Teichmann
Alzheimer Hellas, Thessaloniki, Greece

Laboratory of Neurodegenerative diseases, Center for Interdisciplinary Research and Innovation (CIRI-AUTh), Balkan Center, Aristotle University of Thessaloniki, Thessaloniki, Greece

Network Aging Research, Heidelberg University, Heidelberg, Germany

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and validation of technology-enabled, quantitative and sensitive measures of functional decline in people with early-stage AD. A running project is an Erasmus+ one in the higher education field, “Genetic counseling in European universities: The case of neurodegenerative diseases” (GECONEU project). The target of this study is to develop an online course for university students focusing on genetic counseling, and support people and society to better understand the aims of genetic testing and the usefulness of genetic counseling by involving students in an innovative learning and teaching setting. AD-gaming, BRIDGE, iCONNECT (Intergenerational CONtact between studeNts and people with dEmentia through CreaTive education), E.L.So.M.C.I (English Lessons with the Use of Songs for People with Mild Cognitive Impairment), Games4CoSkills, and De-Sign are all Erasmus+ projects that aim to improve the quality of life of patients with MCI or dementia. Story2remember, Dementia right, ASPAD (Augmentation of the Support of Patients suffering from Alzheimer’s Disease and their caregivers), INFOCARE (Supporting Informal Caregivers of People with Dementia), S.IN.CA.L.A (Supporting Informal Carers: A Whole-Family and Life course Approach), and PIA (Peer support workers as an Innovative force in Advocacy in dementia care) are all Erasmus+ projects for training and supporting caregivers of patients with dementia.

Keywords

European projects · ICTUS · DESCRIPA · LLM · VRADA · RECAGE · AddNeuroMed · RADAR · GECONEU · AD-gaming · BRIDGE · iCONNECT · E.L.So.M.C.I · Games4CoSkills · De-Sign · Story2remember · Dementia right · ASPAD · INFOCARE · S.IN.CA.L.A · PIA

Alzheimer’s disease (AD) is highly prevalent, and a major cause of dementia (60–70% of all kinds of dementias) and death in elderly individuals (seventh cause of deaths) [1]. The global total of dementia patients is projected to reach 82 million by 2030 and 152 million by 2050. AD is one of the most common neurodegenerative disorders, with a prevalence rising from 0.2% in subjects aged between 55 and 65 years to 27% in subjects older than 85 years. Accumulation of amyloid in the brain is believed to be the first sign of the disease and can precede a clinical diagnosis of dementia by up to 20 years [2]. Based on the degree of cognitive impairment, AD is often divided into three stages—the preclinical stage, characterized by normal cognitive ability; the prodromal stage, characterized by mild cognitive impairment (MCI); and the dementia stage, with functional impairment [3]—but it is unclear how long individuals with amyloid pathology spend in each stage. A better understanding of the stage-specific duration of AD is needed to inform patients, caregivers, and clinicians. This information is also useful for the design of clinical studies, as well as to provide context for the interpretation of trial results, in particular the clinical trials that include individuals in predementia stages and aim to slow down progression to AD dementia. We needed to have all this information to help our patients and their caregivers in order to have better quality of life. So, the last two decades we tried to support our patients and the families with different programs that were funded by the European Commission.

ICTUS Project (Impact of Cholinergic Treatment USe [ICTUS] study). http://www.ictus.eu/

Briefly, the ICTUS study is a prospective, multicenter cohort study aimed at evaluating the natural history, treatment outcomes, and socioeconomic impact of AD in Europe. All the 29 participating centers from 12 European countries were members of the European Alzheimer Disease Consortium (EADC), a network of clinical and research institutions specialized in the diagnosis and treatment of AD. The participating centers were grouped into four clusters (Northern, Western, Eastern, and Southern Europe) according to the established UN classification of European countries. Clustering was used as a proxy for the healthcare and welfare systems reflecting the European North-to-South gradient. The following inclusion criteria were adopted in the ICTUS study: (1) diagnosis of probable AD made according to National Institute of Neurological and Communicative Disorders and Stroke-Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA) criteria; (2) Mini Mental State Examination (MMSE) score ranging from 10 to 26; (3) living in the community with the presence of a well-identified, informal caregiver; (4) absence of known conditions reducing to less than 2 years the patient's life expectancy; and (5) ability to sign an informed consent. After the baseline assessment (occurring between February 2003 and July 2005), participants received follow-up for 2 years with mid-term re-evaluations every 6 months. The study was approved by the Ethics Committee of the Toulouse University Hospital (coordinating center) and at individual centers by local or national ethical committees. All the study participants provided written informed consent. At the baseline assessment and at each follow-up visit, a comprehensive clinical and neuropsychological assessment was performed. In particular, the following scales and questionnaires were administered to evaluate the neurological, functional, and social factors of participants: Clinical Dementia Rating (CDR), MMSE, ADAS-Cog, Zarit Burden Interview (ZBI), Neuropsychiatric Inventory (NPI). Activities of Daily Living scale (ADL), and Instrumental Activities of Daily Living scale (IADL). Moreover, at every visit, concomitant pharmacological treatments were recorded [4].

DESCRIPA Study (Development of Screening Guidelines and Clinical Criteria for Predementia Alzheimer's Disease) http://www.descripa.eu/

According to the current diagnostic criteria for AD at the beginning of the twenty-first century, the diagnosis could only be made when a subject was demented. There was an urgent need to diagnose AD in the predementia phase. This would allow physicians to start interventions that may improve cognition or prevent the progression of the disease at an earlier stage than is currently possible. This was the first thought of DESCRIPA project. The objective of the clinical part of this study was to develop criteria for the diagnosis of predementia AD that can be used in clinical practice. The aim of the population-based part was to develop screening guidelines for predementia AD in the general population. Inclusion and exclusion criteria were chosen in order to select a population in which criteria for predementia AD would be most useful. Inclusion criteria were new referral to a memory clinic because of a cognitive complaint and an age of 55 years or over. Exclusion criteria were dementia according to Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria at baseline; referral because of a high family risk in otherwise normal subjects; history of schizophrenia, bipolar disorders, or recurrent psychotic disorders; and any somatic, psychiatric, or neurological disorder that may have caused the cognitive impairment. There was an urgent need to diagnose AD before subjects reach a diagnosis of dementia, and the DESCRIPA study has been designed to contribute to the development of evidence-based criteria for predementia AD [5]. The project started on January 1, 2003, and ended on July 1, 2007. It is planned to continue the prospective cohort study of non-demented subjects from the memory clinic until July 1, 2010. Participants were 23 centers from 11 countries—5th Framework Program Contract number: QLK-6-CT-2002-02455938.

LLM Project (Long Lasting Memories) (**www.longlastingmemories.eu/**)

A platform based on a web services approach integrates different components and systems promoting cognitive training (CT) or physical training (PT) thereby tackling the first challenge. User surveys are focused on measuring numerous elements that, besides usual approaches confined to usability and satisfaction, introduce ideas associated with the affective and social integration elements of elderly life and interaction with the CT and PT systems. Finally, a battery of neuropsychological assessments (like the California

Verbal Learning Test [CVLT], the Trail Making Test A and B [TMT-A, TMT-B], the Digit Span test, and others) is employed to measure the effectiveness of the combined CT and PT intervention. Analysis of results from a first iteration demonstrates that elderly maintain their mental capacity, and in most participants there seems to be an improvement between the pre- and post-neuropsychological assessments [6].

VRADA Project (A virtual reality application for the exercise of dementia and Alzheimer patients) (http://psych.pe.uth.gr/index.php/en/projects/vrada)

With an aging population across developed countries, ensuring an independent and healthy lifestyle for older people has become a key social issue and a global public health priority. In this regard, the World Health Organization (WHO) has called for more research to identify ways to prevent dementia and support the needs of people living with dementia. On the basis of earlier studies, we designed simultaneous dual task virtual reality (VR) system for physical and cognitive training to support people with MCI. Drawing on clinical findings regarding MCI rehabilitation and new VR technology, we adopted a person-centered approach to develop a user-friendly, immersive VR training system called VRADA. The first findings suggest that VRADA is an acceptable, usable, and tolerable system for physical and cognitive training of older people with MCI and university students. Randomized controlled trial studies are needed to assess the efficacy of VRADA as a tool to promote physical and cognitive health in patients with MCI [7].

RECAGE Project (REspectful Caring for the AGitated Elderly) http://www.recageproject.eu/

The RECAGE project will tackle one of the most challenging problems arising during the clinical course of dementia: the so-called Behavioral and Psychological Symptoms of Dementia (BPSD). The current state-of-the-art treatment of these symptoms is still unsatisfactory and there are many unmet needs in this area. The major objective of the project will be to assess the effectiveness of an intervention—*the special medical care unit for patients with BPSD* (SCU-B)—that, albeit already implemented in some European countries, is not widespread and has not been sufficiently studied so far, although it seems to be promising for its short-term efficacy (alleviating BPSD and improving quality of life of patients with dementia) and possibly for its long-term efficacy also. It is a prospective cohort study, comparing the activity among the centers endowed with SCU-B and those who lack this facility and testing the efficacy and the cost-effectiveness of the proposed intervention in seven European countries. Two cohorts of 250 patients each will be recruited by 6 clinical centers endowed with SCU-B (first cohort) and 6 centers lacking this structure (second cohort). The follow-up will last 3 years, during which patients will be visited every 6 months and submitted to a battery exploring the severity of the BPSD and the quality of life. All adverse events will be registered, as well as some anticipated occurrences (admissions to the general hospital for intercurrent diseases, admissions to SCU-B pertaining to the clinical participating center, and, if any, admissions to SCU-B not pertaining to the consortium member, nursing home placement). At the same time the quality of life of the primary caregivers will be measured, as well as their attitude toward dementia. A cost-effectiveness analysis will be performed comparing the cohorts. Finally, time to the nursing home placement will be recorded and compared between the two cohorts. This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 779237 [8].

AddNeuroMed, http://www.innomed-addneuromed.com/

As part of InnoMed, it was a precursor of the Innovative Medicines Initiative (IMI). AddNeuroMed was a cross-European study with participants from six countries (the United Kingdom, Italy, Finland, France, Greece, Poland) and funded by the European Union (EU) and members of the European Federation for Pharmaceutical Industries and Associations (EFPIA), and designed to find biomarkers, or tests, for Alzheimer's disease. It was launched in 2005. The AddNeuroMed objectives were to produce and improve experimental models of Alzheimer's disease for biomarker discovery and to identify a biomarker for Alzheimer's disease suitable for diagnosis, prediction, and monitoring disease progression for use in clinical trials and in clinical practice. AddNeuroMed was involved in multiple preclinical studies including mice models, rat models, drosophila models, bioinformatics driven, and imaging. FP6-2004-LIFESCIHEALTH-5, Life Sciences, Genomics and Biotechnology for Health, Health Research Council of Academy of Finland and strategic funding for UEFBRAIN, The Gamla Tjänarinnor Foundation, The Swedish Alzheimer's Association, and Swedish Brain Power.

RADAR (Remote Assessment of Disease And Relapse - Alzheimer's Disease) www.radar-ad.org

In this project, the aim is to investigate how mobile technologies can improve our understanding of Alzheimer's disease. For example, these techniques might help to detect AD earlier in people with cognitive decline. Mobile technology also allows for a more personalized approach to AD treatment and care, so that people with this disease can live independently for longer. In addition, another aim is to identify "digital biomarkers" (electronic signals that give information about a person's health status) for AD. This creates new perspectives for the development of treatments against this progressive and debilitating condition. We are only just starting to understand the possibilities of mobile technology in healthcare. In RADAR-AD, we work closely together with patients, caregivers, and regulators to ensure that adequate regulatory frameworks are developed, that technologies are safe, and that users are comfortable using these technologies. RADAR-AD will also draw on the wealth of lessons and expertise from the *RADAR-CNS* project. Together these projects form a concerted effort in developing innovative ways to use remote measuring technology for the benefit of patients. According the Work package 5, "Validation of the technology-enabled function assessment system in a real-world clinical setting," 220 participants from 13 clinical centers of Europe and 20 participants from each clinical center including Greece were assessed. In specific, five preclinical AD (MMSE > 26, CDR = 0, Positive amyloid load biomarkers of AD), five prodromal AD (MMSE > 23, CDR = 0.5, Positive amyloid load biomarkers of AD), five mild-to-moderate AD (MMSE > 17, CDR > 0.5, Positive AD biomarkers; in case Cerebrospinal Fluid (CSF) is not available, the Apolipoproteine E (APOE-ε4) genotype is eligible for inclusion), and five healthy controls (MMSE > 27, CDR = 0, Negative amyloid load biomarkers of AD) were assessed. The duration was from January 19 to June 30, 2022.

GECONEU (Genetic counseling in European universities: The case of neurodegenerative diseases) **www.genecounsel.eu**

The aim is to develop an online course for university students focusing on genetic counseling and to support people and society to better understand the aims of genetic testing and the usefulness of genetic counseling by involving students in an innovative learning and teaching setting. The participants are six universities or organizations from five countries and the duration is from February 2022 until July 2024. The results of this program will be: (1) The "Best Genetic Counseling Protocol" in Europe; (2) An innovative creative course that can be part of the curriculum of higher education institutions (HEIs) in Europe; (3) Service system for universities' e-learning platforms; and (4) A guideline handbook that helps HEIs across Europe to implement the training, the service system, and the teaching material.

AD-GAMING (Development of a training program for the improvement of quality of life of persons with Alzheimer through "Serious Games") http://adgaming.ibv.org/en/home/

The target of this program is to Increase technological and digital skills and Information and Compute Technology (ICT) literacy of people with Alzheimer, their families, and caregivers, allowing them to use Serious Games with the purpose of improving the quality of life. The duration of the program was between September 2016 and September 2018. The participants were six organizations from five countries. We prepared an *E-platform* including the 25 best Serious Games for training cognitive abilities (5 from each country) [9].

The "Bridge" Project: A European Innovative Intergenerational Approach Using Serious Games for People with Dementia https://projectbridge.eu/

The aim of this project was to develop and to test Serious Games (physical, digital, and phygital) acting positively on *dementia symptoms* and to develop games through *intergenerational* workshops involving elderly and young people, caregivers, and health professionals. The duration of the project was between September 2018 and August 2012. The participants were five organizations from three countries. The results of this program were: (1) A Methodological Guide on How to develop the "Bridge" Co-Creation Workshops; (2) 8 Final Games **https://projectbridge.eu/**; and (3) E-Learning Platform including Massive Open Online Courses (MOOCs) http://bridgecourses.uowm.gr/ [10].

iCONNECT: Intergenerational CONtact between studeNts and people with dEmentia through CreaTive education http://iconnectdementia.eu/

The aim of this project is to support the social engagement of students in higher education institutions (HEIs) in parallel to the social inclusion of older people with dementia by bringing them together in an intergenerational creative approach. By implementing the results from this project, HEIs all over Europe will be able to contribute to the goals of dementia-friendly environments. The duration of the program was from September 2017 to August 2020. The participants were six organizations from four countries (The Netherlands, Greece, Italy, and Finland). The results were: (1) An online module using a blended learning platform, combining online and classroom methods, to prepare students and learn about the different facets of dementia; and (2) The development of an innovative learning module for higher education based on principles of creative learning, with elements of arts, theatre, music, and poetry.

(**E.L.So.M.C.I**) (English Lessons with the Use of Songs for People with Mild Cognitive Impairment) **www.songsforcare.eu**

The aim of this study was to develop an educational program on teaching English to people with mild cognitive impairment (MCI) and using English songs as a main tool for the teaching process. The methodology of this program is based on innovative teaching approaches such as "Communicative Language Teaching" and "Natural Approach" and the method of "Neuro-Linguistic Programming (NLP)." These methods place great emphasis on verbal communication, creation of a positive environment in class, reduction of stress, and encouragement of learners to learn step by step in a natural and pleasant way. The duration of this project will be from September 2020 until February 2023. Participants are five organizations from five countries (Greece, Spain, Slovenia, Italy, and Croatia). The results will be: (1) Development of the methodology related to the workshops; and (2) Development of an open online education course for professionals.

Game4CoSkills (Mobile game for cognitive skills development and concept teaching for adults with intellectual disabilities) https://interactive4d.com/en

The aim of this project is to improve the cognitive skills of adults with intellectual disabilities and to create a mobile game, through which to promote the development of mental skills such as memory, calculation, perception, speech, dexterity, versatility, and attention to detail, but also appropriate learning strategies. The participants are six organizations from six countries (France, Austria, Italy, Greece, Cyprus, and Turkey). The duration of the project is from December 2021 until December 2023). The results of this program will be: (1) Cognitive skills development and concept teaching scenarios; (2) Mobile game for cognitive skills development and concept teaching; (3) Trainers' toolkit; and (4) Policy recommendation report.

