



## Medical students' health-related quality of life – A comparative study

### Kvalitet života povezan sa zdravstvenim stanjem studenata medicine – komparativna studija

Milan Latas\*<sup>†</sup>, Tihomir Stojković\*, Tijana Ralić\*, Svetlana Jovanović<sup>‡</sup>, Željko Špirić<sup>||</sup>, Srđan Milovanović\*<sup>†</sup>

\*Faculty of Medicine, University of Belgrade, Belgrade, Serbia; <sup>†</sup>Clinic for Psychiatry, Clinical Center of Serbia, Belgrade, Serbia; <sup>‡</sup>Department of Public Health, Faculty of Dental Medicine, University of Belgrade, Belgrade, Serbia; <sup>||</sup>Clinic for Psychiatry, Military Medical Academy and Faculty of Medicine of the Military Medical Academy, University of Defence, Belgrade, Serbia

#### Abstract

**Background/Aim.** Previous studies on medical students' subjective perception of health and health-related quality of life (HRQoL) showed inconclusive results. Moreover, there are no published studies to compare HRQoL of medical students to non-medical university students. The aim of the study was to assess subjective perception of health-related quality of life (HRQoL) in medical students' sample, to compare it with non-medical university students and to ascertain predictors of better perception of HRQoL in medical students. **Methods.** Scores of all domains on the Mental and Physical Component Summary subscales and total score of the Short Form Health Survey (SF-36), used for assessment of HRQoL in samples of 561 medical and 332 non-medical university students were assessed and compared. In addition, linear regression to identify predictors of better perception of mental and physical components of HRQoL and overall HRQoL in the sample of medical students was used. The dependant variables were subscores and total score with the SF-

36, and independent variables were certain sociodemographic and academic characteristics of the students. **Results.** Medical students had statistically significantly higher scores on the Mental Component Summary and total SF-36 score compared to non-medical students. Linear regression analysis demonstrated that higher scores of Physical Component Summary were associated with age, male sex and the year of studies. The Mental Component Summary were associated with age, male sex, the year of studies and marital status. The total SF-36 score was associated with age, male sex and the year of studies. **Conclusion.** Medical students perceive their health much better than other university students do, but female, older and second grade medical students have worse perception of their HRQoL. Those points should be potential target areas for specific prevention and treatment in order to achieve better HRQoL.

**Key words:** quality of life; students, medical; students; serbia; health; psychiatric status rating scales; questionnaires

#### Apstrakt

**Uvod/Cilj.** Dosadašnje studije subjektivne percepcije zdravlja i kvaliteta života povezanog sa zdravstvenim stanjem (HRQoL) studenata medicine pokazale su kontradiktorne rezultate. Štaviše, ne postoje objavljene studije koje su poredile HRQoL studenata medicine i studenata ne-medicinskih fakulteta. Cilj ove studije bio je da se proceni subjektivna percepcija HRQoL na uzorku studenata medicine, da se uporedi sa percepcijom HRQoL studenata ne-medicinskih fakulteta i da se utvrde prediktori bolje percepcije HRQoL kod studenata medicine. **Metode.** Uzorak za istraživanje obuhvatio je 561 studenta medicine i 332 studenta ne-medicinskih fakulteta Univerziteta u Beogradu. Istraživanje je obavljeno uz pomoć *Short Form Health Survey* (SF-36) upitnika koji procenjuje mentalnu i fizičku kom-

ponentu, kao i ukupan skor subjektivne procene kvaliteta života vezanog za zdravstveno stanje. Upoređeni su skorovi sa zbirne skale i supskala dve grupe studenata. Pored toga, korišćena je i linearna regresija da bi se procenili prediktori boljeg sagledavanja ukupnog skora i mentalne i fizičke komponente HRQoL na uzorku studenata medicine. Zavisne varijable bile su supskorovi i ukupan skor sa SF-36 upitnika, a nezavisne varijable sociodemografske i akademske karakteristike ispitanika. **Rezultati.** Studenti medicine imali su statistički značajno više skorove na supskali mentalnog zdravlja i na ukupnom skor SF-36 upitnika u odnosu na studente ne-medicinskih fakulteta. Linearna regresija pokazala je da su viši skorovi fizičke komponente povezani sa godinama starosti, muškim polom i godinom studija; viši skorovi mentalne komponente povezani sa godinama starosti, muškim polom, godinom studija i brač-

nim statusom. Ukupan SF-36 skor povezan je sa godinama starosti, muškim polom i godinom studija. **Zaključak.** Studenti medicine gledaju na svoje zdravstveno stanje mnogo bolje nego studenti ne-medicinskih fakulteta. Ipak, devojke, stariji studenti i studenti druge godine medicine imaju lošiju percepciju svog kvaliteta života koji se vezuje za zdravlje. Ovo bi trebalo da budu fokusi za specifičnu

prevenciju i eventualnu terapiju u cilju postizanja boljeg kvaliteta života studenata medicine.

