




## ORIGINAL ARTICLE

# Self-reported psychological problems amongst undergraduate dental students: A pilot study in seven European countries

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## Abstract

**Aim:** To map psychological problems amongst undergraduate dental students with a focus on different time points in clinical work in seven Eastern European and Scandinavian countries.

**Materials and Methods:** A total of 1063 3rd- and 5th-year dental students (response rate 70%) participated in this pilot study and completed a pre-tested, structured questionnaire, which collected information on sociodemographic characteristics and self-reported psychological problems. Data were analysed by bivariate and multivariate methods.

**Results:** The majority of participants were female and were younger than male participants. Most participants, though more females than males, agreed that the clinical work of dentistry was psychologically difficult. Almost half of participants felt nervous before working with patients (N = 506, 48%) and experienced a lot of stress whilst working with patients (N = 488, 46%); almost one-third (N = 287, 27%) felt anxious/worried after working with patients. Being a 3rd- and 4th-year student (vs 5th-year) reduced the odds for anxiety after working with patients; being a 3rd-year student (vs 5th-year) increased the odds for stress whilst working with patients. Studying in countries other than Norway reduced the odds for stress whilst working with patients. Less than good self-perceived health, presence of psychological health complaints before starting dental education, female gender and lack of physical activity increased the odds for psychological problems.

**Conclusion:** A high number of undergraduate dental students reported psychological problems in connection with clinical work. It is unlikely that “one size fits all”; therefore, further qualitative investigations on stressors in clinical learning environments should be done in order to design tailor-made supportive strategies.

## KEYWORDS

clinical learning environment, dental education, dental students, professional hazards, psychological health, stress

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## 1 | INTRODUCTION

Dentistry is considered one of the most stressful professions.<sup>1</sup> Occupational stress has been a main factor in the higher risk for suicide amongst dentists; even before graduation, 6% of dental students in the United States tested above the cut-off for clinically significant suicidal ideation.<sup>2-6</sup> A systematic review concluded that psychological problems have the strongest association with suicide.<sup>7</sup> Moreover, numerous studies have reported a high prevalence of psychological problems amongst dental students all over the world.<sup>8-13</sup> A high level of stress at baseline and incremental increases throughout their education was found amongst dental students in several dental schools in Northern and Western Europe.<sup>14,15</sup> Multicountry studies showed that the perceived source of stress varied greatly amongst dental students in different countries<sup>10,16,17</sup>; clinical training was one of the main stressors according to two systematic reviews.<sup>18,19</sup> A recent study in France identified high clinical task quotas and overly stressful examinations as stressors in clinical education.<sup>20</sup>

Some work has been done to improve dental students' learning environment, like teaching stress management in the UK<sup>21</sup> and mindfulness in Germany.<sup>22</sup> Studies from India and Turkey suggested that spiritual health/religion may increase students' coping strategies.<sup>23,24</sup> However, although clinical work is one of the greatest stressors in dental education, it has not received much attention in the literature. The primary goal of each and every academic institution is to educate health professionals whilst supporting the health of these students; therefore, it is of the utmost importance to identify the stressful aspects of clinical work in dental education in order to improve the clinical learning environment. The aim of this pilot study was to map psychological problems amongst undergraduate dental students with a focus on clinical work in seven Eastern European and Scandinavian countries.

## 2 | MATERIALS AND METHODS

One dental school each in Albania, Bulgaria, Lithuania, Macedonia, Norway, Poland and Romania participated in this cross-sectional, questionnaire pilot study. All 3rd- 4th and 5th-year undergraduate students enrolled in the dentistry programme of participating schools were invited to complete a questionnaire. In most of the participating schools, the length of education to obtain a dental degree lasts 5 years and it consists of theoretical, pre-clinical and clinical parts. There is a shift in the 3rd year from pre-clinical to clinical courses, and in the 4th and 5th years, courses are mainly clinical. The didactic courses extend throughout all 5 years of dental education. The exception was the dental school in Macedonia, where the 3rd-year students only attend the pre-clinical courses.