Story2remember (Using Drama and Storytelling in Dementia Care) www.story2remember.eu

The aim of this study was to: (1) improve health and social care professionals' competences working in the care field through an educational program using creative drama and storytelling; (2) improve communication skills of family carers of persons with dementia through a toolkit based on role-play and storytelling; (3) improve quality of life of persons with dementia through these tools; and (4) raise social awareness on dementia issue through a policy recommendation regarding building up dementia-friendly communities/institutions. Participants are six organizations from five countries (Romania, Ireland, Greece, Bulgaria, and the United Kingdom). The duration of the project was from October 2018 until September 2020. The results were: (1) A Booklet, "Life in a story: Creative arts and storytelling use for Alzheimer Disease patients' and caregivers' support in UK, Greece, Romania, Bulgaria and Ireland"; (2) A training program using theatre and storytelling, targeting health and social care professionals for a better support for older people with Alzheimer's disease; (3) A toolkit for family caregivers, for improving communication between family carers and persons diagnosed with dementia through role-play and storytelling; and (4) Policy recommendation for creating dementia-friendly communities/institutions in terms of raising awareness and integrating tools as creative arts in the care of persons with AD.

Dementia Right (Developing a rights-based approach to dementia)

The main objectives of the project are: (1) Improving the quality of life, social inclusion, and dignity of people living with dementia, their caregivers, and family members; (2) Developing a new approach to dementia, human rights-based, with effective guidelines for implementing and supervising the care provided in health/care facilities to people with dementia (PwD) regarding their rights; (3) Improving the professional competencies of health and social care professionals, social educators, and other caregivers to revamp their care skills and their approach to dementia; and (4) Making care centers more inclusive and efficient to cope with the different needs of people living with dementia. The participants are seven organizations from five countries (Portugal, Spain, Greece, Ireland, and Turkey). The start date of the project was September 1, 2020, and the end date December 31, 2022. The results will be: (1) a Charter of Rights for people with dementia and their caregivers will be developed to promote a better understanding of dementia, fight stigma, and support the decision-making process of professionals, which includes why this Charter is needed, a specific approach of the rights of people with dementia based on first person testimonies; (2) an innovative rights-based approach to dementia will be established and a European professional guide on human rights-based approach to dementia will be developed, which includes a protocol with harmonized standards and guidelines to access and monitor the implementation; (3) an online open-access digital platform for health and social care professionals will be developed, which includes an ICT learning module based on the guide developed and a discussing forum for professionals, to promote experiential learning, supported by practice and social interaction, allowing the integration of the participants in an international community of practice; (4) innovative learning materials will be developed, which includes an informative video for digital media/platforms and social networks and specific rights booklets for strategic targets, such as political decision-makers, media, informal caregivers, or care organizations. Informative sessions will be promoted to the community based on these booklets, to a minimum of 100 participants.

ASPAD (Augmentation of the Support of Patients suffering from Alzheimer's Disease and their caregivers) http://aspad.csd.auth.gr

It is materialized by the Special Account of the Research Committee at Aristotle University of Thessaloniki. The project is funded by the European Union (European Social Fund) and the Ministry of Education, Lifelong Learning and Religious Affairs in the context of the National Strategic Reference Framework (NSRF, 2007–2013). The results of this program were: (1) many Internet-based exercises for patients with mild cognitive impairment and mild dementia who had memory or language problems [11]; (2) the first Internet platform for caregivers who had the ability to be connected and attend educational or support programs [12, 13]; and (3) different groups of patients had the opportunity to follow dancing programs in order to support both their body and cognition [14].

INFOCARE (Supporting Informal Caregivers of People with Dementia)

The aim of this project is to provide support to informal caregivers, families, legal guardians, and individuals who look after people with dementia (PwD) daily, by providing practical training material based on non-formal education (NFE). The project intends to: (1) improve the social interactions between informal caregivers and PwD; (2) enable better assistance to both families and PwD; (3) diminish the social, economic, and emotional burden of families; (4) improve the digital skills of project's target groups; and (5) enhance peer support among informal caregivers, families, and legal guardians. The participants are five organizations from five countries (Spain, Greece, Turkey, Denmark, and Austria). The results will be: (1) training on cognitive activities/Mind-stimulating activities for PwD—practical information, tools, and activities based on NFE to stimulate the cognitive abilities and help in the recognition of symptoms and prevention; (2) remote caring/mind-stimulating activities through new technologies—adaptation of activities so they can be performed remotely, providing a practical response to social distancing; and (3) support groups for relatives and legal guardians of PwD—training for caregivers to create support groups for sharing experiences and best practices, aimed at overcoming the stigma toward people with dementia. The duration of the program is from November 2021 to December 2023.

S.IN.CA.L.A (Supporting Informal Carers: A Whole-Family and Life course Approach) **www.sincala.eu**

The objectives of this study were: (1) to develop and test a pedagogical method based on narration, adapted to different EU country contexts, targeting households caring for older family members; (2) to provide informal carers with an opportunity to participate in an intervention designed particularly for them; and (3) to make available to educators and professionals working with family carers the S.IN.CA.L.A E-Learning course (MOOC). The participants were seven organizations from six countries. The duration of the project is 2 years, from November 2020 to April 2023. The target groups were: (1) informal caregivers; and (2) adult educators and professionals working with caregivers. The results will be: (1) "Tell Me About You" Report: Users experiences of families with caring role; (2) "Listen to my story": A program of narrative-based workshops for informal caregivers; (3) S.IN.CA.L.A E-Learning Course: Methodological guide and training for trainers via MOOC.

PIA (Peer support workers as an Innovative force in Advocacy in dementia care) **https://piaproject.eu/**

Peer support workers (PSW) have been employed as a resource to promote the people who were previously caregivers of people living with dementia, use their significant experience in dementia services, and, therefore, strengthen dementia care. The aim of the project is to create sustainable and competency-enhancing services for people with dementia by finding new ways to involve ex-caregivers, as PSW, in dementia services as well as home care. The participants of this program are five organizations from four countries (Norway, Greece, Romania, and Italy). The duration of the program is 2 years, from February 2022 to January 2024. The results of this program will be: (1) training materials and methodology—development of dedicated training resources for peer support workers in dementia care; (2) guidelines for involving and empowering peer support workers—development of digital platform for communication and collaboration by creating a network for sharing of experience and knowledge specific for community-based dementia care; (3) strategies for increased involvement of informal caregivers in delivery and designing of home-based dementia care—advocacy.

De-Sign (Raising Awareness for Dementia in Deaf Older Adults in Europe)

The objectives focus on promoting full participation and social inclusion of the Deaf people, by creating opportunities of equal access to information, education, and healthcare services with the assistance of a digital platform. Details are as follows.

Priority 1: Common values, civic engagement, and participation. One of the main aims of the project is to promote and highlight dementia awareness in the Deaf in Austria, Germany, Greece, and Italy through informing different groups of people, which involve Deaf individuals, friends and relatives of Deaf, healthcare professionals, and the public. Full participation of Deaf will be supported by dementia training delivered directly in their mother language, providing the opportunity to raise questions and interact with the trainers, who in some cases will be Deaf, and by conducting the training in a space they are familiar with (i.e., local Deaf clubs). Local communities will have the opportunity to visit the Deaf clubs during the open dementia awareness trainings and events and get acquainted with local Deaf community. Representatives of the Deaf will be actively involved throughout the whole project, not only as participants, i.e., attending training courses, but also they will be actively involved in planning the project and collaborating with hearing partners, in order to implement high-quality activities that match the needs of the Deaf.

Priority 2: Inclusion and diversity in all fields of education and training. Creating opportunities for Deaf to participate in the project's training courses by diminishing the linguistic and cultural barriers that are hindering them to participate in such activities otherwise, plays a central role in the project's design. Therefore, interpreters and fluent sign language users will be engaged during the whole project to support equal access. Taking into consideration that many Deaf are low-skilled because they struggle to excel in education and training due to barriers in communication, the project will create upskilling pathways for them by organizing and implementing in Germany and Greece non-formal high-quality training courses for Deaf on the use of the digital platform, test administration, transcription of the answers, and scoring instructions. In terms of diversity, four different spoken and four different European sign languages will be used during the project, along with English and international signs.

Priority 3: Addressing digital transformation through development of digital readiness, resilience, and capacity. One of the aims of the project is the development of a new, comprehensive, technologically enhanced method for dementia screening in older Deaf adults in two sign languages. A web-based platform for dementia screening test administration will be created and experts and non-experts will be trained to use it through non-formal hands-on training. A flexible method of development and management (agile methodology) will be implemented, as there is a need for rapid design. The duration will be from October 2022 to May 2025.

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Repetitive Transcranial Magnetic Stimulation in Post-stroke Aphasia: Comparative Evaluation of Inhibitory and Excitatory Therapeutic Protocols: Narrative Review

Chrysanthi Ntasiopoulou, Grigorios Nasios,
Lambros Messinis, Anastasia Nousia,
Vasileios Siokas, and Efthimios Dardiotis

Abstract

Objective: Aphasia is a serious consequence of stroke resulting in difficulties in using language for communication with negative effects on patients' quality of life. The use of non-invasive repetitive transcranial magnetic stimulation (rTMS) is a novel approach in aphasia therapy, based on the knowledge gained by functional imaging technics of the brain. **Aim:** This review evaluates the effectiveness of rTMS on aphasia therapy according to the results of English language studies that have been published in the databases PubMed/Medline, Scopus, and Web of Science from 2011 to 2021. **Results**: Twenty-seven studies were included in the review with 672 participants. The studies mainly concern the application of inhibitory rTMS on the right inferior frontal gyrus (rIFG) in the subacute and chronic phase, as well as excitatory rTMS of the unaffected language areas of the left cerebral hemisphere in the chronic phase after stroke. Most of the studies concluded that there was statistically significant improvement in various parameters of language including confrontation naming, repetition, and aphasia quotient. Three studies published results that doubt the effectiveness of rTMS. **Conclusion:** rTMS is a safe therapeutic method for aphasia treatment in the subacute and chronic phases after stroke. Its effectiveness is immediate as well as distant with a gradually decreasing therapeutic effect. Moreover, rTMS may supplement speech and language therapy as a priming factor. The most recognized method at this point in time is the application of suppressive rTMS on the right inferior frontal gyrus in combination with speech and language therapy.

C. Ntasiopoulou
Anagennisi Rehabilitation Center,
Thessaloniki, Greece

G. Nasios · A. Nousia (✉)
Department of Speech and Language Therapy, School of Health Sciences, University of Ioannina,
Ioannina, Greece

L. Messinis
Lab of Cognitive Neuroscience, School of Psychology, Aristotle University of Thessaloniki,
Thessaloniki, Greece
e-mail: lmessinis@psy.auth.gr

V. Siokas · E. Dardiotis
Department of Neurology, Laboratory of Neurogenetics, University of Thessaly,
Larissa, Greece

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Keywords

Aphasia · Stroke · rTMS · Cerebrovascular accident

60.1 Introduction

The recovery from aphasia after stroke is based on the neuroplasticity functions of the brain and the reorganization of the neural networks. The language networks are wildly streamed throughout the brain and the interconnections are many involving various areas [24]. During recovery the activation of the non-dominant right hemisphere takes place in the first weeks after stroke, possibly due to decrease in intrahemispheric inhibition, and is followed by the perilesional activation of the functionally intact areas of the left hemisphere [8]. The reorganization of the balance between the perilesional, ipsilateral, and contralateral hemispheric activation via the reduction of intrahemispheric inhibition is associated with the improvement of aphasia [1]. The mechanisms of brain functional recovery and the importance of the role of each hemisphere in the improvement of aphasia are not entirely understood. According to the study of Wilson and Schneck [36] the evidence for the recruitment of right hemisphere homotopic regions is modest as well as that left hemisphere language regions return to function over time. Also, the longitudinal evidence for the language network dynamic reorganization is not compelling.

The use of non-invasive repetitive transcranial magnetic stimulation (rTMS) is a novel approach in aphasia therapy that tries to utilize the above knowledge and promote recovery. The method applied originally inhibitory rTMS 1 Hz in the right pars Triangularis in order to decrease the right hemisphere activation and increase the activation of the perilesional areas [19]. Specifically, the target is to suppress the high activation (overactivation) that has been observed during language tasks in parts of right Broca's area and right perisylvian areas, which is possibly maladaptive [22].

In an area of interest that keeps evolving, like the study of the language network recovery, the rTMS has a vast space to explore the effect of its application on various target points and stimulation protocols. In view of the rapid accumulation of new evidence, we endeavored to examine the effectiveness of rTMS in aphasic patients in subacute and chronic phases after stroke. The present narrative review aims to evaluate: (a) the effectiveness of rTMS in subacute and chronic phases after stroke, (b) the effectiveness of inhibitory and excitatory rTMS therapeutic protocols, which is the most recognized method at this point in time, and (c) if the data that have been selected from the functional imaging techniques in the review support the effect of rTMS in the functional connectivity and reorganization of language networks.

60.2 Method

60.2.1 Literature Search and Eligibility Criteria

We searched PubMed/Medline, Scopus, and Web of Science for English articles published from January 31, 2011, to October 31, 2021, using the key words aphasia, stroke, and rTMS. There were no restrictions concerning the type of stroke, the aphasia type, and the recovery phase after stroke (acute, subacute, and chronic) or the location of the lesion. There were also no restrictions concerning the target points, the type of stimulation (inhibitory or excitatory), and the combination with speech therapy. Studies that involved post-stroke aphasia rehabilitation with rTMS in adults and used standardized tools for aphasia evaluation such as the Boston Naming Test, Aachen Aphasia Test, Snodgrass Naming Test, etc. were considered eligible. There were exclusion criteria applied during the patient selection in the studies concerning safety such as the exclusion of patients with history of epileptic seizures, pacemakers, implanted electrodes, etc. Meta-analysis, systematic reviews, and case studies were excluded. Retrieved abstracts were initially assessed for inclusion. In case of inability to establish if a study met the inclusion criteria, we reviewed the full text.

60.3 Results

A total of 46 studies were derived from the PubMed database, 125 from Scopus, and 147 from Web of Science. The application of the aforementioned eligibility criteria resulted in a total of 27 studies (672 patients). No safety issues were reported from the studies. Most of the patients were suffering from mild to severe post-stroke aphasia without history of any previous neurological diseases. Dropouts were reported due to the reduced tolerance to magnetic resonance imaging (MRI) or positron emission tomography (PET) [15, 31] as well as due to stroke complications. Twenty studies were randomized and used different types of sham stimulation and seven studies did not use any sham stimulation.

Eight studies used placebo coil for the sham stimulation and 12 studies used modifications of the orientation and placement of the coil (vertical orientation and placement of the coil distant to the area of interest usually close to the sensory cortex) causing similar sensory and auditory sensations as the real stimulation. Eleven studies included patients with non-fluent aphasia, 13 studies included patients with various types of aphasia (non-fluent, anomic, fluent, subcortical, etc.), 2 studies did not report the type of patients' aphasia that was treated with rTMS, and 1 study included global aphasic patients. Eighteen studies combined the use of rTMS with speech and language therapy (SLT) sessions right after or shortly after the stimulation. The duration of the speech and language therapy (SLT) usually was 45 min, ranging from 20 to 60 min. The exception was the study of Heikkinen et al. [14] that applied three hours of SLT. Eleven studies were evaluating the effectiveness of rTMS during the subacute phase of stroke, 13 during the chronic phase of stroke, and 3 studies included patients in subacute and chronic phases. The duration of the stimulation therapy program was 2 weeks/10 sessions/1 session per week day for 17 studies, 3 weeks/15 sessions/1 session per week day for four studies, 4 weeks/20 sessions/1 session per week day for 3 studies, and 3 studies used single stimulations. The target points were different and most of the studies (19) applied inhibitory rTMS in the right Broca area and particularly pars Triangularis, five studies used excitatory rTMS in the perilesional areas of left hemisphere, and three studies applied combined inhibitory and excitatory rTMS in both hemispheres. Stimulation, type of aphasia, duration of speech language therapy, and stimulation therapy program are available in Table 60.1.