#### **Ključne reči:**

**kvalitet života; studenti medicine; studenti; srbija; zdravlje; psihijatrijski status, određivanje, skale; upitnici.**

## **Introduction**

The development of modern medical practice puts the focus on achieving high quality of life, although there are different approaches in interpretation of this term. The World Health Organization defines quality of life as individuals' perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns<sup>1</sup>. The health-related quality of life (HRQoL) is a relatively new term in medical literature, receiving more attention in recent years. The HRQoL is developed as a narrower term than the comprehensive "quality of life" term, adequate for use in medical science and as an additional indicator of an individual's health. Unlike conventional indicators of a person's health, the quality of life related to health attempt to assess a person's health by the person him/herself. In case of a person with deteriorated health, the HRQoL is defined as his/her perception of the way illness and treatment affect his/her physical and working abilities, physical health as well as psychological condition and social communication<sup>2</sup>.

The common impression is that the student population is a part of the general population with a relatively high level of good health. However, it is also a population that is constantly being exposed to a great number of stressors and there are studies that show that students' mental health worsens during the study<sup>3-5</sup>. For example, students of medicine are exposed to the amount of stressors which can be significant and as a consequence can lead to negative effects in achieving academic results, occurrence of emotional problems or deterioration of physical health<sup>6,7</sup>. Moreover, a subjective evaluation of the HRQoL can be more negative.

The aim of the study was to assess the subjective perception of the HRQoL in medical students' sample, to compare it with non-medical university students and to identify important predictors of the HRQoL by analyzing a number of sociodemographic and academic characteristics in a sample of medical students.

## **Methods**

### *Participants*

The research was conducted among the student population of the Belgrade University, Serbia. The Belgrade University is a public university, located in a large metropolitan area. With 89,482 students, it is the biggest and oldest higher education institution in the Balkan region, consisting of 31 faculties divided into four sections: social sciences and humanities (with 41,231 students), medical sciences (with

12,857 students), nature sciences and mathematics (with 6,873 students), and technology and engineering sciences (with 28,521 students)<sup>8,9</sup>.

The participants were recruited during the introductory lesson in amphitheatres of the faculties, at the begging of the winter semester 2010, which is mandatory for all students. The students were selected in order they appeared.

The sample consisted of 902 students divided into two groups based on the school they were attending. The number of recruited students was about 1% of all Belgrade University students. Nine (1.0%) students were not included in the study sample because they provided invalid data – six medical students and three students from the control answered incorrectly. Thus, the final sample included 893 (99%) participants.

The first group consisted of 561 students of the Medical Faculty. The Belgrade University Medical Faculty has traditional semester curriculum which takes 6 years, including 2 years of basic sciences, 3 years of clinical training and 1 year of clinical internship. During the winter semester of 2010, the number of students that enrolled to the first year was 552, on the second year there was 512, on the third year 511, fourth 494, fifth 525, and final, sixth year, 509 students.

The control group consisted of 332 students from a variety of non-medical schools from the same university: 178 (53.6%) students of social sciences and humanities, 30 (9.0%) students of nature sciences and mathematics and 124 (37.4%) students of technology and engineering sciences. The participants from the control group reflected the proportions of students in these faculty sections (0.43%). Students of veterinary medicine, dentistry and pharmacy were excluded from the research.

Participation was anonymous and voluntarily. All the students who agreed to participate gave their written informed consent. The approval for the study was obtained from the Ethics Committee of the Faculty of Medicine of the University of Belgrade.

