



# The role of the personality traits and work characteristics in the prediction of the burnout syndrome among nurses—a new approach within predictive, preventive, and personalized medicine concept

Simona Grigorescu<sup>1,2</sup> · Ana-Maria Cazan<sup>1</sup> · Ovidiu Dan Grigorescu<sup>1,3</sup>  · Liliana Marcela Rogozea<sup>1</sup>

Received: 22 July 2018 / Accepted: 9 October 2018 / Published online: 25 October 2018  
© European Association for Predictive, Preventive and Personalised Medicine (EPMA) 2018

## Abstract

**Background** The burnout syndrome is characterized by emotional exhaustion, depersonalization, and lack of personal accomplishment. It was identified in some professional categories, the most often being affected those in public health services.

**Objectives** This study mainly aims to identify and analyze the value of the personality traits and work characteristics as predictive factors for the occurrence of the burnout syndrome in nurses, under the new approach of predictive, preventive, and personalized medicine.

**Method** A total of 192 nurses were included in the study. The NEO-Five-Factor Inventory, the Copenhagen Burnout Inventory, and the Inventory of Nursing Work Characteristics were administered to all of the participants.

**Results** Some personality traits proved to be predictive factors for the occurrence of the burnout syndrome. Neuroticism, negative self-esteem, and negative emotionality predict burnout vulnerability. The negative correlations between sociability and the burnout dimensions show that the positive affectivity of the extraverted individuals and the strong positive orientation of the extraverts towards others are protective factors against burnout. There are also significant associations between certain personality traits and nursing work characteristics (work overload, the existence of problems in the department, and satisfaction in the professional and family life), which could be defined, also, as predictive factors for burnout.

**Conclusions** This study confirms the influence of the Big Five personality traits and nursing work characteristics as predictive factors of the burnout occurrence, opening real possibilities to perform a targeted prevention and provide personalized interventions as organizational services.

**Keywords** Predictive, preventive personalized medicine · Burnout syndrome · Personality traits · Work characteristics · Nurses · Copenhagen Burnout Inventory

✉ Ovidiu Dan Grigorescu  
dan\_o\_grigorescu@yahoo.com

Simona Grigorescu  
simo.grigorescu@yahoo.com

Ana-Maria Cazan  
ana.cazan@unitbv.ro

Liliana Marcela Rogozea  
r\_liliana@unitbv.ro

<sup>1</sup> Transilvania University of Brasov, 29, Eroilor Street, 500036 Brasov, Romania

<sup>2</sup> Emergency Clinical Children Hospital Brasov, 45, Nicopole Street, 500063 Braşov, Romania

<sup>3</sup> Emergency Clinical County Hospital Brasov, 25-27, Calea Bucuresti Street, 500326 Braşov, Romania

## Introduction

Belonging to the modern world, the burnout syndrome is a pathological entity that was put into evidence by Freudenberg at the end of the twentieth century (1974), its complexity remaining not elucidated even in present times [1]. As a general definition, the burnout syndrome is a state of mental, physical, and emotional stress resulting in a chronic state of pressure or stress at work, being associated with individuals who do “people work” [2].

The best known and the most widely used definition of burnout was described by Christina Maslach as a syndrome characterized by emotional exhaustion (depletion of emotional resources and decrease of individual energy), depersonalization (negative attitudes and feelings, insensitivity, and lack

of compassion for the customers), and lack of personal accomplishment starting from a negative self-evaluation of one's own professional activity and ending with feelings of diminished competence [3, 4].

Despite the research on burnout as a syndrome and, probably, because it is put off by the fuzzy definition of the syndrome or the large overlaps between it and established psychiatric diagnostics such as depression or adaptation disorder, this pathological entity has not yet been given a specific place in ICD-10 or DSM-IV as a particular disease [5]. More precisely, burnout is not even mentioned in DSM-IV, and in ICD-10, it is listed in the residual category “Z 73, problems related to life management difficulty” as “burnout: state of vital exhaustion,” burnout being considered more as a risk factor for developing depression [6].

Even more, the burnout syndrome must be differentiated from some other apparently similar syndromes, such as the chronic fatigue syndrome and the sub-optimal health syndrome, which are characterized by specific symptoms, some of them being common with those of the burnout syndrome itself. However, burnout is clearly distinct from them. In fact, burnout and chronic fatigue are related, but, conceptually, they are different constructs. Therefore, burnout is conceptualized as a work-related condition whereas chronic fatigue is seen as a more general condition [7].

For the nursing population, studies show that the chronic fatigue syndrome is related to long working hours, rotating shifts, and night shifts, while burnout is generated not only by these factors but by many more others [8]. There are specific differences also between burnout and the sub-optimal health syndrome (SHS), the latter being characterized by ambiguous health complaints, general weakness, and lack of vitality, and it may be associated with progression or development of chronic diseases, SHS being regarded as a subclinical, reversible stage of such diseases [9]. Sharing some similar conditions with SHS, burnout, as a specific syndrome, is not only a physical state between health and illness (as SHS is defined) [10], but a complex physical, mental, and emotional condition [2], not associated with the evolution of chronic diseases.

The burnout syndrome was identified in some professional categories which provide hard work in the public services area, most often being affected those involved in public health services (doctors, nurses). Nurses are a professional category usually under the pressure of stress factors, as concluded in some studies [11–13]. Nursing has been one of the fastest growing professions in the past 20 years and it is projected to keep growing 19% faster than all other occupations, at least until the year 2022 [14].

Nursing is considered a high-risk profession, one with high levels of stress and exhaustion, these levels increasing in the modern era [4, 15, 16]; the burnout syndrome in nurses may

be generated by their frequent interactions with un-cooperative, aggressive, or suspicious patients and with people with unrealistic expectations or facing severe chronic diseases [17]. This profession is associated with high levels of burnout, producing many negative effects on the individual and organizational level. Furthermore, it provides negative systemic effects in economic terms and in terms of quality of the healthcare related to the patient.

