

RELATIONSHIP BETWEEN STRESS SOURCES AND POSITIVE WELL-BEING OF THE UNIVERSITY STUDENTS

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ABSTRACT

Introduction: Stress of university students is multifactorial, linked to both academic and non-academic factors, and may impact on the psychological well-being of students and negatively affect their academic achievement and personal development. The aim of this study is to evaluate the relationship between stress sources and positive well-being of university students majoring in different fields. **Materials and Methods:** A cross-sectional study was conducted on university students from Bucharest, Romania. Sources of stress were investigated using the Dental Environment Stress (DES) questionnaire, with or without clinical factors, depending on majoring field. The psychological well-being was assessed by WHO-Five Well-being Index (WHO-5). **Results:** Two hundred and sixty-two university students fully completed the questionnaire and were included in this study. DES and WHO-5 scores were rather different between schools, but examinations, fear of falling course or year, and the lack of time for relaxation were highly ranked stressors in all universities. Regression analysis indicated that DES scores significantly predicted the variance of WHO-5 scores, explaining a higher proportion of variance of it among the students majoring in Chemistry and Material Engineering than among the students majoring in Dentistry. Domains of DES strongly related to academics (i.e. academic work and educational environment for all students, and supplementary clinical factors for dental students) were the strongest predictors for students' well-being in all majoring fields. **Conclusions:** In order to help students to maximize their potential, both personally and academic stressors should be identified and analyzed as impact. This knowledge may be used to understand and prevent some of students' negative coping behavior to stress.

Key words: academic environment, depression, mental health; psychological well-being

INTRODUCTION

Nowadays, education is perceived as more than the acquisition of scientific knowledge and practical skills, being very important to guide the students for reaching their full potential. Also, attention should be given for developing students socially, perceived as social proficiency, which can be very important, at some point, for a future academic or non-academic success. Professional social skills aim interpersonal interaction between persons involved or in a group setting, requiring an awareness of the position of the members, but also the relationships among members and the task at hand [1]. Stress of

university students is multifactorial, linked to both academic and non-academic factors, and may impact on the psychological well-being of students and negatively affect their academic achievement and personal development [2, 3]. Psychological well-being is a component of well-being that is seen as being strongly linked to personal achievement, besides other positive and negative states. But, according to Bech [4, 5] subjective psychological well-being is considered usually an individualistic or personal issue, which implies a very difficult cross-cultural definition to obtain. Also, psychological distress is a focal concern for university students, being considered an

important public health issue [6].

Study aim is to evaluate the relationship between stress sources and positive well-being among the university students majoring in different fields, i.e. Dentistry, Chemistry, and Material Engineering.

MATERIALS AND METHODS

A cross-sectional study was conducted on university students from Bucharest, Romania, under the protocol approved by the Ethics Committee of the Scientific Research of the “Carol Davila” U.M.Ph., with ethical approval ID PO-35-F-03, number 55.

Faculty students from three universities were invited to participate in this study, i.e., dental students from “Carol Davila” U.M.Ph., students that were majoring in Chemistry from University of Bucharest, and students that were majoring in Material Science and Engineering from Polytechnic University of Bucharest. Inclusion was done on a voluntary basis, considering students who attended the named universities, a convenience sample being formed, i.e. two out of a total of three series of 2nd year dental students, and one out of a total of three series of 3rd year students from the Faculty of Dentistry; all first and third year students from the Faculty of Chemistry; first and third year students from the Faculty of Material Science and Engineering. All participants in this study provided an informed consent to be included in this study.

Data was collected in academic setting, through a written questionnaire administered after classes, during the teaching period of the academic year.

Sources of stress were investigated using the Dental Environment Stress (DES) questionnaire. The modified version of DES questionnaire [7, 8, 9], seen as more applicable to population of younger students, as that of this research. This questionnaire consists of 39 items, with answers rated for each item on a

scale from 0 (not stressful) to 4 (highly stressful). As suggested by Naidu *et al.* [10], items were grouped in five stressor domains: living accommodation (items 1 to 4, with a total of 4 items); personal factors (item 5 to 17, with a total of 13 items); educational environment (items 18 to 22, with a total of 5 items); academic work (23 to 30, with a total of 8 items); clinical factors (31 to 39, with a total of 9 items). DES questionnaire was adapted in order to be applied to students majoring in other fields than dentistry, being modified by exclusion of items of clinical factors domain, and of any reference to the dental field in the other items (e.g., “uncertainty about dental career” was modified as “uncertainty about future career”).