### *Instruments*

In all the students, the HRQoL was assessed using Medical Outcomes Study Short Form 36-Item Questionnaire (SF-36 Questionnaire, Serbian translation). The SF-36 Questionnaire is a general health multidimensional survey with 36 questions<sup>10-15</sup>. It is used to evaluate both negative (illness or incapability) and positive (well-being) aspects of health. This questionnaire provides scores in eight domains of life quality which are organized into two summary subscales: Physical Component Summary – PCS (which consists of the following domains: Physical Function, Role Limitations due to Physical Health, Body Pain, General Health) and

Mental Component Summary – (MCS) (which is comprised of the following domains: Energy/Fatigue, Social Functioning, Role Limitations due to Emotional Problems, Emotional Well-being). Each domain was scored out of 100, where a higher score indicate less limitation, better functioning or less pain. The total score of the questionnaire was obtained by calculating the average in each score in all domains, which was also transferred into grades from 0 to 100. Better perception of HRQoL was defined as a higher total score of the SF-36 Questionnaire and its two dimensions – Physical Component Summary and Mental Component Summary, defined as higher scores of those dimensions.

Information concerning age, sex, marital status, parenthood and place of residence and academic data (year of studies, the number of failed years and the average grade of the studies) were gathered through the sociodemographic and academic questionnaire.

#### Statistical analysis

We used several different methods: descriptive summary statistics for the sociodemographic and academic characteristics and SF-36 scores; parametric (*t*-test) and non-parametric statistic tests ( $\chi^2$  and Fisher exact test) to determine socio-

were not normally distributed; regressive multivariable analysis (linear regression) to identify the predictors of a better perception of HRQoL in the sample of medical students. Better perception of HRQoL is defined as a higher score of the Physical Component Summary, Mental Component Summary and total SF-36 score. These were dependent variables, and the independent variables were: demographic data (age, sex, marital status, parenthood and place of residence) and academic data (year of studying, average grade, history of failed grade years). A statistical significance was set at  $p < 0.05$ .

#### Results

Sociodemographic and academic characteristics data for the medical students ( $n = 561$ ) and the control group of students ( $n = 332$ ) are presented in Table 1. The results showed that the medical and the control group of students did not differ on marital and parental status and the history of failed grade year, while the medical students were statistically significantly older, had higher average grade, and female gender dominated. The two groups of students, also, differed on frequency of grade year and on living place.

**Table 1**  
Sociodemographic and academic characteristics of medical and non-medical students

Characteristics	Medical students n = 561	Control group n = 332	<i>p</i>
Sex, n (%)			
male	192 (34)	158 (48)	< 0.001* (Fisher exact test)
female	369 (66)	174 (52)	
Age (years), median (range)	23 (18–35)	22 (18–31)	< 0,001 ( <i>t</i> = 3.74)
Average grade, $\bar{x} \pm SD$	8.21 $\pm$ 0.78	7.97 $\pm$ 0.92	0.001 ( <i>t</i> = 3.46)
Grade year, n (%)			
1	76 (14)	73 (22)	< 0.001 ( $\chi^2 = 78.38$ )
2	85 (15)	72 (22)	
3	111 (20)	71 (21)	
4	81 (14)	66 (20)	
5	110 (20)	50 (15)	
6	98 (17)	0 (0)	
Failed year, n (%)	185 (33)	97 (29)	0.264 (Fisher exact test)
Marital status, n (%)			
single/separated/divorced	544 (98)	328 (99)	0.190 (Fisher exact test)
married	13 (2)	3 (1)	
Parenthood, n (%)	10 (2)	4 (1)	0.588 (Fisher exact test)
Place of living, n (%)			
with parents	202 (36)	114 (34)	< 0.001 ( $\chi^2 = 27.75$ )
in university dormitories	118 (21)	120 (36)	
in rented apartments	158 (28)	64 (19)	
in own apartment	71 (13)	29 (9)	
other	11 (2)	5 (2)	

Note: Four medical students and one from the control group failed to respond when asked for marital status and one medical student failed to respond when asked for place of living;

demographic and academic characteristics and differences between students according to the school; non-parametric statistics (Mann–Whitney test), in comparison with the SF-36 scores according to the faculty of studying because data

The scores and significance of differences of all SF-36 Questionnaire domains for the medical and the control group of students are presented in Table 2. The results indicated that medical students in comparison to the control group had

Table 2

The scores and significance of differences of all domains, Physical Component Summary, Mental Component Summary and total SF-36 score for medical and non-medical students