Burnout among nurses not only leads to a decrease in their personal satisfaction, but subsequently can seriously affect the quality of the provided health services and their professional development [18]. High levels of burnout among health professionals have been associated with physical illness, obesity, sleep disorders [19], psychiatric diseases [20], suicide attempts [21], and higher rates of cardiovascular disease [22]. Because of prolonged exposure to a high workload, of treating patients who are terminally ill, of inappropriate training for the workplace exigencies, and of emotional exhaustion, nurses, as healthcare professionals, are frequently exposed not only to the burnout syndrome manifestations, but, supplementary, also to the danger of psychotropic substance abuse or alcohol [23].

In health care units (wards, departments), the burnout syndrome occurrence in nurses as medical staff may generate a decline in the quality of medical care and a high risk of errors related to the management of patients [17], to the administration of medication, and to the nosocomial infections [24]. Because of the serious consequences of the burnout syndrome in nurses, both at the individual and at the organizational level, it is extremely important to identify as soon as possible its clinical manifestations in order to make possible their removal or, better, to prevent their appearance by using specific measures.

To accomplish this goal, it is very important to use as modern approach the newer and more effective strategies developed in the innovative paradigm of predictive, preventive, and personalized medicine concept [25], which demands a continuous effort to discover and identify any probable predictive factors, to implement all the effective prevention measures possible and, at the same time, to reduce the consequences of the burnout syndrome by specific personalized interventions and methods.

The early detection of individual predispositions for the burnout syndrome in the healthcare professions, followed by preventive treatments tailored for nurses, should observe the modern obligations of primary healthcare [25]. Maslach and her collaborators considered the lack of concordance between the employee and his work or his professional environment a very important predictive factor of the burnout syndrome [26]. To identify the vulnerability factors which can lead to individual psychological disturbances, many researchers demonstrated that personality traits could be considered predictive factors for the occurrence of diseases such as depression or burnout.

The Big Five Theory (also known as The Traits Theory) is the newest and the most studied theory, demonstrating that personality influences certain behaviors, attitudes, and work performance, as well as the physical and mental health [27]. Certain personality characteristics have been considered important predictors of the manner in which individuals perceive and respond to the workplace requirements, especially because personality is seen as a relatively stable factor when compared to unstable situational predictors, such as workload.

Nowadays, the burnout syndrome has become a problem which must be solved mostly in terms of prevention, its removal by specific interventions being much more difficult than its prevention. In this context, there must be identified, first of all, the individual and organizational professional factors perceived as stress generators, as well as some new and complex prophylactic strategies in order to fight them [28].

The personality traits must be analyzed as predictive factors of the burnout syndrome because some of them could be predispositions to the burnout emerging pathology. The prediction of the burnout syndrome could also be determined by the characteristics of the nursing work, which could become in some cases “burnout markers,” being able to predict some of the symptoms of this syndrome.

According to the predictive, preventive, and personalized medicine concept, which is considered to be the main determinant of future medicine development, the burnout syndrome, as new arisen pathology, can be addressed on all the PPPM levels. Individually, the three PPPM elements are increasingly becoming a recognized concept and are gradually integrated into healthcare systems across Europe in various forms. The approaches related to the burnout syndrome could also be included, as efforts to develop predictive tools and deliver personalized care [29]. In a modern approach of the burnout syndrome, both predictive elements of its occurrence and certain prevention and personalized actions could be developed, such as specialized interventions targeted at nurses who have developed or are about to develop the syndrome in the near future.

## Objectives

The main aims of this study are to identify and, subsequently, to analyze, the value of personality traits and work characteristics as predictive factors of the burnout syndrome in nurses. More specifically, we aimed to highlight the mechanism through which the personality traits and the nursing work characteristics could provide a valuable prediction for the emergence of professional emotional exhaustion, as equivalent of the burnout syndrome. Another purpose is to put in evidence the link between those predictive factors and the possibilities to prevent the increase of the syndrome occurrence and to provide specific personalized interventions

having as purpose the elimination of its pathological manifestations.

To achieve these aims, we pursued several hypotheses, related to the existence of significant associations between (a) the burnout syndrome and the personality traits, (b) the burnout syndrome and the nursing work characteristics, and (c) the personality traits and the nursing work characteristics.

## Material and method

### Participants

The study was conducted in the Emergency Clinical County Hospital of Brasov, Romania, pencil-paper questionnaires being administered to 210 nurses. Finally, we considered as valid (completely filled in) only 192 of the questionnaires. Subsequently, statistical analysis were carried out on these 192 valid questionnaires, representing 178 women and 14 men with an average age of 37, all of them being full-time employees of the Emergency Clinical County Hospital Brasov, Romania. The participation was voluntary and the participants did not receive any material rewards. In terms of experience and seniority at the workplace, the participants were distributed as shown in the table below (Table 1):

### Instruments

The instruments used in this study were the NEO Five-Factor Inventory (NEO-FFI) [30, 31], the Copenhagen Burnout Inventory [32]—the Romanian version and the Inventory of Nursing Work Characteristics, and the last one being designed by the authors of the research.

The NEO-Five Factor Inventory (NEO-FFI) is the short version of NEO-Personality Inventory (NEO-PI-R) and it contains 60 items divided into five personality traits, each of them containing two sub-dimensions: neuroticism (negative self-esteem, negative emotionality), extraversion (sociability, activism), openness (curiosity, mental flexibility), agreeableness (trust, politeness), and conscientiousness (productivity, organization) [31]. The Cronbach’s alpha coefficients for the Big Five traits ranged between .76 and .90 [31].

The Copenhagen Burnout Inventory (CBI) [32] contains 19 items measured on a five-point Likert scale grouped in three parts which can be applied in different domains. The personal burnout dimension refers to the personal exhaustion, the degree of physical and mental fatigue experienced by the individual. The second dimension, work-related burnout, refers to the physical and psychological fatigue perceived by the individual as being related to his/her professional activity. The client (patient)-related burnout refers to the degree of physical and mental fatigue and exhaustion perceived by the affected person as related to his/her work with clients (patients). In

**Table 1** Distribution of participants by seniority

	Work experience as a nurse		Work experience at the current workplace	
	<i>N</i>	%	<i>N</i>	%
Less than 5 years	50	26.0	56	29.2
5–10 years	30	15.6	41	21.4
10–15 years	31	16.1	30	15.6
More than 15 years	81	42.2	65	33.9
Total	192	100	192	100

order to correctly understand the term “client,” it should be noted that when the CBI is used in practice, “client” refers to those who work in the human service sector, such as user, patient, student, client, and colleague [33]. The Cronbach’s alpha coefficients for the burnout dimensions ranged between .83 and .91, the coefficient for the entire scale being .92.

