Portal to care: general practitioners' decision-making on child and youth mental health problems and the influence of their (lived) experience

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Chapter 4 - Burnout, depression and anxiety in preclinical medical students: a cross-sectional survey

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Abstract

Objectives

The purpose of this study was to assess the prevalences and correlates of adverse affective states (burnout-, depression- and anxiety-related symptoms) among preclinical medical students.

Methods

Self-report questionnaires were sent to all preclinical medical students of Leiden University Medical Center (n=1311). Burnout-related symptoms were measured using the Maslach Burnout Inventory-General Survey (MBI-GS), depression and anxiety-related symptoms and vitality using the Symptom Questionnaire-48 (SQ-48). Furthermore, duration of sleep, quality of life (SF-36), need for recovery, happiness and dispositional optimism were assessed and analysed in relation to affective symptoms using regression analysis.

Results

Among the 433 responders (response rate = 33.0%), prevalences of self-reported burnout-, depression- and anxiety-related symptoms were 46.0% (n=199), 27.0% (n=117) and 29.1% (n=126) respectively. Independent correlates for burnout-related symptoms were less than 6 h sleep per night ($p = 0.02$), low happiness ($p < 0.001$) and a high need for recovery ($p < 0.001$). Independent correlates for both depression- and anxiety-related symptoms were low optimism ($p < 0.001$; $p < 0.001$ respectively), low happiness ($p < 0.001$; $p = 0.001$ respectively) and a high need for recovery ($p = 0.03$; $p < 0.001$ respectively).

Conclusions

Prevalences for adverse affective states were high among preclinical medical students and mainly associated with personality trait-related factors and need for recovery, rather than work-related factors.

These findings suggest that being a medical student increases one's risk to adverse affective states, and should inspire preventative initiatives.

Introduction

Previous studies showed that adverse affective states among non-university students, university students and medical students in particular are a relatively common phenomenon (1,2). In the last decade, several studies have been conducted on adverse affective states among medical students and the coverage in popular media has grown. The most prevalent categories of symptoms indicating adverse affective states among medical students are burnout-, depression- and anxiety-related symptoms. Prevalences of burnout-, depression- and anxiety-related symptoms among medical students vary from 45% to 71%, 6.0% to 66.5% and 7.7% to 65.5% respectively (3,4). These broad ranges could be explained by differences in used measurement instruments, study-phase in the medical education and nationality of the medical students between these studies. Dyrbye *et al.* described several consequences of adverse affective states among medical students, such as serious impaired academic performance, cynicism towards patients, academic dishonesty, substance abuse and suicide (1). Burnout during medical school could have a negative impact on the self-reported patient care, personal health and well-being of the medical student (4). Ibrahim *et al.* indicated that depression in medical students could have a negative impact on the interpersonal, social and occupational functioning of the medical student (2). Moreover, anxiety may be a cause for alcohol abuse among this population (5).

Several correlates for adverse affective states in medical students have been identified. Worrying about own financial situation may correlate with burnout in medical students, low family income may correlate with depression and anxiety (3,6). Studies have provided inconclusive results on the correlation between gender and depression or anxiety-related symptoms (3,5). Although no differences in mental health between medical students and their peers seem to exist before starting medical school, medical students' mental health is thought to deteriorate by each consecutive year of the medical training (1,3). The need for recovery (NFR) is defined as 'the need to recuperate from work-induced fatigue experienced after a day of work'. Contrary to the association between a high NFR and burnout, the association between low dispositional optimism and burnout is still unclear (7,8). Certain personality traits may influence medical

students' experience of symptoms indicative of adverse affective states (5). A high dispositional optimism, defined as 'a personality characteristic which is conceptualised as a generalised expectation that good things will happen', may lower the risk of depressive symptoms; similar to emotional vitality, characterised by 'a sense of energy, positive well-being, and effective emotion regulation' (9-11).

Studies regarding the prevalence, causes and consequences of adverse affective states among preclinical medical students have been conducted in the US, some in European countries and few in countries elsewhere in the world, such as China (12). Two Dutch studies in 2011 and 2012 gave an alarming overview of the prevalences of adverse affective states among Dutch medical students. A study from the Academic Medical Center in Amsterdam showed that prevalences of self-reported stress-, depression- and anxiety-related symptoms among clinically not yet active students were 20%, 41% and 32% respectively, and a study from the Erasmus Medical Center in Rotterdam showed that there was a high need for counselling among preclinical medical students (13,14). This study also showed that psychological distress was associated with life-events and experiences with fellow medical students.