We aimed to create a short questionnaire with a focus on students' perception of their psychological health, especially in relation to clinical work, as none of the existing validated instruments measured our construct of interest and were short. Our final, structured

questionnaire collected information on age, gender, year of study, students' physical activity and self-perceived health (categorised as "good" if the respondent chose "very well/well," and "less than good" if the respondent chose "satisfactory/bad/very bad"). The questions related to psychological health included: "In your opinion, how does your work with patients affect your health?" (I feel nervous before working with patients; I experience a lot of stress whilst working with patients; I feel anxious/worried after working with patients; problems at work wake me up at night; dental practice is psychologically difficult); "Did you experience any of these psychological health complaints (nervousness, sleeplessness, anxiety, depression, mental exhaustion) before starting your dental education?"; and "How often have you experienced these psychological health complaints (nervousness, sleeplessness, anxiety, depression, mental exhaustion) over the past 6 months?" Participants responded using a 5-point Likert-type scale, where 1 meant "never" and 5 meant "always." The variables then were categorised as "never/rarely" and "sometimes/often/always." The questionnaire was composed in English, face-validated and then translated-back translated into the corresponding languages. Test-retest reliability of the questionnaire rendered a Cohen's kappa of 0.7-1.0.

Ethical approvals were obtained from appropriate authorities in all countries: Conservative Dental Department of the Faculty of Dental Medicine, Albania; Ethical Review Board for Scientific Investigations of the Medical University of Sofia, Bulgaria; Lithuanian Bioethical Committee, Lithuania; Ethics Committee of the Faculty of Dental Medicine, Macedonia; Norwegian Centre for Research Data, Norway; Bioethical Committee of the Medical University of Lublin, Poland; "Victor Babes" Medical Hospital, Romania. The participation was voluntary and based on informed consent.

SPSS software version 25 (IBM SPSS) was used for statistical analysis. The independent sample t test was used to compare mean age between female and male participants. Chi-square and Fisher's exact tests were used to identify differences in variables between genders. Univariable binary logistic regression analysis was used to investigate aspects of psychological health in relation to clinical work and associated factors. Variables that resulted in statistically significant associations were included in multivariable models together with age, gender, year of study and country despite the significance. For all models, Nagelkerke  $R^2$  was recorded and Hosmer and Lemeshow goodness-of-fit tests rendered  $P > .05$ . The statistical significance was set at  $P$  value of .05, and odds ratios (ORs) and 95% confidence intervals (CIs) are presented.

## 3 | RESULTS

A total of 1063 students (females: 707, 67%; males: 356, 33%) agreed to participate (response rate: 70%; range: 100% in Lithuania to 27% in Norway). The majority of participants were female in all seven countries and all years of study (50% in 5th year in Romania and 100% in 3rd year in Norway; Table 1). Age amongst female students was

**TABLE 1** Number of participants stratified by gender, year of study and countrywide response rate

	3rd-y students		4th-y students		5th-y students		Response rate
	Females N (%)	Males N (%)	Females N (%)	Males N (%)	Females N (%)	Males N (%)	Both genders N (%)
Albania <sup>a</sup>	25 (81)	6 (19)	55 (71)	22 (29)	52 (66)	27 (34)	187 (69)
Bulgaria <sup>b</sup>	—	—	38 (76)	12 (24)	44 (69)	20 (31)	114 (81)
Lithuania <sup>c</sup>	19 (76)	6 (24)	29 (88)	4 (12)	22 (85)	4 (15)	84 (100)
Macedonia <sup>d</sup>	32 (78)	9 (22)	28 (80)	7 (20)	28 (54)	24 (46)	128 (46)
Norway <sup>e</sup>	3 (100)	—	8 (73)	3 (27)	11 (79)	3 (21)	28 (27)
Poland <sup>f</sup>	82 (62)	51 (38)	75 (63)	44 (37)	60 (55)	49 (45)	361 (88)
Romania <sup>g</sup>	43 (62)	26 (38)	17 (85)	3 (15)	36 (50)	36 (50)	161 (73)
Total	204 (67)	98 (32)	250 (73)	95 (27)	253 (61)	163 (39)	1063 (70)

