Factors associated with health-related quality of life among Belgrade University students

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Abstract

Purpose The aims of the study were to evaluate health-related quality of life (HRQoL) among students of University of Belgrade (Serbia) and to identify factors that might have associated with their HRQoL including relationship with depression.

Methods Between April and June, 2009, 1624 students were enrolled in the cross-sectional study. HRQoL was assessed by using SF-36 questionnaire and general depressive status by Beck Depression Inventory (BDI). In statistical analysis, ANOVA (Bonferroni adjustment), χ^2 test, and correlation analysis were performed.

Results In our study, the highest SF-36 scale score was obtained for Physical Functioning. All SF-36 domains significantly ($P < 0.01$) negatively correlated with BDI. Students of medical sciences had the lowest scores in almost all SF-36 domains. Students who lived with parents had statistically significantly higher scores of majority of SF-36 domains. The total SF-36 score significantly correlated with average monthly family income ($P = 0.002$). Smokers and non-smokers significantly differed in the total SF-36 score ($P = 0.001$). Based on the comparison across the physical activity categories, there is a clear pattern of differences in the total SF-36 scores ($P = 0.001$).

Conclusion Our findings indicate that multiple factors are adversely associated with students' HRQoL. Appropriate health education programs to target modifiable risk factors may improve students' HRQoL.

Keywords Quality of life · Students · Habits · Depression

Introduction

Over the past decades, it was shown that health-related quality of life (HRQoL) assessments are very important in educational settings [1–6]. Namely, it is well known that public learning is primarily a social process that has greater impact upon the lives of young adults. In this line, a specific attention has been paid on a cohort of university students and their life during schooling process which is recognized as a particularly high-stress period [6, 7]. Some of studies suggested that student perceptions of the quality of their university experience are essentially related to attrition rates and academic achievements [6, 8]. However, assessing HRQoL in faculty students is more comprehensive and depending on several factors such as type of university, students' age, gender, residence, health status, and their economic and social environment.

Quality of life of the student population is influenced by a variety of factors. For instance, psychological problems, such as depression, poor social interactions, low self-esteem, have significant implications for students' lives, academic performance, and behavior [3, 4]. Additionally, students who better perceive quality of life take advantage of all university services, are integrated better in academic

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backgrounds, and take part in a number of non-school-related activities [9].

Quality of life among university students has never been assessed in our country, despite the fact that its measuring enables researchers and policy makers to perceive trends in the student well-being, to evaluate the remote effects of education process, health and social policies, and to determine allocation of resources.

We hypothesized that university students face unique personal and academic challenges that may relate to various factors and culminate in variations in student well-being. Therefore, the aim of the present study was to estimate HRQoL among students of University of Belgrade (Serbia) and its associations with socio-demographic factors (gender, type of faculty, social status, lifetime residence), habits (smoking, alcohol abuse, and physical activities), and depression status.

Method

Subjects

Participants were recruited from the University of Belgrade (Serbia). Belgrade is the capital of the Republic of Serbia with population of 1.6 million inhabitants. The University of Belgrade, with 89,482 students, is the biggest and oldest higher education institution in the Balkan region, consisting of 31 faculties divided into four sections: social sciences and humanities, medical sciences, nature sciences and mathematics, and technology and engineering sciences.

Between April and June, 2009, 1,624 consecutive students who attended the Student Public Health Center in Belgrade due to regular check-ups were enrolled in this cross-sectional study. At our University, regular annual health check-ups are mandatory for all students. The number of recruited students is represented about 1.8% of all Belgrade University students.

Participation was voluntary and anonymous. Ethical approval for the study was obtained from the University Ethics Committee, and informed consent forms were assigned by all students who agreed to participate.

Instruments

All study participants completed the questionnaire which comprised demographic information, as well as information regarding education, social status, lifetime residence, and habits (smoking, alcohol abuse, and physical activities).

Information on smoking was obtained through questions on smoking, including: duration of smoking (years) and average number of cigarettes smoked per day. Smokers were defined as students who reported everyday smoking during a 60-day period prior to completing the questionnaire. Alcohol consumption was determined by the type of alcoholic beverage (hard liquor, beer, wine) and the frequency of drinking, defined as: everyday, weekly (1–6 times per week), occasionally (rarely, less than one beverage per week), and never. To assess participation in moderate physical activity, students were asked if they do moderate activities for at least 10 min at a time, such as brisk walking, cycling, swimming, or any other activity that causes some increase in breathing or heart rate. Responders who answered ''yes'' were asked how frequently they engage in moderate activities, defined as: everyday, weekly (1–6 times per week), occasionally (rarely, less than one time per week), and never.