The Nursing Work Characteristics Inventory includes 24 items grouped in seven dimensions evaluating in detail the respondents’ perception on their workplace. The “Insults” dimension contains three items related to the presence of tensed relationships between nurses and other people (patients or professional colleagues belonging to the same speciality or to others) and insults or the lack of support from the colleagues (either equals or superiors in the hierarchical management of the organization). The three items included in the “task overload” dimension are linked to the workplace tasks that are either not fulfilled or are being defective, to the continuous time pressure, the lack of fulfilling the job descriptions and to the obligation to work overtime. The inventory also contains items related to unbalanced poor human resources compared to the existing necessities (number of hospital beds/patients, the specific medical pathology). The “Work context” dimension includes five items related to specific characteristics of the nursing activity, represented by the continuous work organized in cyclic periods of time (including the night) or shift work, by the nursing performed to the patients with severe chronic pathologies and by the level of emotional impairment generated by the relationship with these types of patients. The “Life satisfaction” dimension contains four items assessing the emotional support provided by the family members of the nurses, the feeling of emotional fulfillment, and the amount of time allocated for socialization and relaxing activities. Finally, this inventory includes questions that allow a specific analysis of the nurses’ perception on the psychological interventions (five items), the involvement of the psychologist in solving emotional problems identified in the department that may adversely affect the professional environment, their willingness to participate in these interventions (two items), and the agreement/disagreement regarding the disclosure at the management level about the identity of the employees affected by these problems (two items). The

Cronbach’s alpha coefficients for the work characteristics dimensions ranged between .67 and .97.

### Statistical analysis

The statistical analyses were performed using SPSS and AMOS (v 24.0). The quantitative data were normally distributed as indicated by the values of the skewness and kurtosis tests and no evidence of multivariate outliers was identified. The Pearson correlation analysis was used to analyze the associations between the burnout syndrome dimensions, the personality traits, and the nursing work characteristics. The prediction of the burnout syndrome emergence through the relationship between the personality traits and the nursing work characteristics was determined by path analysis, the personality traits being exogenous variables, and the work characteristics, mediating variables. The analysis of the direct and indirect effects of personality traits and work characteristics on burnout was also performed, in order to highlight if work characteristics could be considered mediators.

## Results

### The relations between the burnout syndrome and the personality traits

The analysis of the associations between the burnout syndrome and the traits of personality revealed the presence of statistically significant Pearson correlations (Table 2).

The analysis showed significant correlations between all the Big Five personality traits and only two dimensions of the burnout syndrome, personal burnout and work-related burnout, while patient-related burnout was unrelated to the personality traits. The strongest correlations were obtained for neuroticism. The study also highlighted that nurses with high levels of negative self-esteem and negative emotionality, characterized by negative attitude, disappointment, feelings of frustration, and helplessness, showed high levels of personal burnout, work-related burnout, and implicitly, total burnout. Among the facets of extraversion, sociability correlated negatively with the dimensions of burnout. There was also a statistically significant

**Table 2** Pearson correlation coefficients obtained between burnout and personality trait dimensions

	Personal burnout	Work related burnout	Patient related burnout	Total burnout
Neuroticism	<i>.408***</i>	<i>.409***</i>	.130	<i>.412***</i>
Negative self-esteem	<i>.359***</i>	<i>.364***</i>	.126	<i>.369***</i>
Negative emotionality	<i>.282***</i>	<i>.272***</i>	.063	<i>.270***</i>
Extraversion	–.139	–.195**	–.083	–.182*
Sociability	–.158*	–.230**	–.087	–.208**
Activism	–.054	–.062	–.043	–.069
Openness	.120	.081	–.009	.069
Curiosity	.003	.016	–.024	–.012
Mental flexibility	<i>.151*</i>	.102	.032	.111
Agreeableness	–.098	–.081	–.023	–.093
Trust (suspicion)	.012	.000	.011	.001
Politeness	–.209**	–.156*	–.063	–.181*
Conscientiousness	–.196**	–.204**	–.089	–.211**
Productivity	–.182*	–.161*	–.071	–.175*
Organization	–.127	–.175*	–.075	–.169*

Italic figures were used to highlight the statistically significant values

Note: \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ ,  $N = 192$

but weak correlation between mental flexibility as expression of openness to experience and personal burnout. Analyzing the agreeableness, only politeness correlated negatively with all three burnout dimensions. On the other hand, conscientiousness and its components (productivity and organization) correlated positively with all the dimensions of burnout (except the patient-related burnout dimension) (Table 3).

### The relations between the burnout syndrome and the nursing work characteristics

Consistent with the previous results, the analyses showed that people with low levels of life satisfaction had high levels of all the dimensions of exhaustion. Task overload was positively associated with burnout. Statistically significant and positive correlations were obtained for the associations between burnout and the problems identified in the ward in which the nurses practiced their profession (Table 4).

### The relations between the nursing work characteristics and the personality traits

As concerning life satisfaction as a characteristic of the nursing work, the results showed that nurses with high levels of neuroticism—and especially with high negative self-esteem—declared low levels of life satisfaction. On the other hand, people with high levels of extraversion—especially a high level of sociability, conscientiousness—a high level of productivity and politeness showed high levels of life satisfaction. High levels of task overload were found only for the neurotic individuals and especially in those with negative self-esteem. The tendency to identify or

perceive problems in the organizational environment was more strongly found in people with negative emotionality. Extraverted people, with high levels of curiosity, agreeableness, and conscientiousness considered the psychologist's and manager's interventions effective in solving various problems of the employees at their workplace, while neurotics had the tendency to accumulate negative affects and develop irrational thoughts. Positive perception of the work context was more common in people with high levels of extraversion (both sides of extraversion positively correlating with the work context), with high levels of curiosity, agreeableness (only politeness correlated significantly and positively with the work context), and conscientiousness, both high productivity and organization being associated with the positive perception of the work context. Surprisingly, people with high levels of mental flexibility showed less favorable perceptions of the work context.