It is essential that a study is performed in which correlates for disorder-specific symptoms are explored, considering the amount of studies that found high prevalences of adverse affective states among medical students and described potential negative consequences. These independent correlates per disorder could be used to identify symptoms indicative of adverse affective states in medical students more accurately that could be done using previously found broader correlates. This could help to develop preventive interventions. The aim of this study is to assess the prevalences of self-reported burnout-, depression- and anxiety-related symptoms among preclinical medical students and to identify potential independent correlates.

Methods

Study design

The medical study at Leiden University Medical School consists of a bachelor and master program of three years each. The last two years comprise clinical rotations (internships), starting in the second year of the master program. A self-report questionnaire comprising five measurement instruments was sent to all 1311 preclinical medical students of Leiden Medical University, Leiden, the Netherlands. Participation in the study was voluntary. The students were given the option to participate in a separate lottery in which four €25,- gift coupons were raffled. At the end of the academic year 2013-2014 (June 2014) the students were sent an e-mail explaining the goal of the study. In this e-mail the students received a link to background information of the study and the online survey. A declaration of no objection was granted by the Institutional Ethics Review Board of Leiden University Medical Center (LUMC). Because of possible psychological distress due to the survey, the student psychologists of Leiden University were informed about the study.

Of the 1311 approached medical students, 520 (39.7%) responded, and 433 (33.0%) who provided complete data were included in the study. All students in the first to fourth year of medical school were included. Interns and students who discontinued medical school for more than 6 months were excluded. Medical students were also excluded if they did not complete the test-battery (Figure 1).

Data collection

During 3 months, data were anonymously collected using an online survey-tool, Surveymonkey® (Surveymonkey Inc.). At the start of the academic year 2014-2015 (September 2014) three reminders were sent. Posters at the university, announcements on social media and presentations at class meetings were used as promotional activities.

Measurement instruments

Socio-demographic characteristics and possible correlates were measured using a demographic questionnaire. This included questions about gender, age, date of starting medical school, current subject, native language, partnership status, housing situation, number of children, number of sick leave days in past year, overall happiness (on a Likert scale from 0 through 10), questions based on the past 2 weeks of their study: the number of hours per week spent on the study, number of hours slept on average per night, (equal to or above 4 on a Likert scale from 1 to 5 was considered as a high amount of sleep loss), self-rated physical health and self-rated mental health (equal to or below 2 on a Likert scale from 1 to 5 was considered as a poor self-rated physical or mental health). Additional questions were questions about whether the student had a side job, was part of a fraternity, was part of a study association, whether the student worried about the financial situation and questions about the social safety net for the student in case of self-reported psychological distress. These correlates were identified using the literature and discussed in a working group with experts on the field. This working group consisted of medical teachers, and representatives of the medical interns union of Leiden University Medical Center.

Maslach Burnout Inventory-General Survey

Burnout-related symptoms were measured with the Dutch version of the Maslach Burnout Questionnaire-General Survey (UBOS-GS) (15,16). The MBI-GS measures three domains of burnout: emotional exhaustion/U-subscale (5 items, Cronbach's α 0.88), depersonalisation/D-subscale (5 items, α 0.75) and personal accomplishment/C-subscale (6 items, α 0.74) (15). Items were rated on a 7-point Likert scale of 0-6 (0=never, 6=always or daily). To define whether a respondent is 'burned out' or 'not burned out', three mean scores on the U- D- and C-scale must be calculated. A high mean score on emotional exhaustion (≥2.20) and depersonalisation (≥2.00) or a lower mean score on personal accomplishment (≤3.16) is suspected of being 'burned out'. These cut-off values are based on a reference population consisting of scientific and academic personnel in the Netherlands (n=349) (16).