In all students, HRQoL was assessed using SF-36 questionnaire (Serbian translation) [10]. The SF-36 is a generic HRQoL instrument that measures eight different domains of life which are calculated as 8 scales: physical functioning (PF), role functioning physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role functioning emotional (RE), and mental health (MH). Based on these eight scales, two summary scales have been constructed: the Physical Composite score (PCS) and the Mental Composite score (MCS).

Scoring and calculation of scales were performed by using the Ware's survey manual [11]. Quality of life scales were presented as T scores (mean = 50, SD = 10) by linear transformation of raw scores that facilitate comparisons across the multiple scales of the SF-36. Higher values meant better functioning and well-being.

Beck Depression Inventory (BDI) was given to each student to explore feelings and attitudes relating to general depressive status and to verify the influence of depression on HRQoL of students [12]. Suggested cutoff values were 0–10 = no depression; 11–17 = existence of mild depression; 18–23 = moderate depression, 24+ severe depression.

Data analysis

The primary analysis involved descriptive summary statistics for estimating socio-demographic characteristics of participants. Differences in investigated parameters were assessed by using ANOVA for continuous variables and χ^2 for categorical variables. Bonferroni post hoc tests for locating differences between multiple groups were also performed. Pearson's correlation coefficient (r) was used to investigate the association between the SF-36 and the BDI scores.

Results

The basic demographic characteristics of participants are presented in Table 1. Data were collected from 1,624 students of University of Belgrade, 752 (46.3%) males and 872 (53.7%) females. The average age of the participants was 20.8 ± 1.8 years (mean $\pm$ standard deviation (SD)). Most of the students (59.7%) were from faculties of social sciences and humanities group. Majority of the study participants (83.4%) had urban place of birth. According to the residence during high schooling, 46.8% students reported living with parents at own home, 35.0% living alone in rented apartments, while 11.1% staying in students dormitories. The average family income was 600 ± 350 Euros per month.

Table 1 Demographic characteristics of participants

Variable	Count	Percentage
Gender		
Male	752	46.3
Female	872	53.7
Type of faculty		
Social sciences and humanities	970	59.7
Medical sciences	195	12.0
Natural sciences and mathematics	81	5.0
Technology and engineering sciences	378	22.3
Place of birth		
Urban	1354	83.4
Rural	270	16.6
Residence during high schooling		
Home (with parents)	761	46.8
Student's dormitory	180	11.1
Alone (in rented apartment)	568	35.0
Other	115	7.1

The mean scale scores of SF-36 in each domain obtained in our sample are presented in Table 2. The highest values of the SF-36 scales were obtained for Physical Functioning (93.7) and the lowest SF-36 values were obtained for Vitality (64.7). The mean SF-36 PCS and MCS scores were 80.0 ± 13.4 and 71.0 ± 18.5, respectively. The two genders differed in any of the eight dimensions of the SF-36 quality of life instrument, except for the Role Functioning Physical (Table 2).

According to type of faculty (Table 3), statistically significant differences in SF-36 scores were registered in the following domains: Vitality, Role Emotional, and Mental Health, as well as in Mental Composite Score and total SF-36 score. Additionally, after Bonferroni adjustment, statistically significant differences in the domains of Vitality ($P = 0.001$) and Mental Health ($P = 0.014$) were existed between students of social and humanities group and students of medical sciences. Students of technology and engineering sciences group scored significantly better than students of medical sciences group in the domains of Vitality ($P = 0.001$), Mental Health ($P = 0.006$) and Role Emotional ($P = 0.030$), as well as in the Mental Composite Score ($P = 0.005$) and total SF-36 score ($P = 0.002$).

The distribution of SF-36 scores according to place of residence is presented in Table 4. Students who lived with parents at their own home had statistically significantly higher scores of all SF-36 domains except for Physical Functioning, Role Physical and Pain. After Bonferroni adjustment, the highest statistically significant differences in SF-36 domains were registered between students who lived at home with parents and students who lived alone in rented apartments.

The total SF-36 score significantly correlated with average monthly family income ($r = 0.304$, $P = 0.002$).

Of 1,624 students, 343 (21.1%) reported smoking daily (Table 5). Smokers and non-daily smokers statistically significantly differed in the total SF-36 score ($P = 0.001$).