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between 19 and 37 years, whilst for male students, it was between 20 and 44 years; female students were statistically significantly younger ( $P < .0001$ ) than male students (mean 22.8 years, standard deviation (SD) 2.2 and mean 24.0 years, SD 3.0, respectively).

Overall, more female than male students reported sometimes/often/always experiencing psychological health complaints over the past 6 months: nervousness (54% vs 36%), sleeplessness (36% vs 29%), anxiety (32% vs 23%), depression (36% vs 24%) and mental exhaustion (29% vs 22%; Table 2). The majority of dental students agreed that dental practice was sometimes/often/always psychologically difficult, with a statistically significantly higher proportion of female students giving this response than male students (64% and 52%, respectively; Table 3).

When looking at self-reported psychological problems, 506 (48%) of the undergraduate dental students reported that they always/often/sometimes felt nervous before working with patients, with a statistically significantly higher proportion of female students giving this response than male students (367, 52% and 139, 39%, respectively; Table 3). Studying in Bulgaria (compared to Norway) reduced the odds of feeling nervous before working with patients (OR 0.02, 95% CI 0.01-0.06). Less than good self-perceived health (OR 2.0, 95% CI 1.4-2.8), not being physically active (OR 1.8, 95% CI 1.3-2.4) and presence of sleeplessness before starting dental education (OR 2.1, 95% CI 1.4-3.2) increased the odds of feeling nervous before working with patients (Table 4). Four hundred eighty-eight students (46%) experienced a lot of stress whilst working with patients, and this was reported by more female than male students (347, 49% and 141, 40%, respectively; Table 3). Female gender (OR 1.4, 95% CI 1.0-1.9), 3rd year vs 5th year of study (OR 2.2, 95% CI 1.3-3.6), having less than

good self-perceived health (OR 2.5, 95% CI 1.7-3.5), and reporting sleeplessness before starting dental education (OR 3.5, 95% CI 2.3-5.3) resulted in higher odds for experiencing a lot of stress whilst working with patients (Table 4), whereas being a student in other countries vs Norway reduced these odds (Table 4).

Almost one-third (287, 27%) of students felt anxious/worried after working with patients (Table 3). Fewer years of study (3rd year vs 5th year, and 4th year vs 5th year) decreased the odds of feeling anxious/worried after working with patients (OR 0.5, 95% CI 0.3-0.8 and OR 0.6, 95% CI 0.4-0.9, respectively; Table 4). Less than good self-perceived health (OR 1.9, 95% CI 1.3-2.6), and reporting anxiety (OR 1.5, 95% CI 1.1-2.3) or mental exhaustion before starting dental education (OR 1.8, 95% CI 1.1-2.9) increased the odds of feeling anxious after working with patients (Table 4). Almost two out of 10 (162, 16%) students reported that problems at work woke them up at night (Table 3). Students who perceived their health as less than good had threefold higher odds (OR 3.0, 95% CI 2.0-4.5) of waking up at night due to problems at work.

## 4 | DISCUSSION

The aim of this pilot study was to map psychological problems amongst undergraduate dental students with a focus on clinical work in seven Eastern European and Scandinavian countries. This was done to lay the foundation for further, more comprehensive qualitative studies on the stressful elements in clinical learning environments in each of these countries individually, so that these data can be used to design more supportive clinical learning environments.