### Prediction of the burnout syndrome

One of the most important objectives of the present study was to demonstrate if personality traits and the nursing work characteristics could predict the burnout syndrome. More specifically, we wanted to highlight whether the relationship between personality traits and burnout was mediated by the work characteristics. To test this hypothesis, the path analysis was used, the personality traits being exogenous variables, and the work characteristics, mediating variables (Fig. 1). Thus, we wanted to analyze the extent to which, on one hand, personal characteristics could be considered predictors of burnout and, on the other hand, whether perceptions of work characteristics could diminish or accentuate this prediction.



**Table 3** Pearson correlation coefficients obtained between burnout and work context

	Personal burnout	Work-related burnout	Patient-related burnout	Total burnout
Insults	-.016	-.038	.040	-.010
Intervention	-.081	-.030	.038	-.035
Context	-.088	-.038	.023	-.043
Satisfaction	-.259**	-.353***	-.390***	-.440***
Identity	.129	.111	.099	.149*
Problems	.088	.158*	.188**	.173*
Overload	.302***	.399***	.180*	.382***

Italic figures were used to highlight the statistically significant values

Note: \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ ,  $N = 192$

We also included in the model the seniority in working as a nurse as a predictor of perceptions on work characteristics and of the burnout syndrome. The obtained model has good fit indices (Table 5).

The analysis of the direct and indirect effects of personality traits and work characteristics on burnout showed that from all of the personality traits of the Big Five model, only neuroticism had significant indirect effects on burnout. Thus, the association between neuroticism and burnout was mediated by the work characteristics, life satisfaction being the most significant mediator (Table 6).

Conscientiousness had a significant direct negative effect on burnout, low levels of conscientiousness predicting high burnout. Among the work characteristics, life satisfaction had significant direct effects on burnout. A low level of satisfaction (negative indirect effect) and high levels of work overload (positive direct effect) could explain the high levels of burnout. Extraversion

and conscientiousness had significant direct positive effects on the perception of work context. In addition, conscientiousness had significant but low direct effects on the attitude towards participation in psychological interventions. At the same time, high seniority had significant positive effects on the pro-active attitude towards participation in psychological interventions. Thus, high conscientiousness and seniority became predictors of positive attitude towards involvement in psychological interventions at work. Instead, high neuroticism had direct effects on overload and negative direct effects on life satisfaction.

## Discussions

Predictive, preventive, and personalized medicine (PPPM) is a new philosophy in healthcare that addresses the majority of already known disorders. Recently emerged in the first decade

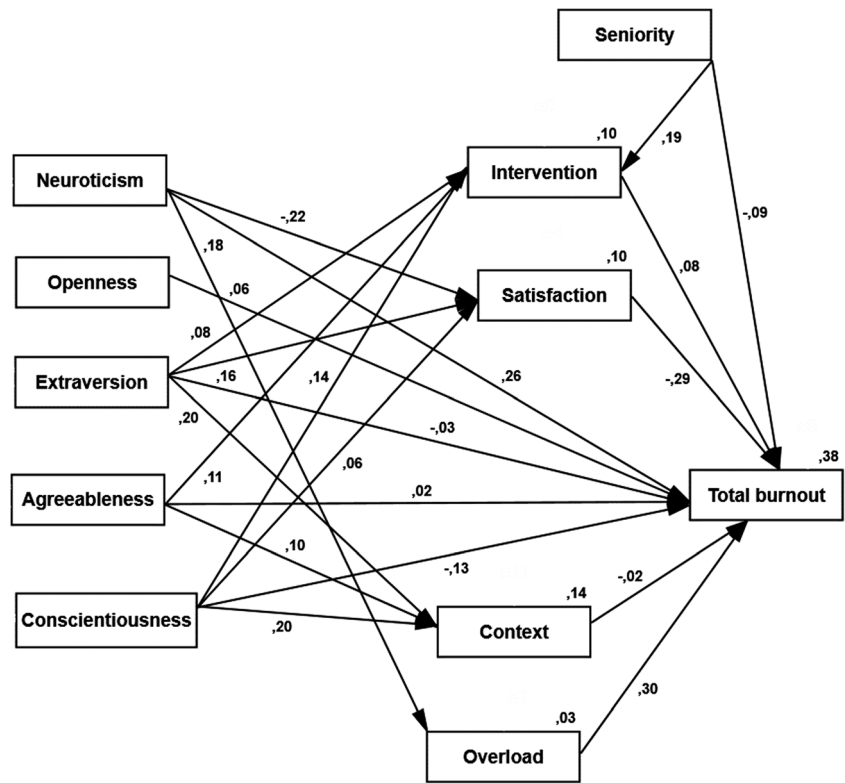
**Table 4** Pearson correlation coefficients obtained between work characteristics and personality traits

	Insults	Intervention	Context	Satisfaction	Identity	Problems	Overload
Neuroticism	-.111	-.009	-.048	-.266***	.091	.056	.178*
Negative self-esteem (NI)	-.104	-.033	-.051	-.263***	.072	-.001	.149*
Negative emotionality (N2)	-.063	.050	-.014	-.117	.080	.154*	.138
Extraversion	.082	.146*	.291***	.228**	.071	.046	.038
Sociability	.076	.118	.242**	.235**	.057	.044	.003
Activism	.058	.130	.250***	.125	.065	.031	.078
Openness	.107	.101	-.026	-.105	-.022	-.001	.015
Curiosity	.120	.198**	.151*	-.013	.060	-.011	-.056
Flexibility	-.025	-.039	-.273***	-.113	-.003	.010	.130
Agreeableness	.062	.174*	.208**	.120	-.083	-.056	.033
Trust	.074	.128	.134	.052	-.112	.007	.059
Politeness	.003	.134	.192**	.149*	.015	-.118	-.029
Conscientiousness	.038	.207**	.321**	.172*	.061	-.030	.084
Productivity	.080	.238**	.297**	.172*	.098	-.065	.068
Organization	-.045	.063	.209**	.091	-.026	.038	.069

Italic figures were used to highlight the statistically significant values

Note: \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ ,  $N = 192$

**Fig. 1** Associations between personality traits, work characteristics, and burnout



of the twenty-first century, this new concept was considered as a “paradigm shift” able to open up new ways and bring remarkable changes in medicine by switching the approach from the delayed interventional nature of traditional medicine to the concept of predictive diagnosis and personalized treatment, including the prevention of the majority of diseases [34]. The benefits of this “paradigm shift” consist in substantial improvement of life-quality and identification of plausible solutions for particular social and economic problems that we face in the current healthcare systems worldwide [35].