Positive psychological well-being was assessed by WHO-Five Well-being Index (WHO-5), an instrument developed by the Psychiatric Research Unit, Mental Health Centre North Zealand, Hillerød, Denmark, a World Health Organization Collaborating Centre. The Romanian language version, available on the website of Psychiatric Research Unit at the Mental Health Centre North Zealand, was used, its psychometric properties being previously tested [11]. WHO-5 consists of a 5-item questionnaire, with a time frame of previous two weeks. As well-being scale, its interpretation is in accordance to the percentage score obtained, that ranges from 0 to 100, higher scores meaning better well-being [4].

Missing data corresponded to exclusion from the analysis. Group comparison was done by Fischer exact test, Kruskal Wallis test. Simple linear regression analysis was performed to identify significant predictor variables (DES score and DES domains were the independent variables) affecting positive psychological well-being (WHO-5 score was the dependent variable). An alpha level of 0.05 was used for all statistical tests. SPSS Statistics

was used for data analysis.

RESULTS

Two hundred and sixty-two faculty students fully completed the questionnaire and, hence, were included in this study. From these, 205 students were majoring in Dentistry, 164 students being in their second year of study (response rate of 87%), and 41 students in their third year of study (response rate 73%). From the students majoring in other fields, 37 were students in Chemistry, 15 students being in their first year of study (response rate 83.33%), and 22 students in their third year of study (response rate 91.66%), and 20 were students in Material Engineering, of which 10 students were in their first year of study

(response rate 76.92%), 10 students in their third year of study (response rate 83.33%).

By analyzing student's characteristics, considering both the majoring field and the year of study (Table 1), the highest perceived stress was observed among dental students and 3rd year Chemistry students, and the lowest perceived stress was observed among the 3rd year students majoring in Material Engineering. Positive psychological well-being was highly variable among different schools and less variable among different years of study of the same school, i.e. higher for students majoring in Material Engineering, and in Dentistry, and lower for students majoring in Chemistry, being generally below the population norms, i.e. of 70 [4].

Table 1. Faculty students' characteristics

Variable	Students majoring field and year of study (no)						p
	Dentistry 2 nd year (n=164)	3 rd year (n=41)	Chemistry 1 st year (n=15)	3 rd year (n=22)	Material engineering 1 st year (n=10)	3 rd year (n=10)	
Age (mean)	20.65	21.70	19.67	21.41	19.50	23.80	<0.001
Sex (male vs female)	38:126	14:27	6:9	7:15	7:3	10:0	<0.001
DES (1-4) (mean)	43.88	40.37	31.60	41.82	32.20	23.90	<0.001
DES (mean)	58.35	55.37	NA	NA	NA	NA	0.809
DES 1 (mean)	5.85	3.83	3.87	5.13	5.30	3.4	0.001
DES 2 (mean)	14.27	13.37	9.87	13.41	8.20	5.6	<0.001
DES 3 (mean)	7.34	7.49	5.20	7.00	3.00	2.1	<0.001
DES 4 (mean)	16.42	15.68	12.67	16.27	15.70	12.8	0.225
DES 5 (mean)	14.47	15.00	NA	NA	NA	NA	<0.001
WHO-5 (mean)	60.19	53.66	46.93	45.45	58.00	60.80	<0.001
Depression (n; %)	51 (31%)	23 (56%)	11 (73%)	16 (73%)	7 (70%)	3 (30%)	<0.001
DES 1-Living accommodation domain; DES 2-Personal factors domain; DES 3-Educational environment domain; DES 4-Academic work domain; DES 5-Clinical factors domain; DES (1-4) – DES without clinical factors domain; DES – DES with all 5 domains							
NA – not applicable							

In all schools, examinations, fear of falling course or year, and the lack of time for relaxation were top ranked stressors. Others were perceived as strong stressors in one

particular school, as the competition for grades among the students majoring in Dentistry, expectation versus reality of school among the students majoring in Dentistry and Chemistry,

uncertainty about future career and difficulty of classwork among the students majoring in Chemistry and Material Engineering, and fear

of being able to catch up if falling behind and financial responsibilities among the students majoring in Material Engineering (Table 2).