**TABLE 2** Number of participants who reported always/often/sometimes experiencing psychological health complaints over the past 6 mo

	Nervousness		Sleeplessness		Anxiety		Depression		Mental exhaustion	
	Female N (%)	Male N (%)	Female N (%)	Male N (%)	Female N (%)	Male N (%)	Female N (%)	Male N (%)	Female N (%)	Male N (%)
Albania <sup>a</sup>	77 (58)	25 (46)	60 (46)*	12 (22)	39 (30)	9 (16)	75 (57)*	19 (35)	6 (5)	–
Bulgaria <sup>b</sup>	–	–	–	–	3 (4)	1 (3)	–	–	–	–
Lithuania <sup>c</sup>	48 (67)	6 (43)	17 (24)	2 (14)	41 (59)	7 (50)	30 (43)	4 (29)	45 (64) *	5 (36)
Macedonia <sup>d</sup>	51 (58)	22 (55)	47 (53)	21 (53)	28 (32)	12 (30)	41 (47)	14 (35)	14 (16)	9 (23)
Norway <sup>e</sup>	11 (50)	4 (67)	8 (36)	2 (33)	6 (27)	1 (17)	6 (27)	1 (17)	14 (64)	4 (67)
Poland <sup>f</sup>	115(53)*	47 (33)	66 (30)	43 (30)	73 (34)	36 (25)	59 (27)	32 (22)	110(51)*	51 (35)
Romania <sup>g</sup>	76 (79) *	25 (39)	56 (58) *	22 (34)	33 (34)	14 (22)	40 (42)*	17 (26)	17 (18)	8(12)
Total	378(54)*	129 (36)	254(36)*	102 (29)	223(32)*	80 (23)	251(36)*	87 (24)	206(29)*	77 (22)

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\*Chi-square test between genders  $P < .05$ .

Students in health professions, especially dentistry, have been shown to be exposed to stress and other psychological problems more often due to the clinical practice that is an integral part of dental education, compared to other professions that consist only of theoretical aspects and/or practice without involving patients.<sup>25</sup> Lazarus and Launier<sup>26</sup> described stress as a result of the relationship between the environment and the individual, not solely depending on one or the other. The most common signs and symptoms of stress that have been identified include anxiety, depression, psychological distress, emotional exhaustion, worry, nervousness, sleeplessness and psychosocial disturbance.<sup>18,25</sup> In the present study, we aimed to map stress and its signs and symptoms in order to capture a broad range of psychological problems that may be related to or triggered by clinical work. In total, 1063 students from seven European countries participated, for an overall response rate of 70%, which can be evaluated as acceptable.<sup>27-30</sup> A high number of dental students reported that they have sometimes/often/always experienced certain psychological health complaints (nervousness, sleeplessness, anxiety, depression and mental exhaustion) over the past 6 months and that they sometimes/often/always felt nervous before working with patients, experienced a lot of stress whilst working with patients and felt anxious/worried after working with patients. Although low levels of stress are reported to be beneficial and positively stimulating, higher levels of stress and its signs and symptoms have been shown to lead to worse academic performance,<sup>14,31,32</sup> as well as numerous psychiatric, endocrine, inflammatory and chronic disorders.<sup>33</sup>

The cross-sectional design of this pilot study did not allow us to investigate the sources of these self-perceived psychological problems; however, some associations with various factors could be identified. In the present study, worse self-perceived health was

associated with increased nervousness before working with patients. It was also associated with stress whilst working with patients, being anxious after working with patients, and sleeping problems related to work. Self-perceived health has been associated with individual socioeconomic position<sup>34</sup> and could be considered a proxy of socioeconomic position in this study. Applying this proxy, our findings are in line with another study, performed more than 50 years ago, which showed that higher stress levels were related to socioeconomic position amongst dental students.<sup>35</sup> We assume that students in our study had similar social backgrounds, as the dental profession in all countries is perceived as prestigious and has good future prospects, and all participating dental schools were public. Thus, not only the academic environment but also socioeconomic position may have an impact on perceived stress. Future studies should include socioeconomic indicators when investigating stressful elements in the clinical learning environment.