Significant predictors	Medical students (n = 561)		Control group (n = 332)		p
	Mean (SD)	Median	Mean (SD)	Median	
Physical Function	95.20 (9.89)	100	94.08 (11.69)	100	0.026
Role limitations due to physical health	80.70 (28.99)	100	76.81 (29.48)	100	0.012
Body Pain	75.34 (22.48)	74	76.55 (20.98)	77	0.530
General Health	74.87 (16.96)	77	74.47 (16.48)	77	0.582
Energy/ fatigue	55.60 (18.91)	55	52.42 (19.41)	50	0.025
Social Functioning	74.73 (22.31)	75	70.93 (23.65)	75	0.019
Role limitations due to emotional problems	63.87 (40.59)	67	54.08 (42.61)	67	0.001
Emotional well being	66.12 (18.88)	68	60.61 (20.25)	64	< 0.001
Physical Component Summary	76.32 (13.51)	79	74.86 (13.66)	76	0.058
Mental Component Summary	67.07 (17.87)	69	62.53 (18.87)	64	< 0.001
Total SF-36 score	73.31 (15.23)	76	70.02 (15.94)	72	0.001

Multiple ANOVA test with Tukey comparison.

significantly higher scores on the following variables: Physical Function, Role limitations, Energy/Fatigue, Social functioning, Role limitations due to emotional problems and Emotional well being. Also, medical students had significantly higher scores on Mental Component Summary and total SF-36 score than the control group.

Multiple ANOVA test with the Tukey comparison was used to compare the total score of the SF-36 Questionnaire according to the grade year of study. The ANOVA was statically significant ( $F = 3.24$ ;  $p < 0.007$ ) and there was a statistically significant difference between second and fourth grade year (mean difference =  $-7.03$ ;  $p = 0.033$ ) and between the second and the sixth year (mean difference =  $-6.42$ ;  $p = 0.048$ ) indicating statistically significant lower scores in the second year. The other comparisons did not provide statistically significant differences.

Linear regression analysis identified significant socio-demographic and academic predictors of PCS [ $F(8,445) = 3.19$ ;  $p = 0.002$ ], MCS [ $F(8,45) = 3.54$ ;  $p = 0.001$ ], and total SF-36 score [ $F(8,45) = 3.95$ ;  $p < 0.001$ ]. Significant predictors for PCS in medical students were: male sex, younger age and higher grade year of studies; predictors for MCS were: male sex, younger age, higher grade year of studies and marital status; and predictors for total SF-36 score were: male sex, younger age and higher year of studies (Table 3).

## Discussion

Previous studies on medical students' subjective perception of health and HRQoL show inconclusive results. One of them indicates that medical students rate their own health as very good, with no significant differences to the general population aged 20–30<sup>16</sup> but the others indicate that medical students have lower mental and physical quality of life scores than population norms<sup>13</sup> and that medical students perceive themselves as less healthy and more likely to become ill than general population aged 25–34 years<sup>14</sup>. Also, there are studies which indicate that major impairments in medical students' HRQoL were observed among the third year, in students with depressive symptoms and in female sex<sup>15</sup>.

The results of this study indicate that medical students had higher scores of HRQoL than non-medical counterparts. Clearly, the results of this study indicate that medical students generally perceive their HRQoL better than other university students. The difference is more obvious on mental health domain but it is also noticeable in some aspects of physical health dimension of HRQoL. This in contrast to Pekmezovic et al.<sup>8</sup>, which may reflect different sample sizes used in our studies (195 vs 561 students, respectively), a different methodological approach (consecutive approach vs distribution from all years) and different sample participants ("medical sciences" vs only medical students, respectively).

Table 3

Results of linear regression to identify sociodemographic and academic predictors of Physical Component Summary, Mental Component Summary and total SF-36 score from medical students (n = 561)

Sociodemographic and academic predictors	Physical Component Summary				Mental Component Summary				Total SF-36 score			
	Unstandardized coefficients				Unstandardized coefficients				Unstandardized coefficients			
	B	Std. Error	t	p	B	Std. Error	t	p	B	Std. Error	t	p
(Constant)	85.56	12.10	7.07	0.000	69.06	16.29	4.24	0.000	82.37	13.71	6.00	0.000
Sex	2.47	1.30	1.90	0.058	4.90	1.75	2.80	0.005	4.03	1.47	2.74	0.006
Age (years)	-1.32	0.43	-3.11	0.002	-1.42	0.57	-2.48	0.013	-1.53	0.48	-3.18	0.002
Study year	2.50	0.65	3.85	< 0.001	3.22	0.87	3.68	< 0.001	2.98	0.73	4.04	< 0.001
Average grade	0.42	0.87	0.48	0.630	0.09	1.18	0.08	0.936	0.39	0.99	0.39	0.693
Failed year	0.32	1.68	0.19	0.847	0.27	2.27	0.12	0.905	0.24	1.91	0.13	0.896
Marital status	8.27	6.00	1.38	0.169	17.23	8.08	2.13	0.034	11.50	6.81	1.69	0.091
Parenthood	-6.50	6.81	-0.95	0.340	-10.27	9.18	-1.12	0.264	-6.47	7.72	-0.83	0.402