60.3.1 Inhibitory rTMS of the Right Pars Triangularis During the Subacute Phase After the Stroke

Ten studies applied inhibitory rTMS exclusively during the subacute phase after the stroke in aphasic patients combined with speech and language therapy. The inhibitory protocols were similar using frequency of 1 Hz, intensity 90% of resting motor threshold (RMT ranging 80–100%), duration 15–30 min, 5 sessions per week, 2–3 weeks in total. The target points were right pars Triangularis for all studies plus pars Opercularis (one study) and posterior superior temporal gyrus (one study-pSTG). Eight studies [4, 11, 15, 25, 26, 31, 35, 39] found statistically significant improvement of the aphasia symptoms in the stimulation groups using the rating scales: Western Aphasia Battery, Aachen Aphasia Test, and Boston Naming Test. In Bai et al.'s [4] study there was also a detection of brain-derived neurotrophic factor (BDNF) in the peripheral blood before and two weeks after treatment. The levels of BDNF were significantly higher in the stimulation groups compared to the levels in the control group. This increase in BDNF may promote nerve repair and brain tissue protection that are involved in neuroplasticity. The studies of Waldowski et al. [33] and Seniow et al. [27] were

Table 60.1 Randomized control studies with and no sham stimulation

Studies	Number of patients	Sham stimulation	Type of aphasia	Sessions; frequency; target point	Speech language therapy
Barwood et al. [5]	12	Yes	Non-fluent	10; 1 Hz; rPTr	Yes/45 min
Weiduschat et al. [35]	10	Yes	Various	10; 1 Hz; rPTr	Yes/45 min
Szaflarski et al. [29]	27	No	Various	10; 50 Hz; left Broca’s	No
Naeser et al. [23]	8	No	Non-fluent	1; 1 Hz; rPTr, rPOp, M1, rSTG	No
Waldowski et al. [33]	26	Yes	Various	15; 1 Hz; rPTr, rPOp	Yes/45 min
Medina et al. [21]	10	Yes	Non-fluent	10; 1 Hz; rIFG	No
Kindler et al. [18]	18	Yes	Various	2; 30 Hz; right Broca’s	No
Thiel et al. [31]	24	Yes	Various	10; 1 Hz; rPTr	Yes/45 min
Seniow et al. [27]	40	Yes	Various	15; 1 Hz; rIFG	Yes/45 min
Heiss et al. [15]	29	Yes	Various	10; 1 Hz; rIFG, lIFG (left-handed)	Yes/45 min
Wang et al. [34]	45	Yes	Non-fluent	10 1 Hz; rPTr	Yes/60 min
Khedr et al. [17]	30	Yes	Non-fluent	10; 1 or 20 Hz; rPTr, rPOp, lPTr, lPOp (1, left)	Yes/30 min
Tsai et al. [32]	56	Yes	Non-fluent	10; 1 Hz; rPTr	Yes/60 min
Chieffo et al. [7]	5	Yes	Various	3; 1/10 Hz; rIFG	No
Rubi-Fessen et al. [26]	30	Yes	Various	10; 1 Hz; rIFG	Yes/45 min
Yoon et al. [37]	20	No	Non-fluent	20; 1 Hz; rIFG	Yes/60 min
Griffis et al. [10]	8	No	Various	10; 50 Hz; left residual cortex	No
Haghighi et al. [11]	12	Yes	Non-fluent	10; 1 Hz; right Broca’s	Yes/45 min
Harvey et al. [13]	9	No	Various	10; 1 Hz; rPTr, rPOp, rPOr, M1	No
Hu et al. [16]	40	Yes	Non-fluent	10; 1 or 10 Hz; rIFG	Yes/30 min
Ren et al. [25]	54	Yes	Global	15; 1 Hz; rPTr, rSTG	Yes/30 min
Heikkinen et al. [14]	17	Yes	Various	20; 1 Hz; rPTr	Yes/3 h
Zumbansen et al. [39]	63	Yes	No report	10; 1 Hz; rPTr	Yes/45 min
Bai et al. [4]	30	Yes	Non-fluent	20; 1 Hz; right Broca’s	Yes/20 min
Fahmy and Eishebawy [9]	20	No	Non-fluent	10; 10 Hz; left Broca’s	No
Szaflarski et al. [30]	27	Yes	No report	5–15; 50 Hz; left residual cortex	No
Allendorfer et al. [2]	13	No	Various	10; –; left residual cortex	Yes/45–60 min

M1 motor area, *rIFG* right inferior frontal gyrus, *rPOp* right pars Opercularis, *rPOr* right pars Orbitalis, *rPTr* right pars Triangularis, *rSTG* right superior temporal gyrus

randomized control studies of inhibitory rTMS followed by SLT that did not find any statistically important effect of rTMS right after the stimulation. Seniow et al. [27] revealed a significant improvement in repetition in severely aphasic patients detected in the follow-up as well as Waldowski et al. [33] detected a delayed beneficial effect for patients with frontal damage.

60.3.2 Inhibitory rTMS of the Right Pars Triangularis During the Chronic Phase After the Stroke

Seven studies [5, 13, 14, 21, 23, 32, 34] applied inhibitory rTMS during the chronic phase after stroke in aphasic patients. Three studies (50%) combined rTMS with speech and language therapy. The inhibitory protocols were similar using frequency of 1 Hz, intensity 90% of resting motor threshold (RMT), duration 10–20 min, 5 sessions per week, 2–3 weeks in total. The target points were right pars Triangularis for all studies plus pars Opercularis (two studies), pars Orbitalis (one study), motor cortex of the mouth (two studies) and posterior superior temporal gyrus (pSTG-1 study). Six studies [5, 13, 21, 23, 32, 34] found statistically significant improvement of the aphasia symptoms after the stimulation of the right pars Triangularis in naming using the rating scales: Western Aphasia Battery, Boston Naming Test, Snodgrass and Vanderwart Test, and Boston Diagnostic Aphasia Examination. The improvement was detected right after stimulation as well as in the follow-up. The randomized double-blind study of Heikkinen et al. [14] explored the application of intensive action language therapy (ILAT) with or without the combination of rTMS. The study concluded that the ILAT method is effective with no documentation of an additional statistically significant effect of rTMS.

60.3.3 Inhibitory rTMS of the Right Pars Triangularis After Stroke (Subacute and Chronic Phases)

The study of Kindler et al. [18] applied inhibitory c-theta burst stimulation (c-TBS) on the right pars Triangularis in aphasic patients in the subacute and chronic phases after stroke. The 18 patients of the study were assigned into two groups: group 1 of c-TBS and group 2 of sham intervention. The patients were trained/evaluated in naming using the Snodgrass and Vanderwart line drawings and evaluated for the reaction time before and after stimulation using the Test of Attentional Performance. The study found significant improvement of aphasia symptoms like aphasia performance and naming latency in the stimulation group compared to the sham intervention group and the patients who were in the subacute phase after stroke responded best in the c-TBS therapy. Moreover, the study of Yoon et al. [37] applied inhibitory rTMS {1 Hz, 90% Motor Evoked Potential (MEP), 20 min, 4 weeks} in combination with SLT in the case group and sham stimulation plus SLT in the control group. The study concluded that there are statistically significant improvements in repetition and naming only in the case group in Korean version of Western Aphasia Battery.

60.3.4 Studies That Combined Inhibitory and Excitatory rTMS in Aphasic Stroke Patients

Three studies attempt investigating different ways of combination of inhibitory and excitatory rTMS [7, 16, 17]. The study of Khedr et al. [17] applied in 20 patients, with non-fluent aphasia in the subacute phase after stroke, inhibitory rTMS in the right pars Triangularis and pars Opercularis combined with excitatory rTMS 20 Hz in the left pars Triangularis and pars Opercularis. The patients followed speech and language therapy after the stimulation session. The study found that there was statistically important improvement in Aphasia Severity Rating Scale and National Institutes of Health Stroke Scale in rTMS group compared to sham group. In the same year, Chieffo et al. [7] compared the performance of five chronic aphasic patients in naming tests before and after the application of: (1) excitatory rTMS 10 Hz, (2) inhibitory rTMS 1 Hz, and (3) sham stimulation of the right inferior frontal gyrus using an H coil. Statistically significant improvement was established in Snodgrass Naming Test in the excitatory stimulation group compared to inhibitory stimulation group and sham group. Finally, the study of Hu et al. [16] studied the effect of the inhibitory stimulation of

1 Hz and excitatory stimulation of 10 Hz in 40 patients with post-stroke non-fluent aphasia (in subacute and chronic phases) combined with speech and language therapy. The target point was the right Broca area. The patients were separated into four groups of ten patients each: group 1 of inhibitory stimulation 1 Hz, group 2 of excitatory stimulation 10 Hz, group 3 of sham stimulation, and group 4 of control. Statistically significant improvement in the performance in Western Aphasia Battery directly as well as at two-month follow-up was found in the group of inhibitory rTMS compared to the other three groups.

60.3.5 Excitatory rTMS of the Unaffected Areas of the Left Hemisphere During the Chronic Phase After the Stroke

Four studies [2, 10, 29, 30] used functional MRI (fMRI) to localize the target points and applied excitatory rTMS on the perilesional areas of the left hemisphere in chronic aphasic patients after stroke. The excitatory protocol was 600 intermittent theta burst stimulation (iTBS), 50 Hz, and 80% active Motor Threshold (aMT). One study [9] used Gouth et al. coordination method for the anatomical localization of the left inferior frontal gyrus and applied excitatory rTMS (trains 10 Hz, 80% RMT). The studies did not use speech and language therapy in combination with the stimulation. The aphasia was evaluated using the clinical tests: Aphasia Severity Rating Scale, Western Aphasia Battery, Aphasia Quotient, Boston Naming Test, Semantic Fluency Test, Controlled Oral Word Association Test, and Kars El-Eiri Arabic Aphasia Test. All studies found statistically significant improvement of the aphasia symptoms in the stimulation of the perilesional areas of left hemisphere group. The study of Szaflarski et al. [30] is a randomized double-blind study of the application of 600 iTBS pulses on the unaffected areas of the left hemisphere in 28 patients localized by fMRI. The patients were separated into four groups with different combination of active or sham rTMS and therapy duration of three weeks. Patients of real stimulation groups gained moderate, large, or significant effect on the Boston Naming Test, Semantic Fluency Test, and Aphasia Quotient of the Western Aphasia Battery-Revised.

Information about inhibitory rTMS in the right Broca area, excitatory rTMS of the left hemisphere, and combination of inhibitory and excitatory rTMS is available in Table 60.2.

60.3.6 Effect of rTMS in Connectivity and Activation of Language Networks

Furthermore, it was observed that there is a positive effect of rTMS on the neuroplasticity function and the reorganization of the brain after stroke and was confirmed via the findings of the functional imaging technics of fMRI [2, 10, 29, 30] and PET scan [15, 35] that have been used in six studies. The neuroplasticity function is active during the subacute phase post-stroke in its maximum. In the studies of Heiss et al. [15] and Weiduschat et al. [35], the patients were treated with inhibitory rTMS of the right inferior frontal gyrus (rIFG) in the subacute phase and were evaluated in addition with PET scan. The rTMS groups improved significantly in Aachen Aphasia Test compared to the sham groups in both studies. The PET scans revealed no activation shift toward the right hemisphere in the intervention rTMS group but an activation to the ipsilesional left hemisphere. In the chronic phase the new functional connectivity and novel language neural networks have been established. The application of rTMS reactivates the neuroplasticity function giving possibly the opportunity to change the established maladaptation models and improve the aphasia symptoms. According to the studies, the effect of rTMS concerns the increase in lateralization and activation of the perilesional areas of the left hemisphere and decreases the activation of the right hemisphere during speech [29]. The improvement in fluency [10] and naming [2] had a negative correlation to right IFG activation. The study of Szaflarski et al. [30] showed increased lateralization to the left hemisphere (non-significant) and greater activation in

Table 60.2 The rTMS stimulation, phase after stroke, and target point of the studies

Studies	Inhibitory/ excitatory/ combination rTMS	Clinical evaluation	Phase after stroke
Barwood et al. [5]	Inhibitory	Pre and 2-month follow-up	Chronic (2–6 years)
Weiduschat et al. [35]	Inhibitory	Pre and post rTMS	Subacute (18–97 days)
Szaflarski et al. [29]	Excitatory	1 week pre and post rTMS	Chronic (5.3 ± 3.6 years)
Naeser et al. [23]	Inhibitory	Pre and 10 min post rTMS	Chronic (1.5–30 years)
Waldowski et al. [33]	Inhibitory	Pre, post, and 15-week follow-up	Acute/subacute (<12 weeks)
Medina et al. [21]	Inhibitory	Pre and 2-month follow-up	Chronic (6–102 months)
Kindler et al. [18]	Inhibitory	Pre and post rTMS	Subacute/chronic (0.5–57.2 months)
Thiel et al. [31]	Inhibitory	Pre and post rTMS	Subacute (MD: 5.4 rTMS, 7.2 sham weeks)
Seniow et al. [27]	Inhibitory	Pre, post, and 15-week follow-up	Subacute (11–106 days)
Heiss et al. [15]	Inhibitory	Pre and post rTMS	Subacute (39.7 ± 18.43 rTMS, 50.1 ± 23.96 sham days)
Wang et al. [34]	Inhibitory	Pre, post, and 3-month follow-up	Chronic (>6 months)
Khedr et al. [17]	Combination	Pre, post, and 1- and 2-month follow-up	Subacute (5 ± 3.2 weeks)
Tsai et al. [32]	Inhibitory	Pre, post rTMS, and 3-month follow-up	Chronic (17.8 ± 7.2 rTMS, 18.3 ± 8.2 sham months)
Chieffo et al. [7]	Combination	Pre and post rTMS	Chronic (1.6–5.0 years)
Rubi-Fessen et al. [26]	Inhibitory	Pre and post rTMS	Subacute (17–94 days)
Yoon et al. [37]	Inhibitory	Pre and post rTMS	Subacute/chronic (6.8 ± 2.39 6 rTMS, 5.2 ± 2.67 control months)
Griffis et al. [10]	Excitatory	1 week pre and post rTMS	Chronic (5.25 ± 3.62 years)
Haghighi et al. [11]	Inhibitory	Pre and post rTMS	Subacute (4–8 weeks)
Harvey et al. [13]	Inhibitory	Pre, post, 2- and 6-month follow-up	Chronic (6–102 months)
Hu et al. [16]	Combination	Pre, post, and 2-month follow-up	Subacute/chronic (>1 month)
Ren et al. [25]	Inhibitory	Post and 3-week follow-up	Subacute (4–12 weeks)
Heikkinen et al. [14]	Inhibitory	Pre, 4- and 7-week, and 3-month follow-up	Chronic (1–8.2 years)
Zumbansen et al. [39]	Inhibitory	1st and 30th day post rTMS	Subacute (5–45 days)
Bai et al. [4]	Inhibitory	Pre and post rTMS	Subacute (3 ± 1.5 months)
Fahmy and Eishebawy [9]	Excitatory	Pre and post rTMS and 1-month follow-up	Chronic (7.5 ± 2.8 months)
Szaflarski et al. [30]	Excitatory	Pre, post, and 3-month follow-up	Chronic (>1 year)
Allendorfer et al. [2]	Excitatory	Pre, post, and 12-week follow-up	Chronic (3.31 ± 2.88 years)

both hemispheres as well as changes in the connectivity of inferior frontal gyrus in the real stimulation groups that were, some of them, correlated to behavioral measure. The above reorganization model promoted by rTMS seems to occur in the majority of medium to severe damages of the left hemisphere.

60.4 Discussion

The present narrative review investigates the effectiveness of rTMS in post-stroke aphasia. The examination of the retrieved studies found that the application of rTMS is a safe and effective method in subacute and chronic phases after stroke. The review did not include any comparison studies concerning the effectiveness of rTMS in subacute phase compared to chronic phase. rTMS was found clinically effective in both patient populations in a meta-analysis that did distinguish between chronic and subacute patients [28]. The study of Zumbansen et al. [40] disagreed and concluded that naming recovery is larger in aphasic patients treated with inhibitory rTMS in subacute phase compared to patients in chronic phase and supported that the addition of rTMS to SLT supplements the recovery only in subacute phase. The comparative evaluation of inhibitory rTMS in subacute versus chronic phase and the combination of inhibitory rTMS in the subacute phase with excitatory rTMS in the chronic phase are possible future study subjects. Moreover, the result of our study provide evidence that the aphasia symptoms improved soon after the completion of the rTMS therapy protocol and the improvement is maintained gradually reduced for several weeks. In the majority of the studies in our review, the rTMS proved effective as an only therapy as well as a priming factor to speech and language therapy. In the review of Biou et al. [6] rTMS was effective even in the absence of SLT, suggesting the possibly direct effect of magnetic fields on language reorganization. The study of Heikkinen et al. [14] doubt the effectiveness of rTMS as a priming factor concluding that there was no significant additional effect on patients with aphasia when rTMS was combined with three-hour sessions of SLT. The study of Hu et al. [16] included a control group with SLT compared to low-frequency (LF)-rTMS + SLT, high-frequency (HF)-rTMS + SLT, and sham stimulation + SLT and concluded that rTMS + SLT are more beneficial than sham stimulation or SLT alone. Moreover, the benefit of adding rTMS to SLT has to be explored with designed studies including SLT + rTMS versus rTMS alone. Most of the studies in our review applied inhibitory stimulations on the right inferior frontal gyrus, particularly on the area of pars Triangularis, a target point that has been found effective in naming performance, which is consistent with other studies [3, 12, 38].

Excitatory rTMS is applied in aphasic patients in the chronic phase after stroke as an only therapy and usually with the localization of the target points at the unaffected areas of the left hemisphere with fMRI. The application of excitatory rTMS was found effective in our study as well as in the meta-analysis of Li et al. [20] where the subgroup analysis concluded that high-frequency rTMS might be effective. In our review there are no studies that compared excitatory and inhibitory rTMS. Only Chieffo et al. [7] established statistically significant improvement in Snodgrass Naming Test in the excitatory stimulation compared to inhibitory stimulation and sham stimulation but the importance is weak due to small number of patients (five patients). The results of Zhang et al. [38] meta-analysis were inconsistent to ours and showed no significant differences in language recovery when high-frequency rTMS was compared with sham rTMS and conventional rehabilitation. The application of excitatory rTMS needs further investigation.