Table 2. Top ranked stressors, considering majoring field and year of study

Majoring field	Stressor	mean
Dentistry/ 2 nd year	Examinations	2.71
	Fear of failing course or year	2.54
	Competition for grades	2.36
	Lack of time for relaxation	2.16
	Expectation versus reality of dental school	1.93
Dentistry/ 3 rd year	Examinations	2.59
	Fear of failing course or year	2.37
	Competition for grades	2.29
	Lack of time for relaxation	2.27
	Expectation versus reality of dental school	2.29
Chemistry/ 1 st year	Lack of time for relaxation	2.60
	Examinations	2.20
	Amount of assigned coursework	2.13
	Uncertainty about future career	2.13
	Expectation versus reality of school; Having reduced holidays compared with other students; Difficulty of coursework	1.73
Chemistry/ 3 rd year	Fear of failing course or year	2.95
	Examinations	2.73
	Uncertainty about future career	2.68
	Expectation versus reality of school	2.32
	Lack of time for relaxation	2.23
Material Engineering/ 1 st year	Examinations	3.40
Material Engineering/ 3 rd year	Fear of failing course or year	2.80
	Uncertainty about future career	2.60
	Fear of being able to catch up if falling behind	1.90
	Lack of time for relaxation; Financial responsibilities	1.70
Material Engineering/ 3 rd year	Fear of failing course or year	2.40
	Examinations	2.10
	Uncertainty about future career	1.9
	Financial responsibilities	1.70
	Fear of being able to catch up if falling behind; Difficulty of coursework	1.5

Regression analysis indicated that DES scores (with or without clinical factors, depending on the majoring field) significantly predicted the variance of WHO-5 scores, explaining a higher proportion of variance of

WHO-5 scores for the students majoring in Chemistry and Material Engineering (R^2 of 0.409, respectively 0.411) than for the students majoring in Dentistry (R^2 of 0.153 and 0.136 for DES with and without clinical factors,

respectively). The domains of DES strongly related to academics (i.e. academic work and educational environment for all students, and supplementary clinical factors for dental students) were the strongest predictors for students' well-being in all majoring fields. It is suggested that, for students majoring in Dentistry the stressors related to educational environment, academic work and clinical

factors explain a rather similar proportion of variance in WHO-5 scores (R^2 between 0.109 and 0.149), while for the students majoring in Chemistry and Material Engineering the stressors related to academic work explain a higher proportion of variance in WHO-5 scores than educational environment (R^2 greater for academic work than for educational environment) (Table 3).

Table 3. Summary of simple linear regression analysis for variables predicting psychological well-being (WHO-5 score)

Majoring field	Independent variable					Variance		
	DES domain	B	SE B	Beta	t	R^2	F	p
Dentistry	DES 1	-0.68	0.37	-0.128	-1.845	0.012	3.4	0.066
	DES 2	-0.64	0.15	-0.285	-4.229	0.081	17.8	<0.001
	DES 3	-1.85	0.31	-0.386	-5.958	0.149	35.5	<0.001
	DES 4	-1.01	0.18	-0.360	-5.493	0.129	30.2	<0.001
	DES 5	-0.74	0.15	-0.330	-4.989	0.109	24.89	<0.001
	DES (1-4)	-0.38	0.67	-0.37	-5.64	0.136	31.88	<0.001
	DES	-0.30	0.05	-0.39	-6.06	0.153	36.76	<0.001
Chemistry	DES 1	-2.12	0.80	-0.41	-2.65	0.144	7.06	0.012
	DES 2	-0.74	0.32	-0.35	-2.27	0.103	5.15	0.030
	DES 3	-2.65	0.68	-0.55	-3.87	0.280	15.00	<0.001
	DES 4	-1.50	0.30	-0.64	-4.92	0.392	24.26	<0.001
	DES (1-4)	-0.64	0.13	-0.64	-4.93	0.409	24.24	<0.001
Material Engineering	DES 1	-1.91	1.45	-0.29	-1.32	0.038	1.74	0.204
	DES 2	-0.99	0.58	-0.37	-1.70	0.090	2.89	0.106
	DES 3	-3.13	1.41	-0.46	-2.22	0.172	4.93	0.039
	DES 4	-1.24	0.35	-0.63	-3.47	0.368	12.08	0.003
	DES (1-4)	-0.71	0.20	-0.64	-3.55	0.411	12.58	0.002

Dependent variable: WHO-5 score

DES 1-Living accommodation domain; DES 2-Personal factors domain; DES 3-Educational environment domain; DES 4-Academic work domain; DES 5-Clinical factors domain; DES (1-4) – DES without clinical factors domain; DES – DES with all 5 domains

DISCUSSION

The results obtained in this study suggest that for the university students from all majoring fields analyzed, examinations, fear of falling course or year, and the lack of time for relaxation were highly ranked stressors. Stressors strongly linked to academics (i.e. included in the domains of academic work and

educational environment for all students, and a supplementary domain of clinical factors for dental students) were stronger predictors than stressors linked to living accommodation and personal factors for students' psychological well-being in all majoring fields. The latter explained a higher proportion of variance of psychological well-being of students majoring

in both Chemistry and Material Engineering compared to those majoring in Dentistry.