In this study, female students were predominant amongst the respondents and also amongst the dental student populations in all seven countries. This is in line with the recent multicountry study demonstrating that female students are in the majority.<sup>10</sup> Female gender increased the odds of experiencing stress during clinical practice. This finding is in line with a number of previous studies from other countries, which showed that female dental students were more stressed than their male counterparts.<sup>10,36-38</sup> In addition, it has been shown that female students in Germany and Switzerland worried more about their competence in clinical work than male students,<sup>39</sup> and in the UK, stress amongst female students stemmed mostly from a perceived lack of confidence.<sup>40</sup> A systematic review found that male students have higher odds for burnout, which is a result of high-level, prolonged stress and other psychological problems.<sup>41,42</sup> In addition, a

**TABLE 3** Number of participants who reported always/often/sometimes experiencing psychological problems in connection with clinical work

	I feel nervous before working with patients		I experience lots of stress whilst working with patients		I feel anxious/worried after working with patients		Problems at work wake me up during the night		Dental practice is psychologically difficult	
	Female N (%)	Male N (%)	Female N (%)	Male N (%)	Female N (%)	Male N (%)	Female N (%)	Male N (%)	Female N (%)	Male N (%)
Albania <sup>a</sup>	75 (57)*	19 (35)	56 (42)*	8 (15)	36 (27)*	6 (11)	13 (10)	2 (4)	93 (71)*	27 (49)
Bulgaria <sup>b</sup>	8 (10)	3 (9)	12 (15)	4 (13)	8 (10)	3 (9)	5 (6)	3 (9)	19 (23)	10 (31)
Lithuania <sup>c</sup>	55 (81)	10 (71)	50 (74)	6 (43)	31 (46)	4 (29)	9 (13)	3 (21)	63 (93)**	9 (64)
Macedonia <sup>d</sup>	37 (42)	15 (38)	37 (42)	18 (45)	3 (3)**	8 (20)	14 (16)	9 (23)	63 (72)	26 (65)
Norway <sup>e</sup>	15 (68)	5 (83)	19 (86)	3 (50)	8 (36)	1 (17)	4 (18)	0	16 (72)	5 (83)
Poland <sup>f</sup>	127(59)*	63 (44)	125 (58)	69 (48)	93 (43)*	45 (31)	45 (21)	27 (19)	140 (65)	80 (56)
Romania <sup>g</sup>	50 (52)	24 (37)	48 (50)	33 (41)	20 (21)	21 (32)	11 (12)*	17 (26)	60 (63)*	27 (42)
Total	367 (52)*	139 (39)	347 (49)*	141 (40)	199 (28)	88 (25)	101 (14)	61 (17)	454 (64)*	184(52)

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\*Chi-square test between genders  $P < .05$ .

\*\*Fisher's Exact Test between genders  $P < .05$ .

study in India showed that male students were more prone to stress than female students.<sup>43</sup> It must be noted that, in the latter study, almost half of the respondents were male, whilst in our study, they represented only one-third of participants; thus, self-selection bias cannot be ruled out. In addition, our used questionnaire was self-constructed and not validated, which may have introduced bias, though face validity and test-retest reliability were acceptable. In general, questionnaires are prone to bias, especially regarding sensitive data, like psychological problems, where cultural values may prevent male students from expressing themselves; however, the use of self-administered questionnaires has been shown to decrease reporting bias.<sup>44</sup> Furthermore, the various instruments used across previous studies limit our ability to directly compare results. It is likely that female and male students are affected by different stressors at different stages of their clinical work. This gender aspect should be investigated further.

