

PREDICTING THE PSYCHOLOGICAL WELL-BEING OF DENTAL STUDENTS DURING THE SEMESTER EVALUATION PERIOD: A PROSPECTIVE STUDY

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Received: February 27, 2016

Received in revised form: March 4, 2016

Accepted: April 21, 2016

Published online: February 27, 2016

Cite this article:

Preoteasa CT, Constantinescu M-V, Preoteasa E. Predicting the psychological well-being of dental students during the semester evaluation period: a prospective study. *Stoma Edu J.* 2016;3(1-2):47-53.

ABSTRACT

[https://doi.org/10.25241/stomaeduj.2016.3\(1-2\).art.7](https://doi.org/10.25241/stomaeduj.2016.3(1-2).art.7)

Aim: The study aimed at monitoring the psychological well-being of dental students over the first semester of the academic year, in order to acknowledge if psychological well-being during the semester evaluation period is predicted by well-being during teaching period.

Methodology: Second year dental students from the Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania were evaluated across the first academic semester, on three consecutive times during the teaching period, and one time during the semester evaluation period. Well-being was evaluated in terms of subjective positive psychological well-being, assessed by WHO-Five Well-being Index (WHO-5), and as the severity of depression symptoms, assessed by Major Depression Inventory (MDI).

Results: As expected, the students' psychological well-being was highest at the beginning of the semester and lowest during the semester evaluation period. By regression analysis it was observed that well-being during the semester evaluation period is poorly predicted by their well-being at the beginning of the semester, and it is better predicted when assessed in similar periods with regard to the quality of stressors (i.e., written examinations) or at the end of the teaching period. Also, their psychological well-being in terms of severity of depression symptoms seems to be a more predictable state than subjective positive psychological well-being.

Conclusion: Early identification of students at high risk to exhibit lowering levels of psychological well-being should be implemented in order to plan the necessary interventions to help students cope with the examination distress and prevent its unwanted consequences.

Keywords: education, stress, risk, mental health, prevention.

1. Introduction

Subjective psychological well-being is seen as a component of the general construct of well-being with great impact on everyday life, on the ability to identify and fulfil goals, to adapt and cope with the environment.^{1,2}

Evidence suggests that the educational process in the medical and dental schools associates a somehow inherent distress, which might have an inadvertent negative effect on the students' well-being, with probable short and long-term consequences, e.g. may affect the academic performance, is a risk factor for anxiety, depression and burnout, is linked to behavioural patterns and health of the future doctors.^{3,4} Keeping in mind that

the basic aim of education is to train knowledge, efforts need to be made in order to identify the most adequate ways to implement it.^{5,6} Since a negative side effect of the educational process on the student's psychological health is suspected, further high quality research is needed in order to understand the problem's magnitude, aetiology, prognosis, and if necessary to identify the best diagnostic and interventional approaches.

The aim of this study was to monitor the psychological well-being of second year dental students during the first semester of the academic year, in order to acknowledge if the psychological well-being during the semester evaluation period is predicted by well-being during the teaching period.

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Table 1. Student's positive well-being, assessed by WHO-5 scores, over the first semester of the academic year

Time	Students	WHO-5 score (mean)	p
T1	All	66	All (T1:T2): 0.038* All (T2:T3): 0.136 All (T3:T4): 0.009* All (T1:T4): 0.014* Male: Female (T1): 0.523 Male: Female (T2): 0.103 Male: Female (T3): 0.805 Male: Female (T4): 0.084 From Bucharest: Other (T1): 0.203 From Bucharest: Other (T2): 0.667 From Bucharest: Other (T3): 0.249 From Bucharest: Other (T4): 0.529
	Male: Female	65: 66	
	From Bucharest: Other	70: 65	
T2	All	62	
	Male: Female	66: 60	
	From Bucharest: Other	63: 61	
T3	All	65	
	Male: Female	64: 65	
	From Bucharest: Other	69: 64	
T4	All	58	
	Male: Female	65: 55	
	From Bucharest: Other	60: 57	

2. Materials and Methods

This study was approved by the Ethics Committee for Scientific Research at the "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania (PO-35-F-03, No. 55).

2.1 Study design and settings

A prospective study was designed and implemented on a cohort of second year dental students from the Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania. Data were collected during the first semester of the 2014-2015 academic year (from October 1st 2014 to February 15th 2015), three consecutive times during the teaching period and one time during the semester exam period.

2.2 Subjects

One series of second year dental students who attended the above-mentioned university was enrolled in this study. Enrolment was done considering all eligible subjects, who voluntarily agree to participate in this study. Repeaters and transferred students were excluded, because their courses are partially different from those of regular students, having usually less or more subjects to attend. All participants were informed upon the main characteristics of this study and a written informed consent was granted, in the beginning, and also in the follow-up appointments.