Predictive, preventive, and personalized medicine has the enormous advantage of offering great promise for the future practice of medicine, being the hot spot and future direction in many fields of medicine [36]. The burnout syndrome has been studied only recently, since the last years of the twentieth century, representing itself, as well, a new discovered pathological entity. The emotional exhaustion is usually approached only after it was diagnosed, when a specific treatment is recommended. The existing philosophy of personalized medicine

seems to perfectly match the burnout syndrome and the necessity of its early accurate diagnose and therefore conducive to better treatment results due to both early detection and targeted therapeutic interventions on intervention-specific subgroups of patients [37]. Nurses, as a professional category, could be considered a subgroup of subjects affected by the pathologic manifestations of the burnout syndrome.

A consolidated position of PPPM professionals towards the new European programme Horizon 2020 could provide the long-lasting instruments for scientific and technological progress in medical services, including the new approaches related to the burnout syndrome among healthcare professionals. Horizon 2020 provides unlimited room for research and implementation in predictive, preventive, and personalized medicine. However, the overall success of the program strongly depends on the effective communication and consolidation of professionals relevant for PPPM as well as on the quality of the communication with the policymakers [38, 39].

In the context in which, fortunately, the practical aspects of the paradigm shift from un-PPPM to PPPM have been already studied [40], to attempt from the early beginning to change this approach in the case of the burnout syndrome is almost mandatory.

The present research analyzed the connections between the elements involved in the appearance of burnout in order to conceive a pattern for recognizing the burnout syndrome among nurses in terms of predictive, preventive, and personalized medicine. Regarding the identification of the possible predictive factors for the occurrence of the burnout syndrome in nurses, the results

**Table 5** Fit indices for the path analysis

$\chi^2/df$	<i>P</i>	CFI	TLI	AIC	RMSEA (90%CI)
.86	.004	.903	.810	128.24	.067 (.038–.085)

CFI Comparative Fit Index, TLI Tucker-Lewis Index, AIC Akaike information criterion, RMSEA root mean square error of approximation, 90% CI 90% reliability intervals for RMSEA

**Table 6** Direct and indirect effects of personality traits and work characteristics on burnout

	<i>Context</i>	<i>Intervention</i>	<i>Overload</i>	<i>Satisfaction</i>	<i>Burnout</i>		
EFFECTS							
	Direct	Direct	Direct	Direct	Direct	Indirect	Total
Neuroticism	–	–	<i>.18**</i>	– <i>.22**</i>	<i>.26**</i>	<i>.12**</i>	<i>.38**</i>
Openness	–	–	–	–	.06	–	.06
Extraversion	<i>.20**</i>	.08	–	<i>.16*</i>	– .03	– .04	– .07
Agreeableness	.10	.11	–	–	.02	.006	.026
Conscientiousness	<i>.20**</i>	<i>.14*</i>	–	.06	– <i>.13*</i>	– .01	– <i>.14*</i>
Seniority	–	<i>.19**</i>	–	–	– .09	.02	– .07
Context	–	–	–	–	– .02	–	–
Intervention	–	–	–	–	.08	–	–
Satisfaction	–	–	–	–	– <i>.29**</i>	–	–
Overload	–	–	–	–	<i>.30**</i>	–	–

Italic figures were used to highlight the statistically significant values

Note: \*\* $p < .01$ , \* $p < .05$ ,  $N = 192$

indicated that the personality traits and nursing work characteristics could be considered predictive factors.

The already evidenced strong correlation between the burnout syndrome and neuroticism could be explained through the argument that neuroticism is a vulnerability factor that generates negative, non-adaptive emotions, increasing the individual's sensitivity to stress [41–44]. It is also known that people with this characteristic tend to amplify the importance of certain situations, to change their perception on events or on their own person, thus generating changes in their attitude, even at work [45]. Highlighting the fact that nurses with high levels of negative self-esteem and negative emotionality show high levels of personal burnout, work-related burnout and implicitly, total burnout, the results underline that individuals characterized by negative attitudes, disappointment, feelings of frustration, or helplessness progressively develop some mechanisms of non-adaptive coping. Another argument is that individuals with high negative self-esteem, being more anxious, more dependent, more defensive, with affective lability and a diminished capacity to control stressful situations, tend to develop emotional exhaustion [44–46]. The lack of associations between the personality traits and the patient-related burnout shows that the basis of exhaustion is represented by the work conditions, not necessarily by the specificity of work. Thus, negative self-image, the difficulty of managing daily stress, and psychological tension, which are the characteristics of people with high scores in neuroticism, are associated with high burnout [47–50]. The negative correlation between sociability, as facet of extraversion, and burnout shows that positive affectivity and the strong positive orientation of extraverts are also predictors of burnout, being protective factors. The involvement in the social or interpersonal environment, associated with effective communication and networking skills, can be considered as adequate resources for stress management. The statistically significant correlation between the burnout syndrome and mental flexibility (as an

expression of openness to experiences) could explain why open minded people, who have good adaptive capacity and ability to find new solutions in problem solving, manage to better cope with various stress-generating problems, avoiding the apparition of emotional exhaustion. The negative association of politeness, as facet of agreeability, with burnout shows that people who tend to behave respectfully to the people they interact with as well as people available to provide assistance or help to others have lower levels of exhaustion. The fact that less conscientious people exhibit higher levels of exhaustion than those characterized by a high level conscientiousness could be sustained by the argument that the first ones have a lower flexibility. Being less organized, they become subjects of criticism and they are exposed to the pressures of their managers.