Self-reported experience of sleeplessness before starting dental education doubled the odds for nervousness before working with patients and stress during it. A systematic review has shown that job stress increased the odds of insomnia.<sup>45</sup> On the other hand, a recent study showed that sleeplessness is likely to mediate the association between school pressure and psychological symptoms.<sup>46</sup> It is likely that a stressful environment can lead to sleeplessness and thus to further psychological problems when working with patients. Self-reported experience of anxiety and mental exhaustion before starting dental education was associated with being anxious after working with patients. This finding is in contrast to a study amongst

pre-clinical dental students that found no association between history of psychiatric treatment and stress,<sup>47</sup> but it is in line with a study amongst clinical students that showed higher self-efficacy amongst those who had no history of psychiatric treatment.<sup>24</sup> It must be noted that the latter study requested information on more severe mental health conditions than those in our study. History of psychological and/or psychiatric health may be an important aspect to take into consideration when investigating psychological health in the clinical learning environment.

Being a 3rd-year compared to a 5th-year student doubled the odds for stress whilst working with patients. Most 3rd-year students were in transition from pre-clinical to clinical courses. It has been shown that this transition from theoretical or pre-clinical training to clinical activities can cause stress due to unfamiliar treatments and a discrepancy between knowledge and clinical situations.<sup>48</sup> One of our findings was also in line with a result from a qualitative study, which showed that 1st-year clinical students were stressed by the "lack of time for clinical tasks," which may refer to stress during the clinical activity. However, another finding from that same study contrasts with ours: they reported "worries about work quality" amongst their participants, which may refer to worries after clinical activity,<sup>49</sup> whereas our study showed that students had reduced odds for being anxious/worried after clinical work early in their dental education compared to the senior peers. The latter finding is in line with several previous studies, where being further in one's education, compared to earlier, pre-clinical years, was shown to be

**TABLE 4** Association between self-reported psychological problems in connection with clinical work and participant characteristics, including previous psychological health complaints, according to univariable and multivariable binary logistic regression analyses

Characteristics of participants	Crude OR (95% CI) Nervous before <sup>e</sup>	Adjusted <sup>b</sup> OR (95% CI) Nervous before N = 959	Crude OR (95% CI) Stress during <sup>f</sup>	Adjusted <sup>b</sup> OR (95% CI) Stress during N = 959	Crude OR (95% CI) Anxious after <sup>g</sup>	Adjusted <sup>c</sup> OR (95% CI) Anxious after N = 958	Crude OR (95% CI) Cannot sleep <sup>h</sup>	Adjusted <sup>d</sup> OR (95% CI) Cannot sleep N = 958
Age								
Continuous	ns	ns	ns	ns	ns	ns	1.1 (1.0-1.2)	ns
Gender								
Female	1.7 (1.3-2.2)	ns	1.5 (1.1-1.9)	1.4 (1.0-1.9)	ns	ns	ns	ns
Male	1	1	1	1	1	1	1	1
Year of study								
Third	1.4 (1.1-1.8)	ns	ns	2.2 (1.3-3.6)	ns	0.5 (0.3-0.8)	ns	ns
Fourth	ns	ns	ns	ns	ns	0.6 (0.4-0.9)	ns	ns
Fifth	1	1	1	1	1	1	1	1
Country								
Albania	0.4 (0.2-0.9)	ns	0.1 (0.1-0.4)	0.1 (0.1-0.3)	ns	ns	ns	ns
Bulgaria	0.4 (0.1-0.2)	0.02 (0.01-0.06)	0.1 (0.1-0.2)	0.008 (0.002-0.03)	0.2 (0.1-0.6)	0.1 (0.1-0.3)	ns	ns
Lithuania	1.5 (0.6-4.1)	ns	ns	0.2 (0.1-0.9)	ns	ns	ns	ns
Macedonia	0.3 (0.1-0.7)	ns	0.2 (0.1-0.5)	0.1 (0.1-0.5)	0.2 (0.1-0.5)	ns	ns	ns
Poland	ns	ns	0.3 (0.1-0.8)	0.2 (0.1-0.6)	ns	ns	ns	ns
Romania	0.3 (0.2-0.8)	ns	0.3 (0.1-0.7)	0.2 (0.1-0.6)	ns	ns	ns	ns
Norway	1	1	1	1	1	1	1	1
Self-perceived health								
Less than good	1.7 (1.3-2.2)	2.0 (1.4-2.8)	2.2 (1.7-2.9)	2.5 (1.7-3.5)	1.9 (1.4-2.6)	1.9 (1.3-2.6)	3.0 (2.1-4.3)	3.0 (2.0-4.5)
Good	1	1	1	1	1	1	1	1
Physically active								
No	1.5 (1.1-1.9)	1.8 (1.3-2.4)	ns	ns	ns	ns	ns	ns
Yes	1	1	1	1	1	1	1	1
Experience of psychological health complaints before starting dental education								
Nervousness								
Yes	1.7 (1.3-2.3)	ns	1.9 (1.4-2.5)	ns	1.9 (1.4-2.5)	ns	ns	ns
No	1	1	1	1	1	1	1	1
Sleeplessness								
Yes	1.4 (1.1-1.8)	2.1 (1.4-3.2)	1.9 (1.1-2.6)	3.5 (2.3-5.3)	1.5 (1.1-2.1)	ns	ns	ns
No	1	1	1	1	1	1	1	1