The findings of the functional imaging technics confirmed a positive effect of rTMS in the neuroplasticity function and the reorganization of the brain after stroke in the subacute (PET scan: [15, 35]) as well as the chronic phases (fMRI: [2, 10, 29, 30]).

A more individualized treatment program is possible with modifications of the stimulation protocol according to severity and type of aphasia as well as intrinsic and extrinsic factors determining the best treatment for each patient at each particular time [3]. The data concerning the previous factors are very limited. In addition, the need of stimulation repetitions periodically reinforcing the therapeutic effect and enhancing the duration of the effects is apparent; therefore the study of repeated therapeutic stimulations protocols is needed. For a more detailed and pro fundus understanding and application of rTMS, the determination of comorbidities like diabetes [32] and other parameters that have negative impact on the effectiveness of the treatment is also very important.

60.5 Conclusions

In conclusion, the present narrative review retrieves from the majority studies that rTMS could exert a beneficial effect on patients after stroke with subacute and chronic aphasia. Moreover, it is observed that rTMS effectiveness is immediate as well as distant with a gradually decreasing therapeutic effect. It is worth mentioning that rTMS may supplement speech and language therapy acting as a priming factor. The most recognized method at this point in time is the application of suppressive rTMS on the right inferior frontal gyrus in combination with speech and language therapy.

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On Net Water Uptake in Posttraumatic Ischemia Foci

A. Trofimov, D. Agarkova, K. Trofimova,
C. Lidji-Goryaev, D. Atochin, and D. Bragin

Abstract

Background: The influence of cerebral edema and resultant secondary complications on the clinical outcome of traumatic brain injury (TBI) is well known. Clinical studies of brain water homeostasis dynamics in TBI are limited, which determines the relevance of our work. The purpose is to study changes in brain water homeostasis after TBI of varying severity compared to corresponding cerebral microcirculation parameters. Materials: This non-randomized retrospective single-center study complies with the Helsinki Declaration for patient's studies. The study included 128 patients with posttraumatic ischemia (PCI) after moderate-to-severe TBI in the middle cerebral artery territory who were admitted to the hospital between July 2015 and February 2022. PCI was evaluated by perfusion computed tomography (CT), and brain edema was determined using net water uptake (NWU) on baseline CT images. The patients were allocated according to Marshall's classification. Multivariate linear regression models were performed to analyze data. Results: NWU in PCI areas were significantly higher than in patients with its absence (8.1% vs. 4.2%, accordingly; $p < 0.001$). In the multivariable regression analysis, the mean transit time increase was significantly and independently associated with higher NWU ($R^2 = 0.089$, $p < 0.01$). In the PCI zone, cerebral blood flow, cerebral blood volume, and time to peak were not significantly associated with NWU values ($p > 0.05$). No significant differences were observed between the NWU values in PCI foci in different Marshall groups ($p = 0.308$). Conclusion: Marshall's classification does not predict the progression of posttraumatic ischemia. The blood passage delays through the cerebral microvascular bed is associated with brain tissue water content increase in the PCI focus.

Keywords

Net water uptake · Posttraumatic ischemia

A. Trofimov (✉) · D. Agarkova · K. Trofimova ·
C. Lidji-Goryaev
Department of Neurological Diseases, Privolzhsky Research Medical University,
Nizhny Novgorod, Russia

D. Atochin
Cardiovascular Research Center, Massachusetts General Hospital, Harvard Medical School,
Charlestown, MA, USA

D. Bragin
Lovelace Biomedical Research Institute,
Albuquerque, NM, USA

Department of Neurology, University of New Mexico, School of Medicine,
Albuquerque, NM, USA

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61.1 Introduction

One of the leading complications of moderate and severe traumatic brain injury (TBI) is the development of posttraumatic cerebral ischemia (PCI), accompanied by an increase in water content in and around the lesion [1]. Such a trajectory of the acute period leads to an increase in intracranial pressure and may result in dislocation and herniation of the brain stem. The worst scenario is malignant ischemic stroke development, the frequency of which, fortunately, does not exceed 3% [2].

At the same time, the several causes of its development remain poorly understood, making it difficult to predict and timely treat it. The main difficulty is distinguishing brain edema phenotypes—vasogenic and cytotoxic—as well as the scarcity of means for quantifying its formation in the early stages [3].

The midline shift is the simplest but not an accurate marker of cerebral edema development because it cannot adequately predict PCI formation in the first 24 h, but only at later stages, when the PCI becomes decompensated. And even in this case, the mechanisms of temporal PCI development remain unclear, especially in terms of primary brain damage severity [4]. The diagnosis of cerebral edema using non-contrast computed tomography (CT) is based on a brain density decrease in Hounsfield units.

In 2018, Brooks et al. proposed an innovative way to assess net water uptake (NWU) by comparing brain density in the ischemic and contralateral hemispheres [5].

Further studies have shown that an NWU increase can predict ischemia age and malignant brain edema development and serve as a marker of a poor cerebral collateral state [5].

A recent meta-analysis showed that NWU is a biomarker of malignant post-stroke cerebral edema development and DWI/FLAIR mismatch—a mismatch between diffusion-weighted imaging (DWI) and fluid-attenuated inversion recovery (FLAIR) magnetic resonance imaging [6].

Although CT scanners are widely available, non-contrast CT cannot distinguish between vasogenic and cytotoxic edema and, therefore, cannot be a reliable tool for PCI recognition [7].

Due to this, the NWU calculation from native CT faces several challenges because it depends on early ischemia identification zone and delineation [8].

However, some other sequences (e.g., multiphase perfusion CT [PCT]) can recognize cytotoxic edema areas, making them indispensable for cerebral ischemia detection [9].

Moreover, the combination NWU measurement–perfusion CT allows more accurate determination of the brain hydration status in the cerebral ischemia foci, which improves diagnosis and prognosis [10].

The brain water content assessment is still rare, even in cerebral strokes, and it has not yet been used to study PCI development [11]. This determines the relevance of our work.

The aim was to study brain water homeostasis changes in PCI foci at moderate-to-severe TBI compared to the cerebral microcirculation parameters.

61.2 Materials and Methods

61.2.1 Study Population

This retrospective observational, non-randomized single-center study was conducted as an analysis of a prospectively maintained database cohort (2015–2022). We analyzed 128 patients with moderate-to-severe traumatic brain injury and PCI.

Inclusion criteria were as follows:

- Moderate-to-severe TBI within 6 h after head injury
- Glasgow Coma Scale (GCS) less than 12 and more than 4
- CT perfusion done within 5 days from the moment of injury
- Unilateral PCI foci at perfusion computed tomography

The exclusion criteria were as follows:

- Age less than 18 and more than 60 years.
- GCS at admission to the clinic more than 12 points.

- Gunshot and explosive skull and brain injuries.
- Severity on the Injury Severity Score (ISS) scale more than 16 points.

PCI was determined using perfusion CT, and brain edema was determined using NWU on baseline CT images. The patients were divided according to Marshall's classification. The protocol of the study was reviewed and approved by the Institutional Ethical Committee and conformed to the standards of the Declaration of Helsinki.

61.2.2 Image Acquisitions

All patients received multiphase perfusion CT (PCT) 2–7 days after admission on a 160-slice scanner (Canon Aquilion Prime SP, Canon Medical Imaging, Japan). The perfusion examination report included an initial contrast-free CT of the brain. Extended scanning was further performed of 16 "areas of interest," 160 mm in thickness, within 60 s with a contrast agent. The scanning parameters were 160 kVp, 160 mA, 70 mAs, and 512 × 512. The contrast agent Ultravist 370 (Schering AG, Germany) was administered with a syringe injector (Stellant, Medrad, USA) into a peripheral vein through a standard catheter (20 G) at a rate of 4–5 mL/s in a dose of 30–50 mL per examination. After scanning, data were transferred to a picture archiving and communication system (KIR, Russia). PCT data were processed using Vitrea workstation (Vitrea FX, Vital Images, USA), where standard perfusion maps were built, including: cerebral blood volume (CBV), cerebral blood flow (CBF), mean transit time (MTT), time maximum (Tmax), and time-to-peak (TTP). Artery and vein marks were automatically recorded, followed by the manual control of indices in the time-concentration diagram. The region of interest (ROI) was established based on subcortical areas of the middle cerebral artery. Errors introduced by delay and dispersion of the contrast bolus before arrival in the cerebral circulation were corrected by the block-circulant deconvolution algorithm [12]. Quantitative perfusion indices, including CBF, were calculated on a voxel-wise basis and were used to generate color-coded maps. The voxels with CBF of more than 100 mL/100 g/min and/or CBV of more than 8 mL/100 g were assumed to contain large vessels and removed from the perfusion map calculation (Fig. 61.1).

Net water uptake (NWU) was calculated using Formula 1 [12].

$$\mathrm{NWU} = \left(1 - D_{\mathrm{ischemic}} / D_{\mathrm{normal}}\right) \times 100\%$$

D_{ischemic}: the ischemic "core" density (Hounsfield unit, HU)

D_{normal}: the density of normal brain tissue in the symmetrical zone of the contralateral hemisphere (HU)

61.2.3 Statistical Analysis

The Shapiro-Wilk test was used to determine whether the data were normally distributed. Data are shown as mean ± standard deviation. Analysis of variance (ANOVA) models were performed to analyze data. Pearson's correlation coefficients were used to assess agreement between computed variables. The regression line and confidence limits for each are for illustrative purposes only; $p < 0.05$ was considered statistically significant.

61.3 Results

NWU in PCI zones was significantly higher than in zones without PCI (8.1% versus 4.2%; $p < 0.001$).

In the PCI zone, PCT, CBF, CBV, and TTP were not significantly correlated with NWU values ($p > 0.05$).

Mean transit time increase in PCI zones was significantly and independently correlated with higher NWU ($R^2 = 0.089$, $p < 0.01$; Fig. 61.2).

There were no significant differences between the NWU values in PCI foci in different Marshall groups ($p = 0.308$).

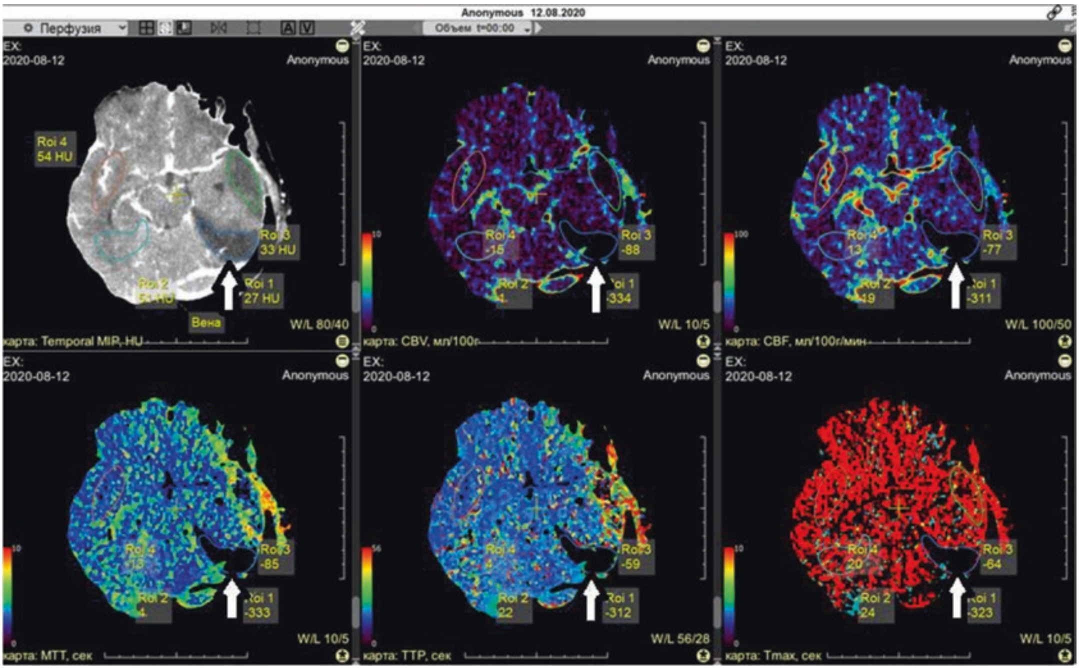

Fig. 61.1 Perfusion maps in posttraumatic cerebral ischemia after TBI. White arrow indicates a zone of PCI in non-contrast CT and all maps: CBV, CBF, MTT, TTP, and Tmax. The thresholds of cerebral ischemia (core and penumbra) were as follows [13]: a CBV decrease <2.0 mL/100 g, or a CBF decrease <145% compared with the contralateral hemisphere

61.4 Discussion

The aim of our study was to assess net water uptake changes in relation with the cerebral microcirculation parameters at non-mild TBI.

The ANOVA showed no significant differences between the NWU values in PCI foci in different Marshall groups.

Earlier we considered that Marshall's classification indicates PCI development. Still, it does not seem to be able to predict PCI progression because it does not consider the following factors: cerebral vasospasm, changes in cerebral microcirculation parameters (cerebrovascular resistance, cerebral arterial compliance, cerebrovascular time constant, and critical closing pressure), and the volume and localization of PCI foci, which play a significant role in PCI development [14].

We have shown that cerebral microcirculation impairments were significantly correlated with increased brain tissue water content in the PCI foci.

In our opinion, there were several reasons for this.

First, it has been shown earlier that PCI is developed against the backdrop of the blood-brain barrier permeability disorders that increase brain tissue water content [15].

Second, the venous outflow in the PCI focus decreases, which leads to "overlogging" of the microcirculatory bed and increases the NWU [16].

Third, as described earlier, the gradient between intravascular and extravascular (parenchymal) oncotic pressure in the ischemic focus makes a significant contribution to the increase in hydration in the lesion [17].

Most likely, it is a combination of all of the above mechanisms, but further studies need to clarify this [18].

Our study has several limitations. The first limitation includes the single-center, retrospective nature of our study and the lack of a control group. This might lead to a potential selection bias regarding PCI recognition.

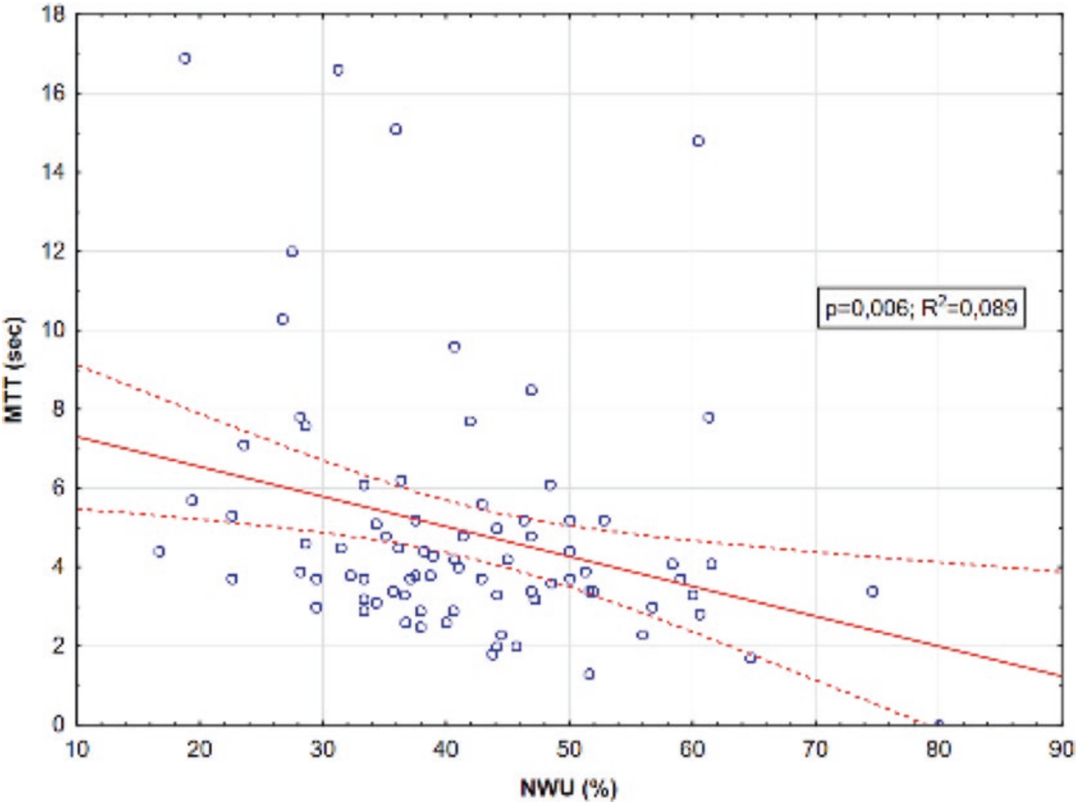

Fig. 61.2 MTT in PCI zones plotted against NWU. Dashed red lines represent 95% confidence intervals for the regression (solid red line)

The second limitation of the quantitative cerebral edema analysis using CT-densitometry was as follows: the volume-occupying lesions, the complex and time-consuming postprocessing, as well as significant PCT-artifacts.