Regarding the associations between the personality traits and the nursing work characteristics, the results show that nurses with high levels of neuroticism, especially with high negative self-esteem, experiment low levels of life satisfaction. On the other hand, people with high levels of extraversion (high sociability) and conscientiousness (high productivity and politeness) show high levels of satisfaction. Neurotic individuals constantly experience higher levels of work overload and have the tendency to amplify the importance of certain situations, to change their perception on events or even on themselves, or generate changes, including their attitude or behavior at work. Extraverted people, with high levels of curiosity, agreeability, and conscientiousness consider the psychologist and manager's intervention effective in solving various problems of employees at their workplace, while neurotics have the tendency to accumulate negative affects and develop irrational thoughts. Surprisingly, people with high levels of mental flexibility show less favorable perceptions of the work context, perhaps because a high level of non-conformism is associated with dissatisfaction related to the given conditions.



In order to provide a systematic prediction of the burnout syndrome, we tested the mediating role of the work characteristics in the relationship between personality traits and burnout. Why from all of the Big Five personality traits, only neuroticism had significant indirect effects on exhaustion? The answer is based on the consideration that neurotic individuals are more prone to exhaustion because of their low levels of emotional energy. Simplifying, individuals with high neuroticism have less effective coping mechanisms [43].

Satisfaction with life proved to be a significant mediator. If there were significant direct associations between neuroticism and burnout, a lower life satisfaction would provide a double negative influence on the emergence of the exhaustion, by two correlative effects: the direct one and the intermediate one, which increased the negative total effect by summation. In addition to life satisfaction, as expected, work overload predicted high burnout. The constant effect generated by these two characteristics could be explained by the immense pressure to which nurses are exposed because of the severe overload of daily work, sometimes generated by the decisions of a management confronted with a long and continuous crisis of the Romanian medical system. In this context, it is obvious why an easy and appropriate communication existing in a multi-disciplinary team could become an important factor for reducing the burnout syndrome, enhancing the professional satisfaction and fulfilling, and, at the same time, reducing the incidence of the psychological pathology.

Moreover, special emphasis should be given to find if there are links between the predictive factors already identified and the possibilities to prevent the apparition of the syndrome and to provide specific personalized interventions to remove its pathological manifestations. Thus, as a preventive measure, nurses should be individually assessed by a psychologist as soon as possible after they are hired as members of the hospital staff. This kind of psychological assessment should be accomplished at appropriate intervals established according to the nursing work characteristics of different work places. One of the main objectives of the organizational management must be to avoid keeping nurses with such specific personality traits in inappropriate work conditions, predisposing them to the burnout syndrome. Preventing the development of the burnout syndrome among nurses is more than necessary, but applying personalized measures to remove its pathological markers is mandatory.

The main strength of the study is, in our opinion, the idea of the necessity to organize in hospitals two categories of interventions as personalized measures specifically oriented to fight the burnout syndrome consequences: (a) organizational interventions, having as main purpose the change of certain nursing working characteristics in order to prevent or decrease the emergence of the burnout syndrome; secondary, an institutional framework would be necessary, consisting in clear selection criteria for nurses, applied either before the moment of the examination, either after it, in order to provide a correct orientation of the nurses in specific workplaces; (b) psychological

interventions dedicated especially to the nurses affected by emotional exhaustion (as individual or group interventions), performed in parallel with focused training programs having as purpose the prevention of the burnout syndrome emerged at the workplace.

This study has some limitations. The first one is represented by the unequal distribution in terms of gender of the participants (98% women, 2% men), characterizing the Romanian health system. The gender differences were already highlighted in the literature [31], but the results of this study could be applied mostly for women nurses. In that case, a future study should include a larger sample of males, in order to find out if the relationship between burnout and personality traits or nursing work characteristics is the same in men and women. The second one is linked to the low sample size which is not representative for the entire national health system. Increasing the territorial coverage of the study and extending the research also for the physicians, as a different professional category is a future research direction.

## Conclusions

This study confirmed the influence of Big Five personality traits on the burnout dimensions as valuable predictor factors. High neuroticism and low satisfaction with life are the main burnout vulnerability factors in nurses, while openness and extraversion were identified as burnout protective factors. Work overload, the problems identified in the ward, the satisfaction in the professional and family life as nursing work characteristics were associated with certain personality traits, having also significant predictive value for the burnout syndrome occurrence.

The study emphasized the utility of instruments identifying the personality profiles of healthcare professionals, so that the medical staff with vulnerable personality traits could benefit in an active way from specific prevention of emotional exhaustion programs and personalized interventions, both at the individual and organizational level, according to the modern concept of predictive, preventive, and personalized medicine.

**Acknowledgements** We acknowledge that the development of the research was authorized by the nurses who participated in this study and the research team would like to thank the management team of the Emergency County Hospital Brasov for their cooperation.

**Authorship statement** The authors certify their contribution to this manuscript, as follows:

Study design (SG, LMR); data collection (SG, ODG) and analysis (SG, AMC); manuscript writing (SG, ODG, AMC).

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest. All authors approve the content of the manuscript and have contributed significantly to the research and the writing of the manuscript.

**Ethical approval** The research did not involve any risk for the participants. All ethical guidelines were followed as required for conducting human research. The procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional research, the study being approved to be run by the manager of the Emergency County Hospital Brasov, where the study was conducted and by the Committee for Ethical Research of Transylvania University of Brasov (Ethical approval number 06.2/2017). The research was also consistent with the ethical guidelines of The College of Psychologists in Romania.

The research complies with the provisions of the Declaration of Helsinki (as revised in Brazil 2013). All the participants gave their informed consent for the research and their anonymity was preserved.