(Continues)

TABLE 4 (Continued)

Characteristics of participants	Crude OR (95% CI) Nervous before <sup>e</sup>	Adjusted <sup>a</sup> OR (95% CI) Nervous before N = 959	Crude OR (95% CI) Stress during <sup>f</sup>	Adjusted <sup>b</sup> OR (95% CI) Stress during N = 959	Crude OR (95% CI) Anxious after <sup>g</sup>	Adjusted <sup>c</sup> OR (95% CI) Anxious after N = 958	Crude OR (95% CI) Cannot sleep <sup>h</sup>	Adjusted <sup>d</sup> OR (95% CI) Cannot sleep N = 958
Anxiety								
Yes	1.7 (1.2-2.3)	ns	1.4 (1.1-2.0)	ns	1.9 (1.4-2.6)	1.5 (1.1-2.3)	ns	
No	1	1	1	1	1	1	1	
Depression								
Yes	1.3 (1.0-1.7)	ns	1.3 (1.0-1.7)	ns	1.7 (1.3-2.3)	ns	1.5 (1.1-2.2)	ns
No	1	1	1	1	1	1	1	1
Mental exhaustion								
Yes	ns	ns	ns	ns	2.1 (1.4-3.1)	1.8 (1.1-2.9)	ns	
No	1	1	1	1	1	1	1	
Nagelkerke R <sup>2</sup>		.269		.264		.169		.123

Abbreviation: ns, not statistically significant.

<sup>a</sup>Adjusted for age, gender, year of study, country, perceived health, physical activity, nervousness, sleeplessness, anxiety and depression before starting dental education.

<sup>b</sup>Adjusted for age, gender, year of study, country, perceived health, nervousness, sleeplessness, anxiety and depression before starting dental education.

<sup>c</sup>Adjusted for age, gender, year of study, country, perceived health, nervousness, sleeplessness, anxiety, depression and mental exhaustion before starting dental education.

<sup>d</sup>Adjusted for age, gender, year of study, country, perceived health and depression before starting dental education.

<sup>e</sup>A participant reported always/often/sometimes feeling nervous before working with patients.

<sup>f</sup>A participant reported always/often/sometimes experiencing lots of stress while working with patients.

<sup>g</sup>A participant reported always/often/sometimes feeling anxious/worried after working with patients.

<sup>h</sup>A participant reported always/often/sometimes waking up during the night because of problems at work.

more stressful for students.<sup>10,37,40,50,51</sup> It seems that different time points in clinical activity (before, during, after working with patients) are more challenging depending on the study years. In contrast, one study showed that study year was not significantly associated with stress level.<sup>52</sup> This aspect of time points in clinical work needs to be further investigated, as it would help to design different, supportive learning environments across different years of study.