The last limitation of this study is the unknown cerebral collateral circulation status, which might have an impact on secondary injury volumes. Furthermore, details on blood-pressure management, which might also affect the degree of secondary injury volumes, are unknown for this study.

61.5 Conclusion

The blood passage delay through the cerebral microvascular bed was significantly correlated with brain tissue hydration increase in the PCI focus. The Marshall's classification does not seem to be able to predict the PCI progression of posttraumatic ischemia.

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Proposal for Monitoring Students' Self-Efficacy Using Neurophysiological Measures and Self-Report Scales

Maria Gerostathi and Spyridon Doukakis

Abstract

The role of STEM—science, technology, engineering, mathematics—education is internationally recognized as critical to both the personal development of students and their future contribution to a country's economy as through this education they are equipped with the necessary twenty-first-century skills. As a result, there is a need to study the way in which such education affects students. In particular, the study of the self-efficacy factor is a contribution in this direction. Self-efficacy is a fundamental concept in the learning process as it contributes to shaping learning outcomes. Self-report scales are commonly used to measure self-efficacy; however, concerns in research circles have been raised regarding their limitations. On the other hand, there is a growing research interest in neurophysiological measures in the field of education, which seem to offer promising possibilities for understanding learning. Therefore, to better determine the impact of STEM education on students, a combination of self-report scales and neurophysiological measures is proposed to measure self-efficacy.

Keywords

Neurophysiological measures · STEM education · Self-efficacy

62.1 Introduction

STEM—science, technology, engineering, mathematics—education is a source of innovation, technological progress, and a way of producing a competent workforce equipped with the necessary twenty-first-century skills [1]. This is achieved by integrating the disciplines of science, technology, engineering, and mathematics through STEM education as an integrated and interactive whole that takes place in the process of teaching and learning. In this way, students' learning can be enhanced as they connect the four scientific disciplines to everyday practical problems [2].

Research has demonstrated the dynamic relationship between the STEM educational approach and students' self-efficacy. STEM education enhances students' sense of self-efficacy while the latter increases students' levels of performance, persistence, and engagement in STEM fields. In educational research, the level of students' self-efficacy is mainly measured by scales of self-reports in specific fields of interest. However, there are strong concerns about the

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M. Gerostathi (✉) · S. Doukakis
Department of Informatics, Ionian University, Kerkira, Greece
e-mail: mgerostathi@ionio.gr; sdoukakis@ionio.gr

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reliability and validity of the results produced by these scales. This is because there are certain limitations such as the subjectivity of the participants, different cultural patterns, and dubious responses (e.g., phenomenon of the socially desirable response). Also, important limitations are the unclear scales of the response categories and the careless behavior of adolescents when filling out the questionnaires. For this reason, it is necessary to improve self-reporting tools. In the field of education, neurophysiological measurements of the physical and emotional characteristics of individuals are gaining more and more research interest.

Thus, neurophysiological measurements are recommended by various studies as a possible way of developing traditional methods of self-report. Through literature review, a research gap was found regarding the measurement of students' self-efficacy in STEM educational contexts using neurophysiological methods. Therefore, this article aims to highlight the necessity of exploring students' self-efficacy in the STEM educational context using neurophysiological measurements.

Initially, the concept of self-efficacy and its role in learning is presented. Then a correlation is attempted between self-efficacy and STEM education. Reference is then made to the traditional self-report measures used to measure structures such as self-efficacy, and the limitations that characterize them are highlighted. Finally, the chapter focuses on neurophysiological measurements, the potential advantages they offer in training, and the need to explore their use in measuring students' self-efficacy in STEM educational contexts.

62.2 The Concept of Self-Efficacy

The concept of self-efficacy was introduced to the scientific community some 40 years ago by psychologist Albert Bandura. He describes self-efficacy as individuals' beliefs about their abilities to produce defined levels of performance that are influential in events that affect their lives [3]. Individuals' beliefs about their self-efficacy do not refer to the number of skills they have but to what they believe they can do with the skills they have under different circumstances [4]. Also, according to Bandura's (1982) theory, self-efficacy develops through four sources: (a) personal experiences, which refer to the individual's performance in achievements and skills (mastery experiences); (b) vicarious experiences, which influence the individual's beliefs about his or her abilities to perform certain activities as he or she observes other people with similar characteristics successfully performing similar tasks; (c) social persuasion, which concerns the interpretation of verbal messages by others; and (d) physical and emotional state such as nervousness, anxiety, fatigue, and mood. According to Muenks et al. [5], self-efficacy is a multidimensional construct that can vary in strength (low–high), generality (many situations or few), and level of difficulty (sense of efficacy for all or only easy tasks). Its role is vital in learning, especially when it comes to situations of challenge and failure [6], as it enhances students' confidence and engagement in the learning process [7]. After all, the amount of effort or perseverance one puts into a task or activity is determined by it. Therefore, if the individual has the belief that he/she will not be able to cope with certain tasks or activities, he/she will not exert the required effort to complete them and will probably turn to other tasks. Consequently, self-efficacy is a key source of motivation and a predictor of an individual's academic performance and choices [8]. Specifically, as reported by Pitsia et al. [9], academic self-efficacy refers to people's assessments of their abilities to perform academic tasks without having to compare themselves to others. Students' beliefs about their self-efficacy, intrinsic abilities, or expectations for future success have been shown to positively predict their engagement and performance in various academic subjects [10].

Furthermore, self-efficacy in a learning context is closely related to feelings of achievement, which influence students' beliefs [11]. In particular, academic emotions are considered a key factor influencing learning and have two dimensions, arousal and value. Arousal refers to the amount of physiological activation that occurs when an emotion is elicited during task performance. This tends to stimulate or suppress cognitive activity. On the other hand, the value indicates whether an emotion is pleasant or unpleasant [11, 12].

62.3 Self-Efficacy and STEM

Today, STEM education is deemed necessary. This is because of the importance of international competitiveness and the constant technological development affecting people's daily lives [2]. Another reason could be the unprecedented social, environmental, and health challenges endured by nations, which require scientific thinking and knowledge to address [13]. STEM (Science, Technology, Engineering, Mathematics) education is seen as a source of innovation and technological progress and a way to develop a competent workforce equipped with the necessary twenty-first-century skills [14]. The integration of the STEM approach in the classroom is essential as teachers report that students' enthusiasm, innate aptitude for learning, and interest in STEM subjects have declined alarmingly [15]. Therefore, it is necessary to drastically increase students' involvement in the educational process.

The integrated STEM approach aims to acquire knowledge and skills through experience by integrating concepts from the fields of Science, Technology, Engineering, and Mathematics. This can be done through appropriate methods, such as Project-based Learning and Problem-based Learning. In this way, students can solve real-life problems, generate creative ideas, and at the same time promote meaningful and active learning in a collaborative context. Furthermore, the STEM approach helps to improve students' sense of self-efficacy, self-confidence, and motivation [16].

In particular, STEM self-efficacy refers to students' beliefs about their abilities to perform STEM learning activities [17]. It is argued by Kuchynka et al. [18] that self-efficacy as a psychological process is associated with students' performance in STEM subjects and is a consistent predictor of their intentions in these areas. The same authors stress the importance of developing STEM self-efficacy through appropriate interventions in supportive active learning educational contexts. Self-efficacy mediates the increase of students' performance, persistence, and engagement in STEM fields and the pursuit of related future goals. Students who are characterized by low self-efficacy tend to avoid goals with STEM content [19]. The mediating contribution of an individual's self-efficacy in STEM subjects is considered essential because it shapes the relationship between their "implicit" beliefs about their STEM competence and their STEM intentions; that is, the stronger an individual's belief that their skills in STEM fields can be improved, the more their self-efficacy increases and their intention to pursue a STEM career is enhanced [20].

Learners' sense of self-efficacy greatly influences their choice of learning strategies to achieve academic performance in a variety of educational contexts, particularly those where learning involves challenging subjects such as mathematics and other STEM subjects [14]. It has been proven that there is a dynamic correlation between self-efficacy and the metacognitive function of monitoring of learning by the students themselves.

Moreover, taking into account that self-efficacy is a predictor of student achievement, teachers can implement educational programs with STEM activities to increase it. Thus, these activities are designed in such a way that they initially offer a high probability of early success. At the same time, they gradually increase the level of difficulty strategically to enhance the perception of knowledge acquisition [21].

To the foregoing, it is necessary to add the reciprocal relationship between self-efficacy and student interest. It is widely recognized that the development of interest dynamically promotes learning in STEM educational environments. Self-efficacy for a course appears to be related to interest in course-specific tasks [6]. At the same time, an individual's current load of self-efficacy for a cognitive domain largely predicts the extent of subsequent interest in that domain [22]. For example, it has been found that students' preexisting self-efficacy in Mathematics predicts later development of interest in the same subject [22].

Although self-efficacy is characterized as a self-report measure, it has been shown to influence the likely degree of an individual's engagement with a particular task and the effort available to achieve it [23]. It should be stressed that individuals with a high sense of self-efficacy in STEM subjects are more likely to engage, persist, and succeed in them than individuals with lower self-efficacy [4].

In the context of STEM activities, self-efficacy refers to students' confidence in their ability to successfully complete a project. But solving this problem requires knowledge and skills from the fields of science, technology, engineering, and mathematics. For this reason, the measurements related to it must be specific and linked to a particular situation and task [21]. Given the importance of STEM education both for the personal development of students and their future contribution to the economy of a country, the necessity of adequate measurement of students' self-efficacy is indisputable in STEM educational contexts.

62.4 Measuring Self-Efficacy in Education

62.4.1 Self-Report Measure

In the educational field, surveys are conducted to collect data on students, which increasingly play an active role in the educational research process. In particular, contemporary educational research is concerned with exploring the beliefs of students, teachers, parents, and other factors related to the educational process [24]. In the educational context, self-efficacy as a concept encompasses a wide range of students' beliefs about their learning abilities and refers to an individual's confidence in his/her ability to perform a particular task and produce results [8, 25]. Most studies use instruments and procedures to determine individuals' beliefs such as Likert-type scales, self-report questionnaires, interviews, belief inventories, etc., which are based on what individuals report to believe [24]. In recent years, various scales have been developed to measure self-efficacy that include a certain number of mathematical or statistical variables (multivariate scales) [21].

Self-efficacy is a non-cognitive structure that influences students' academic performance and contributes to the achievement of learning within a cognitive domain. Although non-cognitive constructs play a potentially important role in the educational process, they are not measured by formal performance or cognitive tests [26]. Their measurement is traditionally based on self-reports and observation of the subject's behavior. Even instances of non-response to a survey are a measure of non-cognitive skills [27].

Specifically, the self-report tool was used in the fields of psychology and education as an evaluation method both in the early period and during their development. This method can take different forms that differ significantly in structure, temporal analysis, and measurements, offering a more nuanced assessment of human thinking than any other method. It may be structured or unstructured, retrospective or contemporary, qualitative or quantitative, unidimensional or multidimensional, may collect data on paper in pencil or conducted online, and may contain one or more objects [28]. Questionnaires are the most common self-report instruments that, based on participants' verbal responses, assess participants' knowledge, emotion, motivation, attitudes, or physical condition. At the same time, they are perhaps the most appropriate method that can be applied to certain types of studies such as large-scale student assessments [28].

Self-report as an educational research tool was invented in the 1920s [6] and continues to be widely used to explore cognitive processing, beliefs, motivation, and emotions. Its widespread use is due to the easy and relatively non-precise data collection process [24]. However, several times this measure is subject to questioning about its reliability and the validity of the results obtained, and it is deemed necessary to improve it. It is argued that the self-report measure should stop being the main methodological practice in the study of individuals' beliefs. Alternative measurement methods should be applied to ensure the quality and validity of educational research [24].

The limitations of the use of self-report tools for students relate to their ambiguous responses due to the difficulty of retrieving information or events [24]. This is because their responses depend on the specificity of the events, the time they occurred, and the individual effort to recall the data. Furthermore, the unclear scales of the response categories, the socially desirable answer phenomenon, and the careless behavior of adolescents while completing the questionnaires are causes of the inaccuracy of self-report measures. Other examples of response bias are mid-level and extreme response biases where people tend to choose neutral responses or extreme options on a scale, respectively [29]. Another cause for concern is cultural norms since words and expressions may be interpreted differently between cultures and their understanding may be affected differently by individual beliefs [30]. Furthermore, when preparing a self-report scale it is necessary to check the validity of the construct and to continuously validate the measures to be used or adapted to new contexts [31]. In addition, self-reports depend mainly on the subjectivity of participants or observers and limit authentic measurement of students' performance in real time when performing an activity or task in class [32]. In particular, self-report measures may be more useful in surveys that ask students to report what they have observed in the world around them rather than when they are asked to report data on their internal situation [33]. Also, these measures require the full cognitive attention of the user and do not allow for the continuous measurement of physiological and emotional responses such as stress [34].

62.4.2 Neurophysiological Measurements

The self-report method is still largely the main way of determining the cognitive and psychological state of an individual. This is a result of the long history of using self-reports in research and the lack of appropriate neurophysiological equipment in earlier times [35]. However, the continued development of research combined with recent technological advances has enabled the development of neurophysiological tools to measure a variety of individual responses in real time. The development of neurophysiological measures offers new possibilities for the advancement of educational research.

Thus, physiological measures are often used with self-report methods to strengthen and support their results [35]. These measurements are grouped into four categories based on the main body organs, i.e., heart and lungs, eyes, brain, and skin [36].

Specifically, physiological measurements are divided into cardiovascular measurements, eye movement, electroencephalogram (EEG), respiration, electromyogram (EMG), and skin reactions [37]. Also, facial expression detection and analysis provide insight into the emotions and underlying processes that an individual experiences through an experience [38]. Furthermore, modern developments in wearable technology and algorithm development [34] contribute to the accurate and easy measurement of physiological responses of the individual related to emotional arousal in various situations.

In the educational context, research has been conducted that presents an alternative approach to measuring the cognitive and non-cognitive constructs directly related to student learning and engagement. This approach involves the collection and analysis of neurophysiological data. Physiological measures provide objective data that are collected in a non-intrusive manner during an individual's engagement with a task or learning material. This is why more and more researchers are showing interest in using such measures [40]. Various neurophysiological measures have been applied in educational settings such as universities to record cognitive load, attention, and emotion. In this way, important data concerning students' behaviors and interactions with learning activities are collected and used to discover, understand, monitor, and improve educational processes [41]. Wearable technology innovations provide information about the mechanisms underlying psychological processes in a non- or minimally invasive manner without requiring users' constant attention, thus enabling continuous assessment.

For example, electrodermal activity (EDA) and heart rate (HR) measurements are performed in laboratories to determine emotional value and arousal, mental workload, stress, decision-making, and engagement [42]. However, the experimental conditions under which physiological sensor studies are conducted do not represent realistic educational environments. This has the consequence of limiting the understanding of students' responses as they perform classroom activities and tasks [32]. With physiological sensors becoming more accessible to the general public through innovations such as smartwatches and other types of wearable technology, their use in the classroom can allow teachers to gain essential insights into how students engage in the educational process and interact with lesson material [39]. The use of these sensors leads to the acquisition of regular physiological data to measure cognitive and emotional arousal to various stimuli.

Thus, it is possible to identify the type and content of activities that will maximize student engagement in learning. This information is likely to provide valuable assistance in improving the design of curricula to provide lessons and activities that enhance students' engagement in the learning process [30]. Furthermore, the school environment is considered ecologically valid for measuring and evaluating the emotional arousal of adolescent students since this is where they spend a large part of their day. Within this, adolescents are often involved in many activities of high cognitive and emotional value, making the school context a highly suitable environment for examining psychophysiological processes. Furthermore, the school environment provides an opportunity to better understand the mechanisms underlying the development of emotional disorders such as anxiety and depression, which often occur during the adolescent period [42].

Neurophysiological measures offer the advantage of measuring emotional arousal without the possibility of conscious manipulation by the subject [35]. This contribution is particularly important because emotion significantly affects human cognitive processes such as perception, learning, attention, memory, reasoning, and problem-solving and facilitates the encoding and efficient retrieval of information. Therefore, the influence of emotions should be carefully considered in the design of educational courses to increase student engagement, and improve learning and long-term retention of the knowledge offered [43].

Research has suggested EDA, HR, blood pressure (BP), and brain activity as possible indicators of students' interest, attention, and active engagement in the classroom. Also, EDA, HR, and BP provide the possibility to correlate different teaching methods with their emotional reactions [30, 35, 39]. Additionally, useful multimodal data are generated from eye-tracking and the use of digital cameras to approximate physiological features based on the analysis of facial expressions and subtle variations in skin tone. These methods offer a deeper understanding of the learning experience and behavioral responses of individuals [44, 45]. Individuals' learning and performance are affected by positive and negative emotions such as pleasure, anxiety, anger, worry, and uncertainty. These emotions are detected through physiological measurements and techniques such as heart rate variability (HRV), measurement of cortisol levels, and saliva pH [32, 42, 45, 46].