## References

- Montero-Marín J, Araya R. Understanding burnout according to individual differences: ongoing explanatory power evaluation of two models for measuring burnout types. *BMC Public Health*. 2012;12:922. <https://doi.org/10.1186/1471-2458-12-922>.
- Aiken LH, Sloan D. Effects of organizational innovations on AIDS care on burnout among hospital nurses. *Work Occup*. 1977;24(4):455–77.
- Khamisa N, Peltzer K. Burnout in relation to specific contributing factors and health outcomes among nurses: a systematic review. *Int J Environ Res Public Health*. 2013;10(6):2214–40. <https://doi.org/10.3390/ijerph10062214>.
- Grigorescu S, Grigorescu D, Rogozea L. Psychosocial factors generators of burnout in the public health system. *J Med Brasov*. 2016;4–10 ISSN 1841-0782.
- Korczak D, Huber B, Kister C. Differential diagnostic of the burnout syndrome. *GMS Health Technol Assess*. 2010;5(6). <https://doi.org/10.3205/hta000087>.
- Kaschka WP, Korczak D, Broich K. Burnout: a fashionable diagnosis. *Dtsch Arztebl Int*. 2011;108(46):781–7. <https://doi.org/10.3238/arztebl.2011.0781>.
- Raftopoulos V, Charalambous A, Talias M. The factors associated with the burnout syndrome and fatigue in Cypriot nurses: a census report. *BMC Public Health*. 2012;20(2):457. <https://doi.org/10.1186/1471-2458-12-457>.
- Richter K, Acker J, Adam S, Niklewski G. Prevention of fatigue and insomnia in shift workers—a review of non-pharmacological measures. *EPMA J*. 2016;7:16. <https://doi.org/10.1186/s13167-016-0064-4>.
- Yan XY, Dong J, Liu Y, Xing HY, Li M, Shia G, et al. Association of Suboptimal Health Status and Cardiovascular Risk Factors in urban Chinese workers. *J Urban Health*. 2012;89(2):329–38. <https://doi.org/10.1007/s11524-011-9636-8>.
- Kupaev V, Borisov O, Marutina E, Yu XY, Wang W. Integration of suboptimal health status and endothelial dysfunction as a new aspect for risk evaluation of cardiovascular disease. *EPMA J*. 2016;7(1):19. <https://doi.org/10.1186/s13167-016-0068-0>.
- Tseng HM, Shih WM, Shen YC, Ho LH, Wu CF. Work stress, resilience, and professional quality of life among nurses caring for mass burn casualty patients after Formosa color dust explosion. *J Burn Care Res*. 2017;39:798–804. <https://doi.org/10.1093/jbcr/irx053>.
- Foster K, Cuzzillo C, Furness T. Strengthening mental health nurses' resilience through a workplace resilience programme: a qualitative inquiry. *J Psychiatr Ment Health Nurs*. 2018;25:338–48. <https://doi.org/10.1111/jpm.12467>.
- Kim YS, Lee SK. Analysis of research on Nurses' job stress using network analysis. *West J Nurs Res*. 2018;019394591878131. <https://doi.org/10.1177/0193945918781310>.
- Health Guide USA (2012) Registered Nurse Job Outlook. Retrieved March 2, 2014 [http://www.healthguideusa.org/careers/registered\\_nurse\\_job\\_outlook.htm](http://www.healthguideusa.org/careers/registered_nurse_job_outlook.htm)
- Garrosa E, Rainho C, Moreno-Jiménez B, Monteiro MJ. The relationship between job stressors, hardy personality, coping resources and burnout in a sample of nurses: a correlational study at two time points. *Int J Nurs Stud*. 2010;47(2):205–15. <https://doi.org/10.1016/j.ijnurstu.2009.05.014>.
- Shahriari M, Shamali M, Yazdannik A. The relationship between fixed and rotating shifts with job burnout in nurses working in critical care areas. *Iran J Nurs Midwifery Res*. 2014;19(4):360–5.
- Zubairi AJ, Noordin SH. Factors associated with burnout among residents in a developing country. *Ann Med Surg (Lond)*. 2016;6:60–3. <https://doi.org/10.1016/j.amsu.2016.01.090>.
- Hu HX, Liu LT, Zhao FJ, Yao YY, Gao YX, Wang GR. Factors related to job burnout among community nurses in Changchun, China. *J Nurs Res*. 2015;23(3):172–80. <https://doi.org/10.1097/jnr.000000000000072>.
- Ross A, Bevans M, Brooks AT, Gibbons S, Wallen GR. Nurses and health-promoting behaviors: knowledge may not translate into self-care. *AORN J*. 2017;105(3):267–75. <https://doi.org/10.1016/j.aorn.2016.12.018>.
- Jong MA, Nieuwenhuijsen K, Sluiter JK. Common mental disorders related to incidents and behaviour in physicians. *Occup Med (Lond)*. 2016;66(7):506–13. <https://doi.org/10.1093/occmed/kqw030>.
- Silva Ddos S, Tavares NV, Alexandre AR, Freitas DA, Brêda MZ, Albuquerque MC, et al. Depression and suicide risk among nursing professionals: an integrative review. *Rev Esc Enferm USP*. 2015;49(6):1027–36.
- Oreskovich MR, Shanafelt T, Dyrbye LN, Tan L, Sotile W, Satele D, et al. The prevalence of substance use disorders in American physicians. *Am J Addict*. 2015;24(1):30–8. <https://doi.org/10.1111/ajad.12173>.
- Pedersen AF, Sørensen JK, Bruun NH, Christensen B, Vedsted P. Risky alcohol use in Danish physicians: associated with alexithymia and burnout? *Drug Alcohol Depend*. 2016;1(160):119–26.
- Nantsupawat A, Nantsupawat R, Kunaviktikul W, Turale S, Poghosyan L. Nurse burnout, nurse-reported quality of care, and patient outcomes in Thai hospitals. *J Nurs Scholarsh*. 2016;48(1):83–90. <https://doi.org/10.1111/jnu.12187>.
- Golubnitschaja O, Yeghiazaryan K, Flammer J. Paradigm change to cost-effective predictive and preventive medicine: individual profiling of healthy vasospastic individuals for targeted prevention as the cost-effective personalised medicine. *EPMA J*. 2014;5(suppl 1):A155. <https://doi.org/10.1186/1878-5085-5-S1-A155>.
- Györfi Z, Dweik D, Girasek E. Reproductive health and burn-out among female physicians: nationwide, representative study from Hungary. *BMC Womens Health*. 2014;14:121. <https://doi.org/10.1186/1472-6874-14-121>.
- Aniței M, Chraif M, Burtăverde V, Mihăilă T. *Tratat de psihologia personalității* [handbook of personality psychology]. Romania: Editura Trei, București; 2016. p. 32–6. ISBN 978-606-719-538-5
- Grigorescu S, Cazan A, Grigorescu D, Rogozea L. Correlations between various factors which generate burnout in the public health system. *Debating Globalization Identity, Nation and Dialogue*, 2017; 501–510. ISBN 978-606-8624-01-3.
- Golubnitschaja O, Costigliola V, EPMA. EPMA summit 2014 under the auspices of the presidency of Italy in the EU: professional statements. *EPMA J*. 2015;6(1):4. <https://doi.org/10.1186/s13167-015-0026-2>.
- Costa P, McRae R. The revised NEO personality inventory (NEO-PI-R). <https://www.researchgate.net/publication/285086638>.