2.3 Variables

The main study outcome was the subjective psychological well-being, assessed using the WHO-Five Well-being Index (WHO-5) and the Major Depression Inventory (MDI). The Romanian language version of both questionnaires was used. The Romanian language version of WHO-5 that was used was the one available on the website dedicate to this index, that of the Psychiatric Research Unit (Mental Health Centre North Zealand, Hillerod, Denmark). The index has been previously tested and demonstrated to have good psychometric properties as a well-being scale and

as a screening instrument for depression.⁷ The Romanian language version of MDI that was used was the one available in the Romanian guide for adult depression for general practitioners. Other study variables were demographics (age, sex) and origin (from Bucharest or other). The latter was chosen on the idea that students from Bucharest experience less life changes, usually preserving their living accommodation and the relations with their family and friends.

2.4 Data collection

Data were collected by administering a written questionnaire before or after classes, its timing being related to the academic activities, as favouring different levels of stress, as follows:
T1 - 2nd week of the teaching period, corresponding to the beginning of the first academic semester;
T2 - 7th week of the teaching period, corresponding to its middle, during which half-semester theoretical examinations are scheduled for some of the courses taken; the questionnaire was filled just after a written examination;
T3 - 13th week of the teaching period, that was just after the Christmas and New Year break, corresponding to the end of the teaching period, when students have practical examinations for the seminars activities of most of the courses taken; the questionnaire was filled just after a practical examination;
T4 - 4th week (last week) of the semester exam period; the questionnaire was administered just after a written examination.

2.5 Statistical methods

Missing data, caused by not fully filling the questionnaire all four times, were managed by excluding the subject from the analysis. Data analysis included frequency distributions, Wilcoxon test, paired t-test, Mann-Whitney test and unpaired t-test. Change in well-being was assessed by change of WHO-5 score and MDI score. The difference of WHO-5 scores of at least 10, considered as a clinically significant change

Table 2. Change of positive well-being over the first academic semester

Well-being change	WHO-5 score change (mean)	Clinically significant change of well-being		
		Improvement	No change	Worsening
In T2 compared to T1	3.88	17 (24%)	24(24%)	29 (41%)
In T3 compared to T2	-2.91	22 (31%)	36(51%)	12 (17%)
In T4 compared to T3	6.74	11 (16%)	32 (46%)	27 (39%)
In T4 compared to T1	7.71	18 (26%)	19 (27%)	33 (47%)

Table 3. Student's well-being, assessed by MDI scores, over the first semester of the academic year

Time	Students	MDI score (mean)	p
T1	All	10	All (T1:T2): 0.004* All (T2:T3): 0.637 All (T3:T4): 0.261 All (T1:T4): <0.001* Male: Female (T1): 0.194 Male: Female (T2): 0.082 Male: Female (T3): 0.681 Male: Female (T4): 0.174 From Bucharest: Other (T1): 0.229 From Bucharest: Other (T2): 0.710 From Bucharest: Other (T3): 0.799 From Bucharest: Other (T4): 0.810
	Male: Female	9:11	
	From Bucharest: Other	9:11	
T2	All	13	
	Male: Female	11:14	
	From Bucharest: Other	13:13	
T3	All	13	
	Male: Female	13:13	
	From Bucharest: Other	12:13	
T4	All	15	
	Male: Female	13:15	
	From Bucharest: Other	14:14	

in well-being, was recorded on an ordinal scale (improvement; no change; worsening). Regression analysis was performed in order to assess if well-being during the teaching period (in T1, T2, T3) predicts well-being during examination period (in T4). SPSS Statistics was used to perform the statistical analysis. Significance was set at $p < 0.05$ (significance level 95%) for all statistical tests. p -value less than 0.05 as marked by “*”.

3. Results

The selected series included ninety-two dental students, out of which eighty-five met the eligibility criteria and all agreed to participate in this research. Seventy of them (response rate of 82%) filled the questionnaires all four times. Most of them were females ($n=49$; 70%), twenty years old ($n=57$; 81%). Fifteen (21%) students were from Bucharest. The students' well-being during the first academic semester. The students' well-being exhibited changes during the first academic semester, in terms of subjective positive psychological well-being, assessed by WHO-5 score, but also as the severity of depression symptoms, assessed by the MDI score. Observing the WHO-5 scores, a statistically significant reduction of well-being was noticed during the first half of the semester (at T2 compared to T1), followed by a not statistically significant increase of it after a two-week holiday (at T3 compared to T2). In the winter exam period (at T4), as expected, a statistically significant reduction in the students' well-being was observed, which reached its lowest level. A subgroup analysis showed that male students and Bucharest natives registered higher WHO-5 scores