As mentioned above, physical and emotional arousal is the fourth source of self-efficacy. Therefore, the correlation between an individual's self-efficacy and academic emotions is direct. A high sense of self-efficacy is associated with positive feelings of activation such as happiness, enthusiasm, and hope, while lower self-efficacy is associated with negative emotions that inhibit one's activation such as boredom, anxiety, and anger [32]. Self-efficacy beliefs can influence perceived stress and corresponding physical reactions [45]. Students perceive stress and anxiety as a weakness that will lead to poor performance, whereas students with positive emotions enhance their self-efficacy and are likely to perform better [7]. Thus, and at this point, the value of collecting neurophysiological data to measure student self-efficacy in STEM educational contexts in addition to self-report scales or other traditional measurement methods is also evident. In STEM educational contexts, the complementary use of neurophysiological measurement with self-reports may generate useful insights into the possible reasons why some students with high self-efficacy perform better and persist in STEM activities compared to those characterized by a low sense of self-efficacy. Furthermore, the determination of the degree of self-efficacy through neurophysiological data could perhaps be exploited for the benefit of students and teachers. It may lead to the improvement of STEM education scenarios, the selection of appropriate teaching practices and methods, and the improvement of the learning climate.

The international literature highlights the need for a combination of self-report methods and modern neurophysiological measurements. This can modernize traditional methods, overcome their limitations, and maximize the validity and reliability of research results [24, 30, 32, 35, 40, 45]. There have been studies demonstrating positive correlations between physiological and self-report measures, for example in test anxiety.

These researchers demonstrated that it is important to use both types of measures in educational psychology research in order to capture the complex construct of test anxiety in more detail and objectivity. In addition, other researchers stress the need for a framework to support the data from neurophysiological measurements. For example, EDA may be a potential indicator of measuring student interest; however, the relevant recordings should be triangulated with behavioral observations. Otherwise, there is a risk that they may not be interpretable or have a specific meaning [30].

62.4.3 Need to Explore the Use of Neurophysiological Measurements in the Educational Process

Given the above, it seems imperative to strengthen the body of research on the adoption of neurophysiological measures in educational settings. The great potential of physiological analyses, in understanding attention, emotions, and information acquisition, remains unexplored and untapped [44]. Also, in research to date, there have been no systematic attempts to integrate physiological methods into educational contexts such as vocational education and training [45]. This position is supported by the view that the potential of using neurophysiological measures in adolescents within school settings has been poorly explored. Furthermore, students' academic achievement was studied using wearable neurophysiological recording devices and demonstrated that these devices are useful tools for educational research and practice [47]. It is strongly emphasized that additional studies integrating neuroscience into educational research are required.

However, ethical issues are raised by the use of wearable and portable technologies to collect neurophysiological measurements during teaching. Such issues include informed consent, confidentiality, privacy, data protection and data security, anonymization of participants, and elimination of discrimination [48]. These ethical issues must be taken seriously and addressed.

62.5 Conclusion

As noted above, STEM education plays an important role in the personal development of students, equipping them with the necessary twenty-first-century skills to contribute to the global economy in the future. For this reason, efforts are being made to effectively integrate STEM education into curricula in most countries. An important factor determining the impact of the STEM educational approach on students is their sense of self-efficacy, which is mainly measured by subjective self-report scales. Therefore, the need arises for more objective measures of this fundamental learning concept such as neurophysiological measures in combination with traditional methods.

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The Impact of Smokers' Information-Seeking Behavior on Smoking Cessation

Petros Kostagiolas, Sofia Parnavela,
and Panagiotis Theodorou

Abstract

Introduction Smoking has a harmful effect on human body and is rated to be the primary cause of preventable premature disease and death worldwide, while it is responsible for at least 25 life-threatening diseases.

Methods An empirical investigation has been carried out through the development and distribution of a structured questionnaire. The sample of empirical investigation consisted of 150 smokers aged over 18 years (response rate 85.7%).

Analysis Descriptive analysis and correlation control of questionnaire variables are used to report the findings of the study.

Results Information about passive smoking, smoking consequences, and current therapies in quitting smoking were rated highest among smoke-related information needs. The main sources of information were family/relatives/friends/colleagues and Internet and less important factors were formal sources like medical staff, health professionals, and primary health care services. E-health literacy is correlated with higher self-efficacy, positive intention to quit smoking, and better educational level while is negatively correlated with increasing age.

Conclusions The creation of specialized programs and upgraded information services is fundamental for successful smoking cessation. These programs and services should be addressed to all socioeconomic groups and combined with the improvement in smokers' e-health literacy will contribute to a higher self-efficacy and finally drive them to quit smoking.

Keywords

Information-seeking behavior · Information literacy · Smoking cessation · Self-efficacy

Abbreviations

EFA	Exploratory Factor Analysis
ELIS	Every Day Life Information Seeking
ENSP	European Network for Smoking and Tobacco Prevention
FTND	Fagerström Test for Nicotine Dependence
HSI	Heaviness of Smoking Index
NICE	National Institute for Health and Care Excellence
NRT	Nicotine Replacement Therapy

P. Kostagiolas (✉)
Department of Archives, Library Science and Museology, Ionian University, Corfu, Greece

Hellenic Open University, Patra, Greece
e-mail: pkostagiolas@ionio.gr

S. Parnavela · P. Theodorou
Hellenic Open University, Patra, Greece

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ONS	Office for National Statistics
PCA	Principal Components Methods
WHO	World Health Organization

63.1 Introduction

Tobacco smoking is the primary cause of preventable premature disease and death worldwide and is responsible for at least 25 threatening diseases [73]. Around 8 million people died from a tobacco-related disease in 2017 while this number can be expected to keep growing even after rates of tobacco use start to decline, because tobacco-related diseases take time to become apparent [74]. In 2000, around a third (33.3%) of the global population (both sexes combined) and aged 15 years and older were current users of some form of tobacco; while in 2015, this rate had declined to about a quarter (24.9%) it is projected to decline further to around a fifth (20.9%) of the global population by 2025. Especially, in Greece, the corresponding percentages for 2000, 2015, and 2025 are 48.1%, 37.9%, and 32.7%, respectively (one of worse rates in European region and globally) [74].

Smoking has a harmful effect on the human body making it necessary to implement effective interventions to quit and reduce the prevalence of smoking. People who smoke lose at least a decade of life expectancy compared to those who have never smoked while quitting before the age of 40 reduces the risk of smoking-related death by about 90% [20]. However, although 75–85% of smokers want to quit smoking and one-third of them try it hard, about three times in their lifetime, less than half manage to quit before the age of 60 [8]. Nicotine dependence is mainly assessed by the Fagerström Test for Nicotine Dependence (FTND), which determines a person's nicotine dependence as low, moderate, or high [16, 19], but also with Heaviness of Smoking Index (HSI) as a test to measure the same factors as the FTND [6]. In addition, the use of tobacco harms the environment and is a significant financial burden on health systems. Therefore, there is an urgent need to control its use and reduce the number of smokers [16].

The Internet is the first place many people turn to for information and assistance with health-related concerns [21] while Internet-based material is an attractive intervention platform, because of low costs for the user, resulting in high cost-effectiveness for clinically effective interventions [65]. Over the last years, more and more smoking cessation programs have been developed through the Internet, achieving significant efficiency in accessing and distributing these programs and helping tobacco users quit [4, 11, 24, 43]. More specifically, among online smokers, approximately one-third searched online for cessation information each year from 2005 through 2015, while in 2017 that proportion increased to 43.7% [23]. Furthermore, although these programs have a low-cost budget, they cause smoking cessation rates similar to other much more expensive programs [63]. Additionally, Internet-based interventions have access to a large percentage of the smoking population and can target specific categories, such as young people. Such interventions can be used as monotherapy or adjunctive therapies, typically collecting information from the patient and then using algorithms to customize comments or recommendations [16, 47].

Modern applications provide multiple iterations of feedback, development, and monitoring of a smoking cessation plan, as well as preventive emails. Websites that are interactive or tailored to participants' demographic characteristics are more effective than sites that are static or more general [27, 66] while studies of interventions that use social media platforms such as Twitter and Facebook suggest they can increase quit rates and quit attempts, and reduce relapses [44]. Internet-based interventions can have an additional benefit when are combined with pharmacotherapies such as nicotine replacement therapy (NRT) and can increase the likelihood of successful quit attempts [22, 66].

This paper aims to examine the smoking-related health information-seeking behavior patterns of people, and is the first such study to be carried out among smokers of the general population in Greece. More specifically, this study includes smokers' information needs, information resources employed, as well as their self-efficacy, nicotine dependence, their intention to quit smoking, and sociodemographic variables. Also assessed are the usefulness and importance of Internet in quitting smoking and satisfaction of Internet usage. The methodology of the survey is informed by Wilson's macro-model [76, 77] for information-seeking behavior and includes responses from 150 smokers of the general population, over 18 years of age who live in Greece.

63.2 Methods: Questionnaire Development

The survey examines the information-seeking behavior of smokers of general population and correlates this behavior with sociodemographic and clinical data, self-efficacy, nicotine dependence, their intention to quit smoking, the usefulness and importance of Internet in quitting smoking, and satisfaction of Internet usage. The survey included 150 out of 175 smokers of the general population who initially received the specially designed questionnaire (response rate: 85.7%) during the study period (February–March 2019). The questionnaire was administered to adult (>18 years old) smokers who were capable of understanding the questionnaire.

In the same lines as Norman and Skinner [48], Kuske et al. [39], and Kostagiolas et al. [34–36], the survey methodology was informed by Wilson's model [76, 77] for information-seeking behavior. Information seeking aims to reduce uncertainty and anxiety through health-related information needs' satisfaction. Hence, people develop specific information needs for health-related matters and use information sources when looking for information. Table 63.1 portrays our adaption of Wilson's information-seeking behavior model to our population.

In addition to the health information-seeking behavior constructs, another 13 (11) questionnaire dimensions are included, i.e., demographics (sex, age, marital status, educational level, work situation, insurance status, and monthly income), clinical data (health situation, chronic health problems, and limitation of bodily activities), health services usage, Fagerström Test for Nicotine Dependence, Heaviness of Smoking Index, intention of quitting smoking with Motivation to Stop Scale [37], number of attempts to quit smoking, self-efficacy, usefulness and importance of Internet in quitting smoking, satisfaction of Internet usage, and e-Health literacy scale, which was created by Norman and Skinner [48].

A 5-point Likert scale was used to measure self-efficacy (a single item), intention of quitting smoking (7 items), usefulness and importance of Internet in smoking cessation (2 items), information needs' satisfaction (a single item), the importance of various information needs (12 items), the frequency of information resources employment (13 items), and e-health literacy (8 items). To facilitate data export of the main results, it was considered appropriate to group the answers in three sections cumulatively for those given 1 and 2 points (not at all–a little) and those given 4 and 5 points (a lot–very much), as this clarifies more clearly the positive and negative assessments from the smokers of the study.

SPSS version 23.0 statistical package was employed for the statistical analysis. Primarily, the overall and the constructs' scale reliability were estimated for internal consistency using Cronbach's alpha reliability coefficient (Table 63.2). Results on demographics (frequencies, valid percentages, median, mean, etc.) were reported using descriptive statistics. Kolmogorov-Smirnov and Shapiro-Wilk Normality tests at significance <0.05 level were carried out and non-parametric statistical tests, such as Mann-Whitney *U*-test and Kruskal-Wallis *H*-test, were used as well. Furthermore, Exploratory Factor Analysis (EFA) was employed since Principal Components Methods (PCA) and Varimax orthogonal rotation method were used to group the variables for each of the questionnaire constructs. Finally, the correlation statistics among all grouped variables, demographics, and clinical data were reported.

Table 63.1 Questionnaire dimensions based on Wilson's model for information seeking

Questioner dimensions	Definition/measurement items
Smoke-related information needs (Items $N = 12$)	Measures the importance of specific smoke-related information needs: *Smoking effects, existing smoking cessation treatments, the effect that secondhand smoke has on non-smokers, the use and effectiveness of nicotine substitutes, the use and efficacy of bupropion, the use and efficacy of varenicline, counseling treatment, the cost of medication, finding smoking cessation clinics, finding a General Practitioner for smoking cessation, alternative therapies, finding support groups*
Information sources employed by smokers (Items $N = 13$)	Measures the frequency smokers employ specific information resources when seeking information: *Public institutions webpages, medical staff, health professionals (nurses, health visitors), pharmacists, primary health care services, Internet/search engines (Google), social networks (Facebook, Twitter, Blogs), broadcast media (television, radio), written material (newspapers, magazines, brochures), family/relatives/friends/colleagues, smoking cessation support groups, medical webpages, workshops/seminars*

Table 63.2 Cronbach's alpha of questionnaire constructs

Questionnaire constructs	Reliability statistics (Cronbach's alpha)	No. of items
Questionnaire in total	0.937	69
Intention to quit smoking	0.666	7
Degree of usefulness and importance of the internet in smoking cessation	0.802	2
Usage of internet in smoking cessation	0.944	12
Information sources	0.932	13
Information literacy and smoking cessation	0.940	8

63.3 Results

Among the 175 eligible smokers, 150 agreed to participate in the study and completed the questionnaire. Table 63.3 summarizes the demographic data of the participants. The majority of the participants were female (58%), married or cohabited (54%), private employees/public servants (78.7%), having university degree (31.4%), public insurance (76.7%), and a monthly income of 772–1.094€ (28.7%), 1.095–1.561€ (26.7%), or 1.562–2.919€ (25.3%).

Table 63.4 portrays the participants' clinical data. Most of the participants had a good (48%) or very good (29.3%) health status while only 25.4% had a chronic health problem and 20.7% experienced activities' limitation because of health problems.

Table 63.5 shows the Fagerström Test for Nicotine Dependence (FTND) and the Heaviness of Smoking Index (HSI). According to FTND, 59.3% and 6.7% of the participants have a moderate and large smoke dependence, respectively, while according to HSI, 59.4% and 30.6% of the participants have a moderate and large smoke dependence, respectively.

Table 63.6 portrays number of efforts on quitting smoking and self-efficacy of the smokers. Overall, 63.3% of the participants have never tried to quit smoking last 12 months, 27.3% have tried 1–3 times, 6.7% have tried 4–6 times, and only 2.7% have tried more than 6 times. Regarding self-efficacy, 30% of the smokers feel confident enough that they can quit smoking in the next 6 months if they decide so, 14.7% feel very confident, and 10% feel too confident.

Appendix I includes the descriptive statistics for the survey. Regarding health services usage last 12 months, most of the smokers of the study had never visited a family/general doctor (54%), a medical specialist (surgeon, orthopedic, etc.) (50%), or another health professional (dentist, physiotherapist, etc.) (46%), while 34.7%, 41.3%, and 40% have visited them 1–2 times, respectively. Also, 18.7% of the participants have visited/been transferred 1–2 times in an Emergency department last 12 months and 13.3% have been hospitalized in the same period while 76.7% and 86% answered negatively, respectively. Regarding intention of quitting smoking, only 22.7% do not want to quit smoking while 52.7% answered negatively in this question. Furthermore, 34.7% of

Table 63.3 Survey participants' demographics

Demographics	Variables	Respondents	Percentage (%)
Sex (Valid *N* = 150)	Male	63	42
	Female	87	58
Marital status (Valid *N* = 150)	Single	33	22
	Divorced	19	12.7
	Married or cohabited	81	54
	I live with parents or resident	15	10
	Widowed	2	1.3
Education level (Valid *N* = 150)	Elementary school	24	16
	Secondary education	35	23.3
	Postsecondary education	26	17.3
	University degree/technical education	47	31.4
	Postgraduate degree/PhD	18	12
Work situation (Valid *N* = 150)	Unemployed	6	4
	Private employee/public servant	118	78.7
	Self-employed	15	10
	Household	5	3.3
	Pensioner	6	4
Health insurance (Valid *N* = 150)	Public	115	76.7
	Private	6	4
	No insurance	17	11.3
	Public and private	12	8
Income (Valid *N* = 150)	≤390€	5	3.3
	391–771€	17	11.3
	772–1.094€	43	28.7
	1.095–1.561€	40	26.7
	1.562–2.919€	38	25.3
	>2.920€	7	4.7

Table 63.4 Clinical data

Clinical data	Variables	Respondents	Percentage (%)
Health status (Valid *N* = 150)	Very poor	4	2.7
	Poor	2	1.3
	Moderate	28	18.7
	Good	72	48
	Very good	44	29.3
Chronic health problems (Valid *N* = 150)	Yes	38	25.4
	No	112	74.6
Limitation of bodily activities (Valid *N* = 150)	Yes	31	20.7
	No	119	79.3

the smokers think that they must quit smoking but they do not want really to do this, 28.7% want to quit smoking but they have not thought when, and 36.7% want really to quit smoking but they do not know when they will do this. Additionally, 41.3% want to quit smoking and they hope they will fulfill this soon, 22.7% want really to quit smoking and intend to do this in the next 3 months, and only 12.7% want really to quit smoking and intend to do this next month. As regards Internet usage' satisfaction in smoking cessation, 22.7% were satisfied quite a bit and only 30% were a lot or very much satisfied while as regards usefulness and importance of Internet in smoking cessation, only 22.7% and 23.3% of the participants answered positively, respectively. Knowledge

Table 63.5 Data about nicotine dependence (FTND and HSI)

	Variables	Respondents	Percentage (%)
Fagerström Test for Nicotine Dependence (FTND) (Valid $N = 150$)	Low dependence	4	2.7
	Low-to-moderate dependence	47	31.3
	Moderate dependence	89	59.3
	High dependence	10	6.7
Heaviness of Smoking Index (HSI) (Valid $N = 150$)	Low dependence	15	10
	Moderate dependence	89	59.4
	High dependence	46	30.6

Table 63.6 Numbers of quitting smoking attempts and self-efficacy

	Variables	Respondents	Percentage (%)
Have you tried to quit smoking last 12 months? (Valid *N* = 150)	None	95	63.3
	1–3	41	27.3
	4–6	10	6.7
	More than 6	4	2.7
If you decided to quit smoking completely in the next 6 months, how confident are you that you will succeed? (Valid *N* = 150)	Not at all	26	17.3
	A little	42	28
	Quite a bit	45	30
	A lot	22	14.7
	Very much	15	10

about passive smoking (15.4%), smoking consequences (15.3%), and current therapies in quitting smoking (15.3%) was rated highest among smoke-related information needs, while family/relatives/friends/partners (18.7%) were the main source of information for the smokers who took part in the survey. Finally, as regards e-health literacy, a large percentage of the participants had little or no e-health literacy. More specifically, the majority of the participants did not know which information sources related to smoking cessation are available on the Internet (62.6%), where (56%) and how (50%) they will find these sources, how to use the Internet to answer questions in smoking cessation (42.7%), and how to use information about smoking cessation they find on the Internet (58.6%). Additionally, they had little or no ability to evaluate the smoking-related resources they find on the Internet (44%), to separate high-quality from low-quality health resources on the Internet (43.3%), and feel no confidence in using information from the Internet to quit smoking (64%).