Table 2 Gender-specific mean T scores of the SF-36 scales

Bold values denote statistical significance ($P < 0.05$)

* Standard deviation

[†] Significance of difference between male and female

Scales of SF-36	Both genders	Male	Female	P value[†]
	Mean $\pm$ SD*	Mean $\pm$ SD*	Mean $\pm$ SD*	
Physical functioning	93.7 ± 12.5	95.0 ± 12.2	$93.0. \pm 12.8$	**0.002**
Role physical	83.3 ± 27.6	84.1 ± 26.6	83.0 ± 26.6	0.432
Pain	83.1 ± 19.5	86.3 ± 18.4	81.6 ± 19.4	**0.001**
General health	74.3 ± 17.4	78.4 ± 15.5	72.6 ± 17.9	**0.001**
Vitality	64.1 ± 21.1	69.4 ± 18.8	61.9 ± 21.7	**0.001**
Social functioning	77.8 ± 22.3	80.9 ± 20.0	76.5 ± 22.9	**0.001**
Role emotional	67.1 ± 40.5	73.2 ± 40.0	63.7 ± 41.5	**0.001**
Mental health	69.9 ± 20.5	73.8 ± 19.1	68.5 ± 20.6	**0.001**
Physical composite score	79.7 ± 13.7	82.6 ± 11.9	78.4 ± 14.0	**0.001**
Mental composite score	70.6 ± 18.8	75.1 ± 16.5	68.6 ± 19.1	**0.001**
Total score	76.7 ± 15.8	80.1 ± 13.8	75.1 ± 16.0	**0.001**

Table 3 Faculty-specific mean T scores of the SF-36 scales

Group of faculty	Social sciences and humanities	Medical sciences	Natural sciences and mathematics	Technology and engineering sciences	P value
Scales of SF-36	Mean ± SD*	Mean ± SD*	Mean ± SD*	Mean ± SD*	
Physical functioning	94.4 ± 10.5	92.8 ± 15.4	92.9 ± 14.2	92.0. ± 15.4	0.168
Role physical	82.5 ± 28.3	82.6 ± 27.1	91.7 ± 20.2	85.3 ± 25.7	0.084
Pain	82.8 ± 19.3	82.5 ± 19.9	84.2 ± 19.4	85.5 ± 17.7	0.069
General health	75.2 ± 17.4	72.6 ± 16.3	76.7 ± 16.5	74.2 ± 17.2	0.319
Vitality	65.1 ± 20.6	56.8 ± 24.0	62.4 ± 20.1	64.1 ± 22.0	**0.001**[†]
Social functioning	78.1 ± 22.0	74.5 ± 23.0	76.7 ± 25.2	79.7 ± 20.8	0.087
Role emotional	65.9 ± 40.7	59.8 ± 41.7	68.3 ± 42.1	74.0 ± 38.2	**0.001**[‡]
Mental health	70.7 ± 20.3	65.5 ± 21.2	69.5 ± 18.7	72.5 ± 20.7	**0.005**[‖]
Physical composite score	80.0 ± 13.4	77.5 ± 14.1	81.6 ± 12.0	81.3 ± 12.7	0.052
Mental composite score	71.0 ± 18.6	65.8 ± 19.7	70.7 ± 17.7	73.7 ± 17.1	**0.001**[§]
Total score	76.8 ± 15.5	73.4 ± 16.4	77.8 ± 13.9	79.1 ± 15.1	**0.001**[¶]

Bold values denote statistical significance ($P < 0.05$)

* Standard deviation

[†] Statistically significant differences between groups of social and humanities and medical sciences, and between groups of technology and engineering sciences and medical sciences

[‡] Statistically significant difference between groups of technology and engineering sciences and medical sciences

[‖, §, ¶] Statistically significant differences between groups of social and humanities and medical sciences, and between groups of technology and engineering sciences and medical sciences

Table 4 Residence-specific mean T scores of the SF-36 scales

Place of residence	Home (with parents)	Student's dormitory	Alone (in rented apartment)	P value
Scales of SF-36	Mean ± SD*	Mean ± SD*	Mean ± SD*	
Physical functioning	94.4 ± 11.6	93.2 ± 15.5	92.5 ± 13.3	0.066
Role physical	85.0 ± 26.1	83.1 ± 29.3	81.3 ± 28.8	0.109
Pain	83.7 ± 19.0	82.1 ± 18.6	82.9 ± 19.6	0.517
General health	76.1 ± 17.3	70.9 ± 17.3	73.9 ± 17.1	**0.001**[†]
Vitality	66.2 ± 20.5	62.0 ± 19.8	62.9 ± 21.9	**0.004**[‡]
Social functioning	79.7 ± 21.5	76.5 ± 22.9	76.2 ± 22.7	**0.022**[‖]
Role emotional	69.7 ± 39.1	64.4 ± 41.2	63.6 ± 42.3	**0.016**[§]
Mental health	71.7 ± 19.4	68.9 ± 19.2	68.6 ± 21.6	**0.012**[¶]
Physical composite score	81.1 ± 12.9	78.2 ± 14.5	78.7 ± 13.8	0.056
Mental composite score	72.7 ± 17.9	68.5 ± 18.3	69.0 ± 19.4	**0.001**[**]
Total score	78.3 ± 14.8	75.1 ± 16.0	75.2 ± 16.2	**0.001**[††]