during the written exam period (at T2 and T4), which means better well-being, at a level that was not statistically significant (Table 1). Considering the difference of WHO-5 score out of 10, assessed as a clinically significant change in positive well-being, at almost all moments in time frequent changes in the positive well-being were noticed, with either improvement or worsening. Only ten students did not show a clinically significant change in the positive well-being when assessed at two consecutive times, across the entire semester. About 40% of the students registered a clinically significant worsening of their positive well-being during the written exam period (at T2 compared to T1; at T4 compared to T3). Over the entire first semester (T4 compared to T1) almost half of the students registered a clinically significant worsening of their positive well-being (Table 2). With respect to the MDI scores, a statistically significant reduction of well-being was noticed during the first half of the semester teaching period (at T2 compared to T1), that continued afterwards, at a level that was not statistically significant. A subgroup analysis showed that during the written exam period female students (T2 and T4) had a tendency of registering higher MDI scores, meaning higher severity of depression symptoms (Table 3). Classifying students according to the MDI score obtained, there were 6 students in T1, 8 students in T2, 13 students in T3 and 17 students in T4 with MDI scores ≥ 20 , regarded as having depression. Consequently, the ratio between mild to moderate to severe depression was the following: 2:3:1 in T1; 3:3:2 in T2; 7:2:4 in T3; 7:5:5 in T4. Prediction of subjective well-

Table 4. Bivariate regression results for students' well-being during teaching period predicting well-being during semester examination period

Dependent variable	Independent variable	B	t(69)	R ²	F(1,69)	p
WHO-5 in T4	WHO-5 in T1	0.13	1.05	0.02	1.10	0.298
	WHO-5 in T2	0.52	5.04	0.27	25.36	<0.001
	WHO-5 in T3	0.43	3.93	0.17	15.45	<0.001
MDI in T4	MDI in T1	0.38	3.35	0.14	11.20	0.001
	MDI in T2	0.72	8.51	0.51	72.37	<0.001
	MDI in T3	0.69	7.88	0.48	62.04	<0.001

being during the semester evaluation period by well-being during the teaching period. Regression analysis showed that psychological well-being during the semester evaluation period (T4) is poorly predicted by the psychological well-being at the beginning of the first academic semester (T1). Even so, psychological well-being (i.e. both the positive psychological well-being assessed by the WHO-5 scores and the severity of depression symptoms assessed by the MDI score) during the semester evaluation period (T4) seems to be more accurately predicted by their well-being during similar periods with respect to the quality of the stressors, i.e. written examination (T2), or at the end of the teaching period (T3). Also, the psychological well-being in terms of severity of depression symptoms seems an aspect that is more predictable than subjective the positive psychological well-being. (Table 4).

4. Discussion

The level of psychological well-being in dental and medical students was previously reported by several studies to be reduced compared to the population norms, being most probably related to the identified high level of stress, reported as present in about one in three dental students.^{4,8} This study results suggest reduced levels of positive psychological well-being in dental students, compared to the general population (i.e., of approximately 70, when measured by WHO-5),^{9,10} especially during the semester evaluation period. Two cross-sectional studies evaluating well-being using WHO-5 on samples formed by dental students from Europe were identified, i.e. one from Munich, Germany, reporting WHO-5 scores of about 55,¹¹ and one from Budapest, Hungary, reporting scores of WHO-5 of 58.¹² Both found the WHO-5 scores for dental students below 70, but it is difficult to compare the results of those studies to those of the current study considering the exact moment for data collection, with regard to the academic year progress, as it was not clearly specified in the two prior studies. Regarding the variation in the students' MDI scores, it was noticed that at the beginning of the academic semester the frequency of depression was rather similar compared to the general population in Europe, i.e. of approximately 8.56%.¹³ Even so, over the academic semester the frequency of depression increased, reaching its highest level during the semester evaluation period (24%), to