Being physically active has been shown to reduce psychological symptoms in general.<sup>46</sup> A Japanese study amongst dental students demonstrated that regular exercising was associated with lower stress levels.<sup>52</sup> This is in line with our finding: students who were physically active had almost twofold lower odds for reporting nervousness before clinical work.

The country in which dental students pursued their dental education seemed to have an impact on self-reported psychological problems in relation to clinical activity. This finding is in line with numerous previous studies that found country of dental education,<sup>15,16,38</sup> nationality<sup>36,50</sup> and ethnicity of students<sup>32,51</sup> to be related to stress. Norway is ranked as the first country according to the Human Development Index<sup>53</sup>; therefore, it was chosen as a reference group in the statistical analysis. It must be mentioned that the response rate in Norway was the lowest of all countries (27%), and represented a relatively small sample size (N = 28), which may have produced selection bias. On the other hand, the sample was homogenous with respect to the outcomes. Opposite to what was expected, being a student in Eastern European countries compared to Norway reduced odds for being stressed whilst working with patients. A recent survey in Norway showed that increasingly more students had psychological complaints.<sup>54</sup> The authors discussed that reduced stigma may have resulted in openness to report psychological complaints amongst Norwegian students, whilst psychological problems still may remain as stigma in Eastern European countries. In addition, more students take higher education in Norway, with different backgrounds, and thus, not everyone has a capacity to cope with demanding studies. Moreover, the increase in risk factors, such as perfectionism, educational expectations, perceived loneliness and drug use may affect mental health of the Norwegian students. These risk factors may not be observed at the same extent in Eastern European countries as it has been shown that adolescents in Eastern European countries used less illegal drugs compared to adolescents in Western European countries<sup>55</sup> as well as students in Eastern European country reported a lower experience of loneliness compared to students in North America.<sup>56</sup> These differences may explain our results. In addition, being a dental student in Bulgaria, an Eastern European country, reduced the odds for nervousness before working with patients and being anxious after it. There might be several explanations for this finding. In Bulgaria, students are introduced to the clinical environment early in the curriculum, before they start clinical courses. Moreover, most of the students work as dental assistants during their education and/or they come from families of dentists. Furthermore, the patients that they treat are usually their family members and friends. How a student responds to stressful

situations depends on the clinical learning environment, for example student/teacher ratio, which varies between and even within countries. But this response also depends on the political context, such as government support<sup>51</sup> and sociocultural environment, for example degree of competitiveness and communication in the academic hierarchy between students and teachers.<sup>10,43,57,58</sup> Perceived stress also depends on individual characteristics, such as beliefs and attitudes.<sup>59</sup> Personality is also an important factor for stress perception and coping abilities.<sup>60</sup> An Australian study amongst dental students found a personality profile similar to that of other students of health professions and concluded that observing changes in personality traits would help determine when to implement prevention strategies and support students.<sup>61</sup> Another study demonstrated a significantly lower student satisfaction with the dental profession in Lithuania compared to Poland, both of which are investigated in the present study.<sup>62</sup> Our results showed that statistically significantly more students in Lithuania reported being nervous before working with patients (both female and male students), stress whilst working with patients (female students only) and perceiving the dental profession as psychologically difficult (female students only) compared to students in Poland (data not shown). The latter finding might indicate differences in clinical learning environments in different countries, some being more supportive than others. On the other hand, a high number of students in Poland reported that they experienced psychological problems in relation to clinical work; thus, the environment there was also not optimal. A multicountry study showed that other circumstances, like being married, increased stress levels amongst dental students.<sup>10</sup> These factors should be taken into consideration in future investigations on stressors in connection with clinical work.

## 5 | CONCLUSION

Within the limitations, the present pilot study showed a high number of undergraduate dental students reporting psychological problems in connection with clinical work. It is unlikely that "one size fits all"; therefore, further qualitative investigations on stressors in clinical learning environments should be done in order to design tailor-made supportive strategies.

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### CONFLICT OF INTEREST

The authors declare no conflict of interest related to this study.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.



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