In comparison to non-medical students, medical students recognize their HRQoL much enhanced on almost all dimensions, which indicate better perceiving of their mental and physical health and overall well-being. Therefore, it seems that most medical students have either better (mental or physical) health or they have the significant resilience in the face of great demands on their inner resources, time, and health during the studies. Our findings could be explained as follows. It appears that the people attracted to medicine are more likely to possess the necessary resiliency that could lead to better perceiving the HRQoL. This means that medical students might have notable potential for successful adaptation, despite challenges and difficult circumstances and that they may better cope with all types of stress, whether it comes from academic, psychosocial and health circumstances. Further, it is possible that the medical school selection process identifies and picks individuals with great resilience and good health and that students attracted to medical studies are more likely to have the basic resiliency.

Although the results indicate that medical students have better perception of the HRQoL than non-medical students, we assume that some students are inherently more resilient while others are more susceptible for mental and physical health problems and that they may experience even small stressors as major threats or crises. The overall results, similarly to recent one<sup>15</sup>, indicates that male, younger and higher grade year students better perceive their HRQoL. In other words, female, older and second year medical students have negative perception of their HRQoL, which correlates with the study of Ray et al.<sup>14</sup>.

The results of several previous studies indicate that male students scored better compared to female students in almost all dimensions and overall score of the SF-36 quality of life instrument<sup>8,17</sup>. The reason could be that academic stress among university students varies across gender with higher levels of depression<sup>8</sup> and anxiety<sup>18,19</sup> perceived by female students. The result that the students from lower grade years, especially in the second year, had worse perception of overall HRQoL and both its' subdimensions related to mental and physical health is in concordance with other studies<sup>20</sup> and it could be due to stress related to specifics of medical study curriculum<sup>21</sup>. Possible explanations of this may be that first two years of the curriculum at the Belgrade Faculty of Medicine are related to basic sciences, which are taught mainly by subject specialists without medical education or experience or that clinical study years give better perception of health compared to pre-clinical years or that the students at clinical years have some strategy to cope with the stress of the medical education/profession<sup>20</sup>. The result that younger age students had better perception of HRQoL, at a glance, stands out against previous one. But, the truth is that there are many very young and ambitious medical students

who have or who develop resilience and who can successfully face up with problems with real life circumstances.

We assume that students that possess predictors of worse perception deserve more attention, prevention activities and, maybe, support in order to improve their resilience and consequently to get better HRQoL. A previous report indicates several measures that should be addressed to vulnerable population of medical students but also to medical schools in order to achieve better quality of life of medical students<sup>22</sup>. The measures include: improvement of medical school selection criteria, support of positive social relationship and mentoring process, self-care skills training, facilitation of strategies for coping with examination stress and modelling of self care<sup>22</sup>.

The results of this study should be interpreted with caution because of several limitations. Firstly, there are limitations associated with the reliance on a self-report instrument (SF-36) for collection of information about HRQoL. Secondly, we did not assess possible mental and physical health problems as (negative) predictors of HRQoL, so we cannot discuss about them as factors that influence the HRQoL. Thirdly, the compared medical students and other university students differed significantly in some demographic data but this is inevitable consequence of different length of studies between medicine (6 years) and other study programs (4 to 5 years of study). And finally, we assessed HRQoL in the sample of students at one university with traditional medical curriculum, so interpretation of these results should be done with caution due to distinctive features of educational programs and curricula in different universities.

## Conclusion

Medical students perceive their health better than other university students. We found several predictors of worse perception of HRQoL among medical students, which may be useful for specific prevention and treatment in order to achieve better quality of life of this population. Finally, we assume that assessment of specific predictors of better perception of HRQoL might help to potentiate those factors in order to get healthier life satisfaction. Furthermore, the overall findings of the study might have implications for more accurate and specific treatments and prevention activities in medical students' population.

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## Conflict of interest

The authors declare no conflict of interest.

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