Principal Components Analysis with Varimax rotation was performed for grouping the initial variables into new factors. Descriptive statistics of the new factors, reliability coefficients, and factor loadings are presented in Appendix II. The Internet usage was grouped into two factors (consultation and visit to a hospital) with a Cronbach's alpha of 0.633 and 0.476, respectively. Intention of quitting smoking was grouped into two factors too (positive and negative attitudes on quitting smoking) with a Cronbach's alpha of 0.825 and 0.688, respectively. Information needs were grouped into two factors (information needs about finding help and smoking cessation process) with a Cronbach's alpha of 0.920 and 0.918, respectively, while information sources grouped into two components too (formal and informal information sources) with a Cronbach's alpha of 0.904 and 0.889, respectively. E-health literacy was grouped into one factor (information health literacy) with a Cronbach's alpha of 0.940.

Finally, Table 63.7 portrays the pairwise Pearson correlation coefficients for demographics and clinical data variables, together with the factors developed through principal components analysis (PCA) groupings. We indicatively note that smokers' "age" is negatively correlated with "educational level" ($r = -0.336^{**}$), "informal information sources" ($r = -0.235^{**}$), and "e-health literacy" ($r = -0.235^{**}$); "education level" is positively correlated with "income" ($r = 0.291^{**}$) and "e-health literacy" ($r = -0.386^{**}$); "income" is positively correlated with "Health status" ($r = 0.211^{**}$) and negatively correlated with "Hospitalizations" ($r = -0.211^{**}$) while "health status" is negatively correlated with "Hospitalizations" ($r = -0.242^{**}$). Furthermore, FTND is positively correlated with HSI ($r = 0.842^{**}$), self-efficacy ($r = 0.325^{**}$), importance of Internet ($r = 0.223^{**}$), and consulting ($r = 0.289^{**}$); number of quitting smoking attempts is positively correlated with self-efficacy ($r = 0.290^{**}$), importance of Internet ($r = 0.304^{**}$), positive intention to quit smoking ($r = 0.341^{**}$), and informal information sources ($r = 0.430^{**}$); self-efficacy is correlated with positive intention to quit smoking ($r = 0.281^{**}$) and e-health literacy ($r = 0.296^{**}$); and positive intention to quit smoking is correlated with e-health literacy ($r = 0.196^{*}$).

63.4 Discussion

The findings of our survey demonstrate that the majority of participants had little or no health services' usage last 12 months, as most of the smokers of the study had never visited a family/general doc-

Table 63.7 Bivariate correlations of the survey factors/variables

Factors/ Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1.	1																						
2.	0.043	1																					
3.	0.105	**−0.336****	1																				
4.	**−0.191***	0.098	**0.291****	1																			
5.	**−0.200***	**−0.187***	**0.270****	**0.211****	1																		
6.	−0.107	**−0.194***	0.121	0.032	**0.259****	1																	
7.	−0.067	**−0.172***	**0.191***	**0.177***	**0.243****	**0.203***	1																
8.	**0.272****	−0.076	**0.246****	−0.005	−0.029	−0.145	−0.045	1															
9.	**0.240****	−0.130	**0.282****	−0.002	0.074	−0.086	0.002	**0.842****	1														
10.	0.030	0.019	−0.056	−0.019	−0.134	−0.135	−0.087	0.139	0.084	1													
11.	0.038	−0.134	**0.198***	0.046	**0.164***	0.050	0.059	**0.325****	**0.394****	**0.290****	1												
12.	0.109	0.086	**0.187***	**0.177***	0.137	0.011	0.012	0.075	0.115	**0.270****	**0.303****	1											
13.	0.086	**−0.200***	0.153	0.036	0.092	0.033	0.101	0.068	0.120	**0.285****	**0.411****	**0.464****	1										
14.	0.147	−0.050	**0.219****	**0.165***	−0.039	0.028	0.045	**0.223****	**0.175***	**0.304****	**0.273****	**0.426****	**0.670****	1									
15.	**0.250****	0.107	0.077	−0.069	−0.12	**−0.165***	**−0.227****	**0.289****	**0.194***	−0.035	−0.047	0.078	−0.051	0.070	1								
16.	0.085	0.028	−0.005	**−0.211****	**−0.242****	−0.108	−0.111	**0.186***	0.118	0.153	0.011	0.074	0.034	0.132	**0.605****	1							
17.	−0.030	0.044	0.054	−0.021	0.010	−0.018	0.039	−0.041	−0.014	**−0.185***	0.007	−0.147	−0.040	−0.032	0.092	−0.025	1						
18.	0.039	**0.179***	0.002	**0.177***	0.102	−0.131	0.000	0.079	0.073	**0.341****	**0.281****	**0.219****	**0.206***	**0.359****	0.018	0.007	−0.108 1						
19.	−0.005	0.009	0.083	0.134	0.067	0.013	0.028	−0.011	−0.040	**0.311****	0.090	**0.281****	**0.390****	**0.552****	−0.080	0.038	−0.096	**0.356****	1				
20.	−0.069	−0.002	0.009	0.143	0.062	−0.002	−0.056	−0.020	−0.036	**0.364****	0.137	**0.353****	**0.534****	**0.547****	−0.124	−0.038	−0.08	**0.317***	**0.746***	1			
21.	0.056	0.066	0.060	0.097	0.026	−0.047	−0.113	−0.019	−0.026	**0.368****	**0.177***	**0.376****	**0.512****	**0.550****	−0.046	0.045	−0.11	**0.285****	**0.774***	**0.735***	1		
22	0.025	**−0.235****	0.081	0.026	0.009	−0.004	−0.001	0.056	0.061	**0.430****	**0.244****	**0.292****	**0.651****	**0.526****	−0.004	0.056	−0.09	**0.208***	**0.556***	**0.649***	**0.743***	1	
23.	0.002	**−0.235****	**0.386****	0.159	0.152	0.023	**0.237****	0.046	0.110	**0.209***	**296**	**500****	**0.500****	**0.405****	−0.098	−0.017	−0.129	**0.196***	**0.405****	**0.438****	**0.425****	**0.505****	1

*$p < 0.05$; **$p < 0.001$

Factors/Variables: (1) Sex; (2) Age; (3) Education level; (4) Income; (5) Health status; (6) Chronic health problems; (7) Limitation of bodily activities; (8) FTND; 9. HSI; (10) Number of quitting smoking attempts; (11) Self-efficacy; (12) Internet usages' satisfaction; (13) Usefulness of Internet; (14) Importance of Internet; (15) Visits to doctors; (16) Hospitalizations; (17) Negative intention; (18) Positive intention; (19) Information needs about finding help; (20) Information needs about smoking cessation process; (21) Formal information sources; (22) Informal information sources; (23) Information health literacy related to smoking cessation tor (54%), a medical specialist (surgeon, orthopedic, etc.) (50%), or another health professional (dentist, physiotherapist, etc.) (46%), while 34.7%, 41.3%, and 40% have visited them 1–2 times, respectively. Also, 18.7% of the participants have visited/been transferred 1–2 times in an Emergency department last 12 months and 13.3% have been hospitalized in the same period while 76.7% and 86% answered negatively. These findings are in line with other studies where current smokers showed a lower probability of physician treatments [71] or were less likely to use primary care services [30]. Such results might be explained by special attitudes of smokers that translate into denial of health risks and delays in seeking health care [30]. On the contrary, in other studies, cigarette smoking is associated with higher rates of hospitalization and outpatient visits [29, 31]. Furthermore, lower levels of income is consistent with higher health care utilization [3, 31], which is in agreement with our findings. Income is also correlated positively with health status, which is in agreement with another recent Greek survey, where highest incomes are correlated to the highest health status too, indicating that wealthier people are healthier [70].

Regarding intention of quitting smoking, the majority of participants want to stop smoking and this intention is correlated with number of quitting smoking attempts and self-efficacy. This is in agreement with other studies [2, 61, 75] where individuals who successfully quit tobacco by themselves had higher self-efficacy than those who were unwilling to quit [14]. In relation to self-efficacy, 54.7% of the participants feel confident that they will succeed to quit smoking, similar with findings of Nguyen Than et al. [46] (50.2%) and Valizadeh-Haghi and Rahmatizadeh [69] (61.4%) where there is adequate self-confidence for using information obtained from the Internet for health decision-making. More specifically, in our research, the majority of the participants (52.7%) want to quit smoking and 36.7% have made at least one attempt last 12 months. In Holland the corresponding rates were 80% and 28% [67] while in the USA, approximately 70% of adult smokers report that they would like to quit smoking and 44% actually attempt to quit each year [5]. In the UK, only 30.5% have attempted to quit smoking [53] and 52.7% have stated that they intended to quit smoking [50], which are similar to our findings. At the same time, in other Dutch studies, 77.7% of smokers want to quit smoking [60] and 33.5% had made a quit attempt in the past year [26]. In addition, in a recent study in the USA, 63% of adults smokers reported an intention to quit smoking [68] while in different studies in the same country, 47.7% [1] and 55.1% [9] said that they had made a quit attempt in the past year. The greatest rate in quit attempts was found in France, where 79.7% of smokers had made previous quit attempts [46]. Moreover, in our survey, moderate and high nicotine dependence (FTND) was 66%, which was similar with other studies such as in Stanczyk et al. [60] (67.6%) or in Nguyen Than et al. [46], where 72.4% were dependent on tobacco.

Regarding Internet usages' satisfaction in quitting smoking, 52.7% of our participants were quite a bit, a lot, or very much satisfied while in study of Wittekind et al. [78], the satisfaction rate was 52.6%. In Woodruff et al. [79], 89% of participants were satisfied as they reported that they would recommend the program to other smokers while in other studies satisfaction with the website was high too (90.2% in Stoddard et al. [62], 90% in Berg et al. [1]; 87.9% in Emmons et al. [15]; 85% in Mananes et al. [40]. Furthermore, in Shuter et al. [59], 78% of respondents were satisfied while 95.2% indicated that they would recommend the intervention to family or friends who were interested in quitting smoking. Finally, in McClure et al. [42], 92% of participants thought the program could help people quit smoking and 87.0% would recommend the program to others. It is also of note that according to European Union Eurobarometer about European citizens' digital health literacy [17], 89% of the participants said that they were satisfied with the information they found on Internet, while over three-quarters of respondents (77%) agree that the Internet is a good tool for improving their knowledge of health-related topics.

In terms of information needs, information about passive smoking, smoking consequences, and current therapies in quitting smoking were rated highest among smoke-related information needs. These findings are in agreement with Robertson et al. [55], where participants used Internet to locate health-related information, such as the long-term effects and the risks relative to smoking. The knowledge about curative treatment among smoke-related cancer was essential too among current smokers in Ruparel et al. [56] where participants felt they had the "right" to an informed decision. These findings represent also poor knowledge about smoking habit, and the right to adequate information about the health consequences of tobacco products should be regarded as an inviolable principle within tobacco control policy debate [7].

According to the findings of this study, family/relatives/friends/partners were the main source of information of the participants (37.4%), which is in agreement with other studies where smokers were supported by friends or family (34%) [10] or seeking smoking cessation advice from family or friends (40.9%) [58]. Internet was ranked second in importance (33.3%), followed by scientific medical websites (23.3%) while broadcast media (television, radio) (22.7%) were ranked fourth in importance. In another European study that was held in seven countries, health professionals were perceived as the most important source of health information (73.8%) followed by "family, friends, and colleagues" at 63.8% while the Internet was ranked lower in importance (46.8%) [38]. In addition, in Mathur et al. [41], current smokers trust doctors the most, followed by family/friends too. In study of Robertson et al. [55], participants relied heavily on word-of-mouth (including word-of-mouse) reports, which is an online forum, and friends or family while in Wackowski et al. [72], physicians were perceived as the most trustworthy source of health information followed by Internet. Furthermore, in Peretti-Watel et al. [52], the Internet was the main source of information followed by relatives who influenced smokers' risk perception and fear of smoking-related cancer, suggesting that they influence smokers' attitudes in several ways. Finally, in Ruten et al. [57], current smokers had less trust in health care professionals than people who have never smoked, but more trust in Internet sources of information.

The findings of our research demonstrate that e-health literacy is correlated with higher self-efficacy and better educational level, which is in agreement with other studies regarding self-efficacy [28, 51, 64] and better educational level [45, 51]. Additionally, e-health literacy is negatively correlated with increasing age, which is also in agreement with other studies [12, 13, 45] while is correlated with positive intention to quit smoking, which agrees with the findings in Hoover et al. [25].

63.5 Conclusions and Further Research for Investigating Smoking Cessation Behavior of Individuals at Risk of Cognitive Decline

The development of specialized programs and enhanced information services is fundamental for successful smoking cessation. At the same time, the Internet is less accessed by older people and/or individuals at risk of cognitive decline [32, 49] and less likely to be used by people with lower incomes, who are more likely to smoke [18, 33]. These programs and services should be addressed to all socioeconomic groups and combined with the improvement in smokers' e-health literacy will contribute to a higher self-efficacy and finally drive them to quit smoking. Therefore, avenues of further study might include addressing the impact of information-seeking behavior on smoking behavior of more specific groups of individuals and specially those facing cognitive impairment and disabilities. Perhaps for those groups of individuals information exchange through, for example, group meetings might have more impact on facilitating lifestyle changes. Therefore, unofficial and/or conventional information provision resources might play a significant role in shaping smoking cessation behaviors of individuals with cognitive decline within the wider frameworks of promoting an active lifestyle and social connectedness. Meanwhile, the inability to control the quality of the online information of some websites, combined with the lack of regular updating, evaluation, and rating of the information provided, makes it necessary to develop quality and validity support tools and mechanisms for the available online medical information [17, 54]. As this survey is the first that has been carried out among smokers of the general population in Greece, there is a need for further research on this issue in more focused age and social groups throughout the country.