Symptom Questionnaire-48 (SQ-48)

Prevalences of depression- and anxiety-related symptoms were measured using the Dutch version of the MOOD- (6 items, Cronbach's α 0.93) and ANXI- (6 items, α 0.92) subscales of the Symptom Questionnaire-48 (SQ-48). The VITA-subscale (6 items, α 0.90) was used to assess vitality; the higher the score, the more efficient one's emotion regulation is. The SQ-48 (published in 2014) is meant to be available in the public domain for routine outcome monitoring (ROM). It can be used as a screening/monitoring tool in clinical settings (psychiatric and non-psychiatric), as a benchmark tool, or for research purposes (17). Contrary to the Brief Symptom Inventory (BSI), it allows measuring emotional vitality, has briefer and clearer questions and has not been used before in studies on adverse affective states among medical students (18,19). Items are rated on a 5-point Likert scale of 0-4 (0=never, 4=very often).To calculate the total score, the scores on the subscales must be added (without the VITA- and WORK- subscale). Cut-off values indicate a discrimination threshold between 'healthy' and 'diseased' (17).

Life Orientation Test-Revised (LOT-R)

Dispositional optimism was measured using the Life Orientation Test-Revised (LOT-R, α 0.68). It is the most commonly used instrument in psychological research to measure optimism (10). The LOT-R consists of 10 items. Four items are filler items and thus not used in the scoring. The other six items are scored on a 5-point Likert scale (0=strongly disagree, 4=strongly agree); the higher the score, the more positive one's attitude in life is. To compute the LOT-R sum score, three negatively worded items must be reversely recoded (10,20). The LOT-R score ranges from 0-24, and a cut-off of 12 or lower indicates low dispositional optimism (21).

Need for Recovery Scale (NFR)

The Need for Recovery scale (NFR, α 0.88) is part of the Questionnaire on Perception and Assessment of Labour. The NFR can be used as a preventive screening tool for fatigue at work. It measures problems workers experience in recovering from the efforts and stress at work. The participant is asked to indicate

whether a statement applies to him, which is measured on a 2-point Likert scale (yes=1, no=0). The NFR consists of 11 statements and results in a score or percentage of 0-100%. The higher the sum scores, the higher the need for recovery after a working (study) day. A widely used cut-off value is 54.5%. This score can be reached by giving positive answers on 6 questions (22,23).

Data analysis

Descriptive analyses were used to describe the socio-demographic and participant-specific characteristics, and to examine the prevalences of symptoms indicative of the adverse affective states of interest. In a univariate analysis, chi-squared tests (Pearson χ^2-test) and t-tests (t-test for Equality of Means) were used to compare the outcomes of the groups with and without symptoms indicative of adverse affective states. In a multivariate analysis, a forward stepwise regression was used to compare potential independent correlates among these groups. In this forward stepwise regression analysis, the z-scores of the variables optimism (LOT-R) score, vitality (SQ-48 VITA) score, happiness score and need for recovery score were used with a standard deviation of 1 and a mean of 0. Age and sex were used as entered variables. To guard against multicollinearity, the variance inflation factor (VIF) score for each variable in de predictor models was examined. We used a stringent rule of thumb cut-off criterion of two for deciding when a given independent variable displayed multicollinearity, which was the case for the variables self-rated mental health and vitality; these variables were excluded from the multivariable models. This yielded odds ratios (OR) with their accompanying 95% confidence intervals (95% CI). All tests were two-tailed with $p<0.05$ denoting statistical significance. The statistical analyses were conducted using SPSS version 21.0 (IBM corp., NY, USA).

Results

Characteristics and prevalences of burnout-, depression- and anxiety-related symptoms

Of the 433 included medical students 75.5% were female. The mean age was 21.2 (SD=2.0; interquartile range IQR=17-33 (20-22)). Medical students had been in medical school for an average of 2 years and 10

months. Fiftyone percent was part of a fraternity, 23.1% was part of a student association (Table 1). In case of self-reported psychological distress medical students would most likely seek help with their parents or relatives (79.7%), or friends (76.9%), following by their partner (40.4%), a general practitioner (35.1%), a student psychologist (20.6%), a confidant (9.0%) and other sources of help (6.2%; including a psychologist).

Of the 433 medical students 199 (46.0%, Table 2) fulfiled the criteria for self-reported symptoms indicative of burnout, 117 (27.0%, Table 3) indicative of depression and 126 (29.1%, Table 4) indicative of anxiety. Mean scores on the MBI-GS U-, D- and C- subscales, SQ-48 MOOD and SQ-48 ANXI were 3.27 (standard error of the mean SE=0.06), 1.68 (SE=0.06), 3.52 (SE=0.04), 6.39 (SE=0.22) and 9.03 (SE=0.23) respectively.