Psychological well-being of this sample of Romanian university students was found to be lower than the population norms, its mean being stated to be for the general population at about 70 on WHO-5 scale [4, 12]. Nevertheless, this reference was obtained after studies conducted on Danish general population [13], which is possible to be quite different in this regard from the Romanian one. The lower value of the WHO-5 in this study is concordant with a survey's results from 2012, in which 27 European Union countries participated, Romanian being ranked the second from the bottom in this regard [14]. Additionally, by our results, psychological well-being was variable in the three universities considered. This could be explained considering the differences between the subjects enrolled in those three universities, probably linked to academic factors (e.g., academic environment, workload and demands), but also personal factors (e.g., personal traits linked to choosing one specific majoring field, motivation to attend that specific university).

Academic environment is assessed by different indices, that overlap in many regards [10, 15]. The hierarchy of stressors observed in dental students in this research is consistent with a recent study that highlights the high scores on examinations and grades, fear of failing course or year, and competition for grades obtained in the case of a sample of 340 dental students [16]. From these, examinations are well-known stressors for students in general, especially the long duration of examinations, the test difficulty, the exam format and the perception of extensive course load influencing it. Also, teachers' attitude and expectations, and sometimes parental pressures in regard to obtain good grades probably influence stress during exams [2]. It

should be noted that dental education, organized in 6 years program in Romania, involves acquisition of academic, clinical and interpersonal skills regarding performing operative procedures while having a personal and great responsibility for the patient's health, which can be considered stressful in itself, posing as a challenge to dental students [17]. A highly ranked stressor was also the "lack of time for relaxation", this being probably related to both academic and non-academic factors. Considering besides academic training students are sometimes engaged in other activities, as sometimes jobs, sometimes these being related to their majoring field, if possible, universities could take this into account for improving some aspects, as student's schedule and the need to attend classes in different locations, with possible positive effects also on their performance and well-being in general. Considering that academic experience comes for students with unavoidable academic stress factors, it would be recommended to early identify students at high risk for low levels of psychological well-being and implement necessary interventions to help them to cope with it in a healthy way [18]. Also, differences in DES score were encountered between faculties (biggest one between Dentistry and Material Engineering) and year of study (biggest one between 1st and 3rd year students majoring in Chemistry). These aspects could have are explainable by different factors, for example 3rd year is a terminal-year graduate study in Chemistry, which is usually associated with higher stress related with the perspectives of an uncertain near future, while dealing with final exams and other academic demands. Therefore, it is suggested that these interventions may be general for all university students, but also adapted to particularities as the majoring field and the year of study.

Previous researches brought evidence of

academic stressors' impact on psychological well-being. By the research of Mirza *et al.* [19] depression and stress encountered in medical students is linked to academic achievement. By Frazen *et al.* [20] lower academic satisfaction was strongly associated with depression, anxiety and stress. By Dodd *et al.* [21] perception of having a negative learning experience was associated with lower psychological well-being. Considering the results of our research and others [22], psychological well-being of university students seems to be a worrying situation, and academic factors seem to play an important part of it. Consequently, more is needed to be known to what extent training features could be adjusted, being very important to preserve the quality of the academic training, but also to ensure as well as possible students well-being in all regards, including the psychological well-being state.

Education must be considered more than the simply transmission of knowledge, for helping students to maximize their potential, from both professional and personal perspectives. Introduction of a positive

student-centered environment in order to discuss about strong points as perceived skills and weaknesses as pressure to perform, perceptions of workload and examinations or time restraints may represent some solution to manage stress among students.

Among the study limitations are the small sample for some majoring fields, and considering only three from the vast existing majoring fields. Also, the results may be biased by the fact that the study was conducted in academic settings, in other study context personal factors being possible to show a greater impact on psychological well-being.

CONCLUSIONS

Based on this research, considering its limitations, academic stressors are important predictors of psychological well-being of university students, some variability among universities with different majoring fields being encountered. Knowledge of the impact of academic stressors can contribute to adopting strategies for improving the academic training and for helping students to maximize their potential.