Bold values denote statistical significance ($P < 0.05$)

* Standard deviation

[†] Statistically significant difference between groups of students who lived at home and those who lived in student's dormitory

[‡, ‖, §, ¶, **, ††] Statistically significant difference between groups of students who lived at home and all the others

Of all study subjects, 279 (17.5%) never drank any type of alcoholic beverage. Furthermore, regarding the frequency of alcohol consumption, 68.3% students drank alcohol occasionally, while 12.6% weekly and 1.6% daily. There was no significant difference in the total SF-36 scores according to the frequency of alcohol consumption in our sample ($P = 0.402$). The highest proportion of students (36.5%) reported weekly practice of physical activity. Based on the comparison across the physical activity categories, there is a clear pattern of differences in the total SF-36 scores ($P = 0.001$).

BDI score ranged from 0 to 44 (mean ± SD, 6.7 ± 6.6). It was lower than 10 in 1267 students (78.0%), 11–17 in 15.1%, 18–23 in 4.1% and more than 24 in 2.8% students. Statistically significant difference in BDI score was observed between male and female students (5.5 ± 5.6 vs. 7.4 ± 7.0, $P = 0.001$). The relationship between the various SF-36 health dimensions and BDI was studied using Pearson's correlation (Table 6). All SF-36 health dimensions significantly ($P < 0.01$) negatively correlated with BDI (correlation coefficients ranged from −0.304 to −0.618).

Table 5 Habits of participants and total SF-36 scores

Variable	Number (%)	Total SF-36 score ± SD*	P value
Smoking status			
Non-smoker	1281 (78.9)	77.9 ± 14.8	0.001
Smoker	343 (21.1)	73.5 ± 16.7	
Alcohol intake			
Never	279 (17.5)	78.4 ± 15.1	0.402
Occasionally	1088 (68.3)	76.7 ± 15.3	
Weekly	200 (12.6)	76.1 ± 16.0	
Everyday	26 (1.6)	74.4 ± 19.6	
Physical activity			
Never	253 (15.6)	71.6 ± 18.3	0.001[†]
Occasionally	315 (19.4)	74.3 ± 14.9	
Weekly	593 (36.5)	78.4 ± 14.3	
Everyday	454 (28.0)	80.0 ± 14.4	

* Standard deviation

[†] Statistically significant difference between groups of students who never practice physical activity and those who practice it everyday

Table 6 Correlation between each of SF-36 dimensions and Beck Depression Inventory score

Scales of SF-36	r*	P value
Physical functioning	−0.309	0.001
Role physical	−0.345	0.001
Pain	−0.304	0.001
General health	−0.362	0.001
Vitality	−0.505	0.001
Social functioning	−0.504	0.001
Role emotional	−0.438	0.001
Mental health	−0.561	0.001
Physical composite score	−0.538	0.001
Mental composite score	−0.617	0.001
Total score	−0.618	0.001

* Pearson correlation coefficient

Discussion

Our results indicate that the highest values of the SF-36 scales were obtained for Physical Functioning and the lowest one for Vitality. These findings are compatible with those obtained in quality of life studies of students performed in Turkey [3] and Canada [8]. Regarding composite scores in our study, higher value was registered for the Physical Composite Score implying good activities of daily living, enough energy, less pain and discomfort, and good work capacity. However, the process of high education was associated with lower scores in the psychological domains rather than physical scales of SF-36. Additionally, lack of positive feelings about the future, balance, happiness,

hopefulness could be an important part of students' life determining low quality of life scores in each domain included in the Mental Composite Score.

A comparison of SF-36 scores in students with the norms for the general population showed that most of the domain scores were similar between the students group and the US general population aged 25–34 years, except for general health perception [8]. They were much lower among the students, which suggest that they perceived themselves as less healthy and more likely to become ill than other [8]. Unfortunately, the standards for the SF-36 questionnaire in the Serbian general population do not exist, thus there was no possibility to compare the HRQoL of students to our age-matched general population.