a level closer to the one reported by Ibrahim et al. for university students (30.6%).¹⁴ According to current knowledge, the association between stress and examinations is predictable, as they are believed to act as an acute stressor, and to have a cumulative effect.^{15,16} This aspect is supported by our study especially for the written examinations, which are associated to a higher decrease in the students' level of wellbeing. Other prospective research, on dental students, suggests that there can be an increase in the stress perceived over the academic year, that is suspected to have detrimental effects on performance and health.¹⁷⁻¹⁹ Stressors perceived by students' and their effects most probably are different among dental schools, being related to a mix of factors, including individual and institutional parameters, but also geographic and socio-demographic patterns, Romanian dental students being previously identified as experiencing a high perceived stress level.²⁰⁻²³ The decrease in the level of well-being should be counted considering several aspects: subjective well-being predicts objective mental health, may impact on the learning performance, may bias the student's evaluation and have negative long-term effects, e.g., emotional problems such as depression, may limit and impact the future professional practice.^{9,10,24} As concerns were raised with respect to the decreased well-being of the dental students, the inherent distress that exists and its negative effect at a personal and learning level, recommendations were made to help students to cultivate their skills to sustain their well-being, through formal and informal offerings within medical school.²⁵⁻²⁷ According to this study's results, students at high risk of reduced levels of well-being during the semester evaluation period may be initially identified during other periods over the semester with written examinations, and interventions for coping with examination stress at the most demanding times of the academic year may be planned accordingly. Also, positive and negative psychological states are generally seen as related, but independent constructs of well-being. Our results suggest that negative well-being is a more predictable state than positive well-being, therefore better knowledge of the impact of academic stressors and their long-term effect on each of them, separately, may be necessary to be understood, in order to have a clearer idea on this phenomenon. Regarding the instruments used for data collection, for positive and negative psychological states, some details

about them are given in this paragraph. WHO-5 is an instrument developed by the World Health Organization, which measures self-reported positive psychological well-being. WHO-5 consists of a 5-item questionnaire, positively worded, with a time frame of previous two weeks. Its interpretation is in accordance to the score obtained, that ranges from 0 to 100 percentage score, where higher score means better well-being.

To monitor change, a difference of WHO-5 percentage score out of 10 is considered clinically significant.^{9,10,28,29} MDI is also an instrument developed by the World Health Organization, and in this study it is used as a self-rating depression scale. It consists of a 10-item questionnaire, two of them having two alternative questions. It has a similar time frame, of previous two weeks. Its interpretation is in accordance to the score obtained, that ranges from 0 to 50. MDI results were recorded as scale score (where high score means higher severity of depression symptoms), were dichotomized according to the cut-off value of ≥ 20 into likely depression or not, and were recorded on an ordinal scale (mild depression: 20 to 24; moderate depression: 25 to 29; severe depression: ≥ 30).³⁰

Study limitations include the possibility that results are biased by specific factors of the population that the sample was drawn, thus results need to be confirmed by studies implemented in other dental schools. Also, a deeper analysis, considering all years of study, effects on academic performance and health, through high quality prospective research is recommended.

5. Conclusions

The psychological well-being of the dental students decreases over the first semester of the academic year, reaching its lowest point during the semester evaluation period. The students' well-being during the semester evaluation period seems to be poorly predicted by well-being at the beginning of the academic year, and it is better to assess it in similar periods with regard to the quality of the stressors (i.e. written examinations) or at the end of the teaching period. Considering the fact that medical training in general requires an increased number of examinations taken over a large time-interval, that may associate a cumulative reduction of well-being, the early identification of students at high risk to exhibit lowering levels of psychological well-being should be implemented in order to plan the necessary interventions to help students cope with the examination distress and prevent its unwanted consequences.

Acknowledgements

This research was supported by a postdoctoral fellowship from the project "Programme of excellency in multidisciplinary doctoral and postdoctoral research of chronic diseases", contract no. POSDRU/159/1.5/S/133377, project co-financed by the European Social Fund through the Sectoral Operational Programme for Human Resources Development (SOP HRD) 2007-2013.

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Questions

Which of the following statements about the WHO-5 Well-being Index is FALSE?

- a. Is an instrument which measures self-reported positive psychological well-being;
- b. Consists of a 5-item questionnaire, positively worded, with a time frame of previous two weeks;
- c. It's interpretation is in accordance to the score obtained, where higher score means better well-being;
- d. To monitor change, a difference of WHO-5 percentage score of 100 is considered clinically significant.

During the academic semester, dental students register the lowest level of subjective psychological well-being:

- a. At the beginning of the semester;
- b. During written exam periods, other than final exams;
- c. During practical exam periods;
- d. During semester evaluation period, when final exams are taken.

Dental students' subjective psychological well-being during the semester evaluation period is better predicted by:

- a. Dental students' well-being at the beginning of the semester;
- b. Dental students' well-being in similar periods with regard to the quality of stressors (i.e., written examinations);
- c. Dental students' well-being at the end of the teaching period;
- d. All the above are similar as predictors.

Which of the following statements regarding the dental students' well-being is FALSE?

- a. The level of their psychological well-being is higher than general population norms;
- b. Their psychological well-being in terms of the severity of the depression symptoms is more predictable than the subjective positive psychological well-being;
- c. Dental students should cultivate their skills to sustain their well-being;
- d. A decrease in their level of well-being may have short-term negative effects, e.g. may impact on the learning performance.