Appendices

Appendix I: Descriptive Statistics

	Measurement scale							
Health services usage Last 12 months, how many times…:	None	1–2 times	3–5 times	6+ times	Valid *N*	Median	Mean	Standard deviation
Have visited/been transferred in an emergency department (Valid *N* = 150)	115 (76.7%)	28 (18.7%)	5 (3.3%)	2 (1.3%)	150	1.00	1.29	0.597
Have visited a family/general doctor (Valid *N* = 150)	81 (54%)	52 (34.7%)	11 (7.3%)	6 (4%)	150	1.00	1.61	0.792
Have visited a medical specialist (surgeon, orthopedic, etc.) (Valid *N* = 150)	75 (50%)	62 (41.3%)	7 (4.7%)	6 (4%)	150	1.50	1.63	0.756
Have been hospitalized for 1 night or more (Valid *N* = 150)	129 (86%)	20 (13.3%)	0 (0%)	1 (0.7%)	150	1.00	1.15	0.413
Have visited another health professional (dentist, physiotherapist, psychologist, etc.) (Valid *N* = 150)	69 (46%)	60 (40%)	13 (8.7%)	8 (5.3%)	150	2.00	1.73	0.833

	Measurement scale						
Intention to quit smoking	Not at all–a little	Quite a bit	A lot–very much	Valid *N*	Median	Mean	Standard deviation
I do not want to stop smoking (Valid *N* = 150)	79 (52.7%)	37 (24.6%)	34 (22.7%)	150	4.00	3.49	1.365
I think I should stop smoking but do not really want to (Valid *N* = 150)	59 (39.3%)	39 (26%)	52 (34.7%)	150	3.00	3.11	1.372
I want to stop smoking but have not thought about when (Valid *N* = 150)	65 (43.3%)	42 (28%)	43 (28.7%)	150	3.00	2.77	1.318
I really want to stop smoking but I do not know when I will (Valid *N* = 150)	61 (40.6%)	34 (22.7%)	55 (36.7%)	150	3.00	2.95	1.387
I want to stop smoking and hope to soon (Valid *N* = 150)	63 (42%)	25 (16.7%)	62 (41.3%)	150	3.00	2.99	1.459
I really want to stop smoking and intend to in the next 3 months (Valid *N* = 150)	95 (63.3%)	21 (14%)	34 (22.7%)	150	2.00	2.22	1.423
I really want to stop smoking and intend to in the next month (Valid *N* = 150)	120 (80%)	11 (7.3%)	19 (12.7%)	150	1.00	1.81	1.228

	Measurement scale						
Degree of satisfaction, Usefulness, and importance of the Internet	Not at all–a little	Quite a bit	A lot–very much	Valid *N*	Median	Mean	Standard deviation
How satisfied are you with the current ability to search for smoking cessation information?	71 (47.3%)	34 (22.7%)	45 (30%)	150	3.00	2.77	1.332
How useful do you feel that the Internet is to help you make the decision to quit smoking?	82 (54.6%)	34 (22.7%)	34 (22.7%)	150	2.00	2.49	1.320
How important it is for you to have access to online resources related to smoking cessation?	79 (52.7%)	36 (24%)	35 (23.3%)	150	2.00	2.51	1.374

	Measurement scale						
Information needs for smoking cessation Information about…:	Not at all–a little	Quite a bit	A lot– very much	Valid *N*	Median	Mean	Standard deviation
Smoking effects	99 (66%)	28 (18.7%)	23 (15.3%)	150	2.00	2.11	1.240
Existing smoking cessation treatments	106 (70.7%)	21 (14%)	23 (15.3%)	150	2.00	2.03	1.287
The effect that secondhand smoke has on non-smokers	97 (64.6%)	30 (20%)	23 (15.4%)	150	2.00	2.16	1.243
The use and effectiveness of nicotine substitutes	107 (71.3%)	24 (16%)	19 (12.7%)	150	1.00	1.98	1.261
The use and efficacy of bupropion	125 (83.3%)	15 (10%)	10 (6.7%)	150	1.00	1.59	1.024
The use and efficacy of varenicline	124 (82.7%)	16 (10.6%)	10 (6.7%)	150	1.00	1.59	1.050
Counseling treatment	109 (72.7%)	20 (13.3%)	21 (14%)	150	1.00	1.97	1.261
The cost of medication	114 (76%)	18 (12%)	18 (12%)	150	1.00	1.78	1.225
Finding smoking cessation clinics	126 (84%)	11 (7.3%)	13 (8.7%)	150	1.00	1.58	1.095
Finding a General Practitioner for smoking cessation	128 (85.4%)	11 (7.3%)	11 (7.3%)	150	1.00	1.58	1.057
Alternative therapies	115 (76.7%)	18 (12%)	17 (11.3%)	150	1.00	1.88	1.215
Finding support groups	130 (86.7%)	8 (5.3%)	12 (8%)	150	1.00	1.52	1.079

	Measurement scale						
Information resources about smoking cessation	Not at all–a	Quite a bit	A lot–very	Valid *N*	Median	Mean	Standard
Public institutions webpages	122 (81.3%)	13 (8.7%)	15 (10%)	150	1.00	1.71	1.178
Medical staff	121 (80.6%)	16 (10.7%)	13 (8.7%)	150	1.00	1.69	1.111
Health professionals (nurses, health visitors)	126 (84%)	14 (9.3%)	10 (6.7%)	150	1.00	1.56	1.039
Pharmacists	130 (86.7%)	14 (9.3%)	6 (4%)	150	1.00	1.51	0.918
Primary health care services	127 (84.7%)	14 (9.3%)	9 (6%)	150	1.00	1.50	1.008
Internet/search engines (Google)	100 (66.7%)	26 (17.3%)	24 (16%)	150	1.00	2.03	1.300
Social networks (Facebook, Twitter, Blogs)	117 (78%)	20 (13.3%)	13 (8.7%)	150	1.00	1.72	1.112
Broadcast media (television, radio)	116 (77.3%)	18 (12%)	16 (10.7%)	150	1.00	1.79	1.137
Written material (newspapers, magazines, brochures)	120 (80%)	18 (12%)	12 (8%)	150	1.00	1.72	1.063
Family/relatives/friends/colleagues	94 (62.6%)	28 (18.7%)	28 (18.7%)	150	2.00	2.21	1.374
Smoking cessation support groups	136 (90.7%)	11 (7.3%)	3 (2%)	150	1.00	1.29	0.719
Medical webpages	115 (76.7%)	15 (10%)	20 (13.3%)	150	1.00	1.79	1.255
Workshops/seminars	133 (88.7%)	8 (5.3%)	9 (6%)	150	1.00	1.38	0.910

	Measurement scale						
Information health literacy	Not at all–a little	Quite a bit	A lot–very much	Valid *N*	Median	Mean	Standard deviation
I know what health resources regarding smoking cessation are available on the Internet'	94 (62.6%)	30 (20%)	26 (17.4%)	150	2.00	2.32	1.292
I know where to find helpful health resources regarding smoking cessation on the Internet	84 (56%)	35 (23.3%)	31 (20.6%)	150	2.00	2.47	1.309
I know how to find helpful health resources regarding smoking cessation on the Internet	75 (50%)	44 (29.3%)	31 (20.6%)	150	2.50	2.56	1.282
I know how to use the Internet to answer my questions about smoking cessation	64 (42.7%)	49 (32.7%)	36 (24%)	150	3.00	2.65	1.317
I know how to use the health information regarding smoking cessation I find on the Internet to help me	88 (58.6%)	37 (24.7%)	25 (16.7%)	150	2.00	2.31	1.221
I have the skills I need to evaluate the health resources regarding smoking cessation I find on the Internet	66 (44%)	37 (24.7%)	47 (31.3%)	150	3.00	2.77	1.397
I can tell high-quality health resources from low-quality health resources on the Internet	65 (43.3%)	34 (22.7%)	51 (34%)	150	3.00	2.84	1.443
I feel confident in using information from the Internet about my decision to quit smoking	96 (64%)	28 (18.7%)	26 (17.3%)	150	2.00	2.21	1.251

Appendix II: Principal Components Analysis Results for the Study Constructs

	Factor								
Items	1	2	3	4	5	6	7	8	9
Health services usage									
Visit to a specialized doctor	0.825								
Visit to a general practitioner	0.796								
Visit to another health professional	0.614								
Visit/transfer to the emergency department		0.884							
Hospitalization		0.720							
Intention to quit smoking									
I want to stop smoking and hope to soon			0.865						
I really want to stop smoking but I do not know when I will			0.806						
I really want to stop smoking and intend to in the next 3 months			0.763						
I really want to stop smoking and intend to in the next month			0.755						
I want to stop smoking but have not thought about when			0.622						
I think I should stop smoking but do not really want to				0.776					

	Factor								
Items	1	2	3	4	5	6	7	8	9
I do not want to stop smoking				0.768					
Information needs for smoking cessation									
Finding smoking cessation clinics smoking cessation					0.898				
Finding a General Practitioner for smoking cessation					0.859				
Finding support groups					0.820				
Alternative therapies					0.755				
Counseling treatment					0.677				
Smoking effects						0.837			
Existing smoking cessation treatments						0.823			
The effect that secondhand smoke has on non-smokers						0.743			
The use and effectiveness of nicotine substitutes						0.686			
The cost of medication						0.656			
The use and efficacy of varenicline						0.651			
The use and efficacy of bupropion						0.642			
Information sources about smoking cessation									
Health professionals (nurses, health visitors)							0.838		
Primary health care services							0.825		
Medical staff							0.757		
Workshops/seminars							0.752		
Smoking cessation support groups							0.749		
Pharmacists							0.652		
Medical webpages							0.589		
Social networks								0.822	
Broadcast media (television, radio)								0.809	
Internet/search engines (Google)								0.793	
Family/relatives/friends/colleagues								0.706	
Written material (newspapers, magazines, brochures)								0.667	
Public institutions webpages								0.569	
Information health literacy related to smoking cessation									
I know how to find helpful health resources regarding smoking cessation on the Internet									0.906
I know where to find helpful health resources regarding smoking cessation on the Internet									0.877
I have the skills I need to evaluate the health resources regarding smoking cessation I find on the Internet									0.861
I know how to use the health information regarding smoking cessation I find on the Internet to help me									0.852
I know how to use the Internet to answer my questions about smoking cessation									0.844
I can tell high-quality health resources from low-quality health resources on the Internet									0.836

	Factor								
Items	1	2	3	4	5	6	7	8	9
I know what health resources regarding smoking cessation are available on the Internet									0.815
I feel confident in using information from the Internet about my decision to quit smoking									0.729
Cronbach's alpha	0.63	0.47	0.82	0.68	0.92	0.91	0.90	0.88	0.94
	3	6	5	8	0	8	4	9	0
Mean value	1.65	1.22	2.54	3.30	1.70	1.89	1.53	1.86	2.51
Standard deviation	0.79	0.50	1.36	1.36	1.14	1.19	0.99	1.19	1.31
	3	5	3	8	1	4	4	4	4

Notes: (1) Visit to a doctor, (2) Hospitalization, (3) Positive attitude toward smoking cessation, (4) Negative attitude toward smoking cessation, (5) Information needs about finding help, (6) Information needs about smoking cessation process, (7) Formal information sources, (8) Informal information sources, (9) Information health literacy related to smoking cessation

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Qualitative Bioinformatics: Towards a Public Understanding of Neurodegenerative Disease Research through BioArt, Data-Art, Hands-on BioMedia Workshops, Immersive Environments, and Artists in Labs

Adam Zaretsky

Abstract

Neurodegenerative disease (ND) research is producing new pharmaceutical compounds for chronic diseases utilizing bioinformatics. Algorithmic data mining of high-throughput omics systems is conjoined with the study of the in vitro dynamics of protein folding through visualization techniques, i.e., Bio-AFM. Novel models of disease pathway diagrams are being produced and the processes are in place to enhance the validation of these models. From bench work to BLAST to bedside, globally standardized research is led by collaborative clusters, working on cloud-based platforms, with crowd sourced human cohort collections, pairing pure, curiosity-based neurological research with deep learning data analysis techniques. ND research is leading the way towards clinical applications for preventing, curing, or ameliorating major diseases of neurological dysfunction, such as Alzheimer's disease (AD) and Parkinson's disease (PD).

Most of this is too complex for the average citizen to comprehend. Can bioart and data-art contribute to the public understanding of genome sequencing and bioinformatics databases in the context of ND research? Informal studies towards demystifying bioinformatics through creative practices have been tested, revealing significant qualitative benefits for public well-being while introducing bioinformatics databases, for instance, previous projects: the VASTAL Bioinformatics and Literary Studies: (De)Mystified Genetic Code Lab, held at the Waag in Amsterdam, NL, 2009 and more recently the Creative Germline Constructs Bank (CGCB) of the transgenic human Genome Alternatives Project (thGAP), held at Hackteria ZET, Zurich, Switzerland, 2021.

For the Hub of Art Laboratories (HAL), of the Department of Audio & Visual Arts (AVArts), Ionian University in Corfu, Greece, the animation node is challenged to create audiovisual, immersive, and interactive environments that highlight natural processes and phenomena of the microcosm and macrocosm through nature/data interface experimentation. It is the intention of the node's researchers to expand these notions to be inclusive of the processes of the biotechnological and bio-

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A. Zaretsky (✉)
Hub of Art Laboratories (HAL), of the Department of Audio & Visual Arts (AVArts), Ionian University in Corfu, Corfu, Greece

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informatics interrogation of human disease as a part of local clades and global nature. In our productions, we would like to emphasize: cryogenic storage, genome analysis, bioinformatic database management, biomarkers for polygenic abnormalities, genotyping/phenotyping, gene expression patterns over time, AI reading of cloud-based research, experiencial DNA/RNA synthesis, the development of novel DNA, RNA and protein-based therapeutic agents for biomedical applications and CRISPR construct design for model organisms. It is the HAL animation node's goal to design and explore bioart-based, hands-on public workshops that mix bioinformatics and data-art with in-depth knowledge of the scientific community around ND research bodies.

To develop these labs, dedicated artistic research is required to be undertaken through laboratory immersion, interactions with scientists, and hands-on experience in the lab. Artists must experience scientific processes through residencies in labs to learn both how to convey the techniques and the social implications of novel methodologies. Artists developing bioart workshops that can introduce non-specialists to a dizzying array of research methodologies need to know what they are talking about. It takes experience and dedication to convey simplified versions of real-time biosensor data, automated histology, clinical databases of medical case studies (anonymized clients), real-time PCR, novel diagnostic biomarker development, etc. As qualitative researchers, artists in labs ensure creative yet informed art and science (SciArt) outcomes able to stimulate public debate through unorthodox education and accurate playfulness. Obviously, the immersive experience of lab research provides an artist's projects with both nuance and knowledge. How can artists in labs also add to the scientific potentials of a laboratory's research goals?

Keywords

Neurodegenerative disease (ND) · Bioart · Omics · transgenic human Genome Alternatives Project (thGAP) · Parkinson's disease · Data-art · Hub of Art Laboratories (HAL) · Real time PCR · Artists in labs · Biomarkers

Adam Zaretsky, PhD, is a former researcher at the MIT department of biology, who for the past decade has been teaching an experimental bioart class called VivoArts at San Francisco State University (SFSU), SymbioticA (UWA), Rensselaer Polytechnic Institute (RPI), University of Leiden's The Arts and Genomic Centre (TAGC), and the Waag Society. His art practice focuses on an array of legal, ethical, social, and libidinal implications of biotechnological materials and methods with a focus on transgenic humans. Zaretsky stages lively, hands-on bioart production labs. Currently, a Post-Doctoral Fellow at the Hub of Art Laboratories (HAL) of the Department of Audio & Visual Arts (AVArts), Ionian University in Corfu, Greece, he is developing audiovisual immersive environments incorporating biomedia and data-art to animate natural processes and phenomena of the microcosm and macrocosm. At the present, he is also a team member in the project "Rewilding Cultures" developed by the Feral Lab Network and co-funded by the Creative Europe Programme of the European Union.

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Personalized Music Playlists and Headphones in People with Dementia: A Literature Review

Notis Paraskevopoulos

Abstract

According to the World Health Organization (WHO), around 55 million people worldwide have dementia, and Alzheimer's Disease International (2019) estimates that by 2050 this number is expected to rise to 152 million. With no available cure (WHO, 2021), non-pharmacological interventions have become a popular alternative in the treatment of the cognitive, behavioral, and psychological symptoms of dementia (Dementia Australia, 2020). A widely adopted option that come in different forms is music interventions and while the basic means remains music, some choose a more personalized approach and even less deliver music through over-ear headphones. A number of studies regarding the latter approach report positive outcomes; however, solid evidence on its benefits is scarce.

The aim of this literature review was to locate the organizations and initiatives around the world that use the specific approach, explore the different methodologies, search for existing evidence on the interventions' efficacy and the symptoms they address, and look for any ongoing research on the subject. Furthermore, we aimed at investigating if there are any relevant initiatives in Greece.

We systematically searched 16 databases and from 276 eligible records, we located 18 relevant studies that met our inclusion criteria and 1 literature review on music interventions for people with dementia. Our examination and analysis of those studies suggested that music interventions utilizing personalized music playlists and headphones result in positive outcomes, including mood improvement and a significant decrease of behavioral and psychological symptoms of dementia. However, our analysis also pointed the need for further and more focused research.

Keywords

Dementia · Alzheimer's · Non-pharmacological interventions · Psychosocial interventions · Music · Effect · Headphones · Personalized · Playlists

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N. Paraskevopoulos (✉)
Department of Informatics, Ionian University,
Corfu, Greece

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Neuroeducation and Genetics

Georgia Tzortsou

Abstract

Nowadays, more and more educators are turning to neuroscience to be able to discover how children's brains and cognitive development are shaped by their learning experiences. This article discusses the link between neuroeducation and genetics. Several learning disabilities arise from specific genetic characteristics. The contribution of neuroscience is remarkable as it helps to understand the working mechanisms and organization of the brain, from the nerve cell to the integrated nervous system, to bridge the organic bases of behavior with their potential applications. In addition, research in the field of neuroeducation combined with the contribution of information and communication technology (ICT) to the teaching and learning process makes learning more accessible and easier for students.

Keywords

Neuroscience · Neuroeducation · Genetic · ICT

G. Tzortsou (✉)
Department of Informatics, Ionian University,
Corfu, Greece

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