In our study, male students scored better compared to female students, in any of the eight dimensions of the SF-36 quality of life instrument, except for the Role Functioning Physical. In the study of quality of life among medical students conducted in Brazil [13], female students had significantly lower SF-36 scores than males in the following domains: Physical Functioning, Pain, Vitality, Social Functioning, and Role Emotional, as well as in the Mental Composite Score. Other studies [14, 15] reported that academic stress among university students varies across gender with higher levels of anxiety perceived by female students. Additionally, lower quality of life scores in our sample might be in relation with higher level of depression measured by BDI in female students.

It is well known that students' HRQoL is impacted by a variety of factors. In addition to personal stressors, academic stressors can arouse feelings of fear, incompetence, uselessness, anger, and guilt that can lead to both psychological and physical morbidity [16–18].

The analysis of relationships between SF-36 scales and type of faculty showed that students of medical sciences had the lowest scores in almost all domains, especially in the domains including in Mental Composite Score. Similar results were obtained in the survey conducted in Lithuania [4]. They found the best quality of life scores in students of social sciences and humanities and offered possible explanation that these students have better personal relationships and stronger social support than students of biomedical and technical faculties [4]. Observations from other studies [19, 20] suggest that the process of medical training is associated with a decline in the psychosocial domains of health status. Additionally, Barbist et al. [7] emphasized that medical students might have a different perception of health and therefore value health status differently compared to the general population.

With respect to place of residence in our study, students who lived at home with parents had higher scores in all SF-36 domains and statistically significantly differed from students who lived alone in rented apartments, in all

domains comprising the Mental Composite Score. Comprehensive support from family might be essential in some stressful situations occurring during student's life. On the other side, changing of environment could negatively affect the psychological well-being of students [3]. Contrary to our results, in the study recently conducted in the Netherlands, Boot et al. [21] found that students living at home with their parents reported a lower perceived health status compared with students living with peers or alone/with a partner. However, Paro et al. [13] showed no differences in HRQoL in students living with vs. without family.

There is lack of studies investigated associations between socio-economic status (SES) of family and quality of life of their students. We correlated the total SF-36 score of students with family income per month, as a direct measure of SES, and found significant positive correlation ($P = 0.002$). Sjoberg et al. [22] reported that there was an important positive connection between students' depression and parents' employment status.

Based on the sample of students surveyed in this study, 21.1% are established daily smokers. Besides that, harmful effects of tobacco use are well known in different population groups, we demonstrated statistically significantly lower the total SF-36 score ($P = 0.001$) in students who smokes compared to non-daily smokers. Therefore, this finding suggests that the relationship between smoking and quality of life in students requires comprehensive investigation.

It is demonstrated that regular physical activity improves physical and mental health in students [23–25]. We found that 36.5% students reported weekly practice of physical activity, which is in accordance with similar studies [23, 25]. Moreover, in our study, statistically significant increase in the total SF-36 score ($P = 0.001$) was observed with increasing of frequency of physical activity. Since physical activity has a positive diversion from stressful thoughts and situations among students, it is essential to promote regular physical activity as a part of strategies to improve the quality of life in students.

Our results indicated that all SF-36 health dimensions significantly ($P < 0.01$) negatively correlated with BDI. Arslan et al. compared the SF-36 scores between students with (BDI more than 19) and without depression and also found that depression negatively affected all of the SF-36 domains. Similar results have been reported by many studies [13, 26, 27] which pointed out that depressive symptoms showed multi-dimensional impairment in HRQoL.

Some methodological limitations might be considered in our study. One of them concerns cross-sectional design, thus precluding inferences in associations among variables. Furthermore, our sample size represents only 1.8% of all students of Belgrade University who underwent routine check-up during 3 months, and it might influence generalizing the findings. Besides that the distribution of participants in our sample according to age, gender, and faculty section (social sciences and humanities, medical sciences, nature sciences and mathematics and technology and engineering sciences) is corresponding to appropriate proportions in the Belgrade University population. Although the use of generic instruments may have allowed for a multidimensional assessment of HRQoL, we may not have been able to detect differences concerning conditions specific to student's population.

In conclusion, our findings indicate that a need of knowledge concerning different factors influencing student's HRQoL still exist and should be addressed by appropriate health education programs. Among factors that significantly influenced HRQoL in our student sample, depression was the most prominent. Therefore, in future public health strategies, special attention should be paid on the improvement of psychological factors influencing HRQoL in student population.

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