Independent correlates of burnout-related symptoms

The univariate analysis showed many variables which associated with burnout-related symptoms (Table 2). Variables which correlated independently and strongly with burnout-related symptoms were shown by the multivariate analysis. Less than 6 h sleep per night (OR 2.00; 95% CI 1.12-3.60) and need for recovery (OR 1.66; 95% CI 1.31-2.11) were risk-enhancing correlates; happiness (OR 0.50; 95% CI: 0.38-0.66) was a protective correlate.

Independent correlates of depression-related symptoms

In the univariate models, many variables were associated with depression-related symptoms (Table 3). The multivariate analysis showed variables which correlated independently and strongly with depression-related symptoms. A risk-enhancing correlate was need for recovery (OR 1.42; 95% CI: 1.03-2.00); protective correlates were optimism (OR 0.44; 95% CI: 0.31-0.62) and happiness (OR 0.18; 95% CI: 0.11-0.29) (Table 2).

Independent correlates of anxiety-related symptoms

The univariate analysis showed many variables associated with anxiety-related symptoms (Table 4). The multivariate analysis yielded variables which correlated independently and strongly with anxiety-related symptoms. The variable need for recovery (OR 1.90; 95% CI: 1.43-2.52) was a risk-enhancing correlate; happiness (OR 0.61; 95% CI: 0.45-0.81) and optimism (OR 0.46; 95% CI: 0.34-0.63) were protective correlates.

Discussion

This study in 433 preclinical medical students from Leiden University showed that 46.0% suffered from symptoms indicative of burnout, 27.0% of depression and 29.1% of anxiety. The multivariate analyses showed independent correlates for self-reported symptoms indicative of adverse affective states. Correlates for burnout were ;6 hours sleep per night, low happiness and a high need for recovery. Correlates for depressive and anxiety-related symptoms were low optimism, low happiness and a high need for recovery.

Our findings are largely consistent with the wide prevalence ranges of burnout-, depression- and anxiety-related symptoms described in previous studies among medical students; 45-71%, 6.0- 66.5% and 7.7-65.5% respectively (3,4). Prevalences of depression-related symptoms were lower than those showed by aforementioned Dutch studies, prevalences of anxiety-related symptoms were similar (13,14). By way of comparison, the mean score for burnout-related symptoms in our study was in between a 'healthy' working population and a population consisting of workers with work-related neurasthenia (16). The same applied for depression- and anxiety-related symptoms, for which the mean scores were in between a Dutch 'healthy' reference group and a psychiatric outpatient group with suspected mood, anxiety or somatoform disorders (24). Therefore, these

findings give rise for concern, as it suggest that being a medical student increases one's risk to adverse affective states.

Correlates for symptoms indicative of adverse affective states were partially consistent with previous studies. Contrary to these studies, our results showed no association between time since start of medical school and depression-related symptoms (1,3). Although in some studies financial concerns were associated with anxiety-related symptoms, our results showed no such association (3). In concordance to several other studies, we found no association between gender and symptoms indicative of adverse affective states (3,5). The correlation between poor perceived level of support from the medical faculty and adverse affective states is frequently described in previous studies; this could be an explanation why our results suggest that medical students tend to seek help at family and friends instead of mental health services offered by the faculty (4,25,26). Personality traits, such as impulsivity and poor self-awareness, have been associated with symptoms indicative of adverse affective states; but these personality related factors were not part of our study (5,6). In accordance to our results, an association between high optimism scores and lower scores on emotional exhaustion of the MBI has been described before (27). Although this study aimed to identify disorder-specific correlates, our results showed that most independent correlates associated with all three examined disorders. While many work- related factors were explored, most of these correlates for adverse affective states were personality trait-related.

Strenghts and limitations of the study

This study has several strengths. First, this study explored disorder-specific correlates of adverse affective states among medical students, while most previous studies showed broader correlates.