31. McRae R, Costa P. A contemplated revision of the NEO five-factor inventory. *Personal Individ Differ*. 2004;36:587–96. [https://doi.org/10.1016/S0191-8869\(03\)00118-1](https://doi.org/10.1016/S0191-8869(03)00118-1).
32. Kristensen TS, Borritz M, Villadsen E, Christensen KB. The Copenhagen burnout inventory: a new tool for the assessment of burnout. *Work Stress*. 2005;19:192–207. <https://doi.org/10.1080/02678370500297720>.
33. Molinero RE, Basart GQ, Moncada LS. Validation of the Copenhagen burnout inventory to assess professional burnout in Spain. *Revista Española de Salud Pública*. 2013;87(2):165–79. <https://doi.org/10.4321/S1135-57272013000200006>.
34. Golubnitschaja O, Baban B, Boniolo G, Wang W, Bubnov R, Kapalla M, et al. Medicine in the early twenty-first century: paradigm and anticipation – EPMA position paper 2016. *EPMA J*. 2016;7:23. <https://doi.org/10.1186/s13167-016-0072-4>.
35. Golubnitschaja O. Time for new guidelines in advanced diabetes care: paradigm change from delayed interventional approach to predictive, preventive & personalized medicine. *EPMA J*. 2010;1:3. <https://doi.org/10.1007/s13167-010-0014-5>.
36. Costigliola V. Preface. *EPMA J*. 2010;1:1–2. <https://doi.org/10.1007/s13167-010-0013-6>.
37. Gefenas E, Cekanaukaite A, Tuzaitė E, Dranseika V, Characiejus D. Does the “new philosophy” in predictive, preventive and personalised medicine require new ethics? *EPMA J*. 2011;2(2):141–7. <https://doi.org/10.1007/s13167-011-0078-x>.
38. Golubnitschaja, et al. Predictive, preventive and personalised medicine as the hardcore of ‘horizon 2020’: EPMA position paper. *EPMA J*. 2014;5:6. <https://doi.org/10.1186/1878-5085-5-6>.
39. Lemke HU, Golubnitschaja O. Towards personal health care with model-guided medicine: long-term PPPM-related strategies and realisation opportunities within “horizon 2020”. *EPMA J*. 2014;5(1):8. <https://doi.org/10.1186/1878-5085-5-8>.
40. Golubnitschaja O, Costigliola V, Grech G. Traditional forum in predictive, preventive and personalised medicine for multi-professional. Consideration and consolidation – EPMA world congress 2017. *EPMA J*. 2017;8(Suppl 1):S1–S54. <https://doi.org/10.1007/s13167-017-0108-4>.
41. Garossa E, Moreno-Jimenez B, Liang Y, Gonzales JL. The relationship between socio-demographic variables, job stressors, burnout and hardy personality in nurses-an exploratory study. *Int J Nurs Stud*. 2008;45:418–27. <https://doi.org/10.1016/j.ijnurstu.2006.09.003>.
42. Hartmann E, Mathieu C. The relationship between Workaholism, burnout and personality: a literature review, *Sante Ment que*. Fall. 2017;42(2):197–218.
43. Zurlo MC, Vallone F, Smith AP. Effects of individual differences and job characteristics on the psychological health of Italian nurses. *Eur J Psychol*. 2018;14(1):159–75. <https://doi.org/10.5964/ejop.v14i1.1478>.
44. Wang Y, Zhang B. Impact of personality traits and professional identity on work-related depression, anxiety and irritation among Chinese nurses. *Southeast Asian J Trop Med Public Health*. 2017;48(2):447–54.
45. De la Fuente-Solana EI, Gomez-Urquiza JL, Canadas GR, Albendin-García L, Ortega Campos E, Canadas-De la Fuente GA. Burnout and its relationship with personality factors in oncology nurses. *Eur J Oncol Nurs*. 2017;30:91–6.
46. Pereira-Morales AJ, Adan A, Lopez-Leon S, Forero DA. Personality traits and health-related quality of life: the mediator role of coping strategies and psychological distress. *Ann General Psychiatry*. 2018;6(17):25. <https://doi.org/10.1186/s12991-018-0196-0>.
47. Ang SY, Dhaliwal SS, Ayre TC, Uthaman T, Fong KY Tien CE, Zhou H, Della P. Demographics and personality factors associated with burnout among nurses in a Singapore tertiary hospital. *Biomed Res Int*. 2016;6960184.
48. Shin Y.A, Satvinder S.D, Tracy C.A, Thendral U, Kuan Y.F, Choo E.T, Huaqiong Z, & Phillip D. Demographics and personality factors associated with burnout among nurses in a Singapore tertiary hospital. *Bjomgd Res Int*. 2016;6960184.
49. Ziapour A, Kianipour N. a study of the relationship between characteristic traits and employee engagement (a case study of nurses across Kermanshah, Iran in 2015). *J Med Life*. 2015;8:134–40.
50. Choi BS, Kim JS, Lee DW, Paik JW, Lee BC, Lee JW, et al. Factors associated with emotional exhaustion in south Korean nurses: a cross-sectional study. *Psychiatry Investig*. 2018;15:670–6. <https://doi.org/10.30773/pi.2017.12.31>.