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REFERENCES

1. Sleight MJ, Ritzer DR. Beyond the classroom: Developing students professional social skills. *Assoc Psychol Sci Monit* 2004;17(9):39-40,51-53.
2. Bedewy D, Gabriel A. Examining perceptions of academic stress and its sources among university students: The Perception of Academic Stress Scale. *Health Psychol Open* 2015;2(2):2055102915596714. doi: 10.1177/2055102915596714.
3. Mocny-Pachońska K, Trzcionka A, Doniec RJ, Sieciński S, Tanasiewicz M. The Influence of Gender and Year of Study on Stress Levels and Coping Strategies among Polish Dental. *Medicina (Kaunas)* 2020;56(10):531. doi: 10.3390/medicina56100531.
4. Bech P. Subjective positive well-being. *World Psychiatry* 2012;11(2):105-6. doi: 10.1016/j.wpsyc.2012.05.021.
5. Martínez-Rubio D, Navarrete J, Montero-Marin J. Feasibility, Effectiveness, and Mechanisms of a

- Brief Mindfulness- and Compassion-Based Program to Reduce Stress in University Students: A Pilot Randomized Controlled Trial, *Int J Environ Res Public Health* 2021;19(1):154. doi: 10.3390/ijerph19010154.
6. Martínez-Rubio D, Navarrete J, Montero-Marin J. Feasibility, Effectiveness, and Mechanisms of a Brief Mindfulness- and Compassion-Based Program to Reduce Stress in University Students: A Pilot Randomized Controlled Trial, *Int J Environ Res Public Health* 2021;19(1):154. doi: 10.3390/ijerph19010154.
 7. Murphy RJ, Gray SA, Sterling G, Reeves K, DuCette J. A comparative study of professional student stress. *J Dent Educ* 2009;73(3):328-337.
 8. Polychronopoulou A, Divaris K. Dental students' perceived sources of stress: a multi-country study. *J Dent Educ* 2009;73(5):631-639.
 9. Polychronopoulou A, Divaris K. A longitudinal study of Greek dental students' perceived sources of stress. *J Dent Educ* 2010;74(5):524-530.
 10. Naidu RS, Adams JS, Simeon D, Persad S. Sources of stress and psychological disturbance among dental students in the West Indies. *J Dent Educ* 2002;66(9):1021-1030.
 11. Preoteasa CT, Preoteasa E. Psychometric properties of Romanian version of WHO-5 well-being index in dental students. *Rom J Oral Rehab* 2015; 7(3):21-27.
 12. Preoteasa CT, Mircescu G, Buzea, CM, Preoteasa E. Sources of stress and well-being in dental students. *Rom J Oral Rehab* 2015;7(1):28-32.
 13. Topp CW, Østergaard SD, Søndergaard S, Bech P. The WHO-5 Well-Being Index: a systematic review of the literature. *Psychother Psychosom* 2015;84(3):167-76. doi: 10.1159/000376585.
 14. Abdallah S, Stoll L, Franz F. Quality of life in Europe: Subjective well-being. Publications Office of the European Union: Luxembourg, 2013. doi: 10.2806/37878.
 15. Armencia AO, Agop-Forna D, Nicolau A, Bamboi I, Rapis A, Tudorici T, Balcos C. Validation of the dundee ready education environment measure (DREEM) in dental medical students. *Romanian Journal of Medical and Dental Education* 2024;13(4):33-39.
 16. Sfeatcu R, Balgiu BA, Parlatescu I. New psychometric evidences on the Dental Environment Stress questionnaire among Romanian students. *J Educ Health Promot.* 2021;10:296. doi: 10.4103/jehp.jehp_4_21.
 17. Preoteasa CT, Duță KA, Tudose BF, Murariu-Măgureanu C, Preoteasa E. Digital Analysis of Closest Speaking Space in Dentates-Method Proposal and Preliminary Findings. *Dent J (Basel).* 2024;12(11):336. doi: 10.3390/dj12110336.
 18. Preoteasa CT, Constantinescu MV, Preoteasa E. Predicting psychological well-being of dental students during semester evaluation period: a prospective study. *Stomatology Edu Journal* 2016;3(1-2):47-53.
 19. Mirza AA, Baarimah H, Baig M, Mirza AA, Halawani MA, Beyari GM, AlRaddadi KS, Alreefi M. Academic and non-academic life stressors and their impact on psychological wellbeing of medical students. *AIMS Public Health* 2021;8(4):563-580.
 20. Franzen J, Jermann F, Ghisletta P, Rudaz S, Bondolfi G, Tran NT. Psychological Distress and Well-Being among Students of Health Disciplines: The Importance of Academic Satisfaction. *Int J Environ Res Public Health* 2021;18(4):2151, doi: 10.3390/ijerph18042151.
 21. Dodd RH, Dadaczynski K, Okan O, McCaffery KJ, Pickles K. Psychological Wellbeing and Academic Experience of University Students in Australia during COVID-19. *Int J Environ Res Public Health* 2021;18(3):866. doi: 10.3390/ijerph18030866.
 22. Stecker T. Well-being in an academic environment. *Med Educ* 2004;38(5):465-78. doi: 10.1046/j.1365-2929.2004.01812.x.