Second, the results give deeper insight in which proportion work-related and personality trait- related factors correlate with these symptoms. There are some limitations to our study as well. First, because of the cross-sectional study design cause-effect relationships cannot be explored. Second, the generalisability is limited by the inclusion of medical students of only one institution. Furthermore, the response rate was rather low with 33%. However, comparable response rates are common in such types of online questionnaires (14,28,29). Third, some variables were dichotomised which may have reduced statistical power.

Future directions

This study aims to be a next step in the exploration of adverse affective states among non-clinical medical students worldwide. In addition, this study is aimed to inspire further research with a follow-up design in which medical schools of other countries are investigated. To increase study generalisability, medical students of multiple institutions have to be included. The findings of this study may be used in future initiatives to lower adverse affective states. Although most studied initiatives focus on improving access to mental health services, Slavin *et al.* proposed several effective curricular changes which aim for cohesion between fellow students (e.g. instituting longitudinal students electives and establishing learning communities) (26). However, introducing this model may inflict substantial changes to most existing medical curricula. We suggest that a more universal model is explored which targets medical students' self-awareness and collective awareness of adverse affective states (1,4).

Conclusion

We conclude that prevalence proportions for adverse affective states are high among medical students, and associated with workload- and personality-related factors. To confirm these prevalences and to explore these relationships further, we recommend multicentre studies with a longitudinal follow-up design. Medical schools are in the position to recognise distress among their students. The correlates found by our study could be used to identify individual students who are at risk for adverse affective states. Since medical students primarily seek help from family and friends in case of distress, medical schools should prioritise raising medical students' self-awareness and collective awareness instead of improving faculty mental health services.

Therefore, universal curriculum models which focus on group engagement and self-awareness are needed to support institutions in establishing an optimal learning environment for future doctors.

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Conflict of Interest

The authors declare no conflict of interest.

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Figure 1: Flowchart of participants

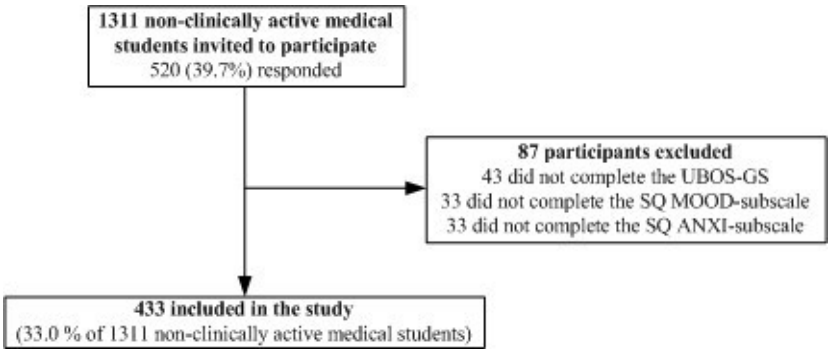

Table 1: Characteristics of medical students (N=433)

Variable	*Data*
Socio-demographic variables	
Female sex - n (%)	327 (75.5)
Age, yr - mean ± SD	21.2 ± 2.0
Age, yr - range (IQR)	17-33 (20-22)
Time since start of medical school, years - mean ± SD	2.8 ± 1.4
Partnership status - n (%)	
• Living alone with partner/ married	28 (6.5)
• Not married	405 (93.5)
Housing situation - n (%)	
• With parents	86 (19.9)
• Student housing (shared facilities)	279 (64.4)
• Private housing (own facilities)	68 (15.7)
Having children - n (%)	5 (1.2)
Native language Dutch - n (%)	394 (91.0)
Part of fraternity - n (%)	221 (51.0)
Part of study association - n (%)	100 (23.1)
Having a side job - n (%)	285 (65.8)
Possible correlates for adverse affective states	
>48 hours per week spent on studying - n (%)	20 (4.6)
<6 hours sleep per night - n (%)	72 (16.6)*
High amount of sleep loss due to medical school - n (%)	60 (13.9)
Worries about own financial situation - n (%)	177 (40.9)
Poor self-rated physical health - n (%)	117 (27.0)
Ten or more sick leave days in past year - n (%)	44 (10.2)
Consulted study adviser for psychological distress before - n (%)	93 (21.5)
Optimism (LOT-R) score (0-24) - mean ± SE	14.41 ± 0.19
Happiness (0-10) - mean ± SD	7.65 ± 1.60
Need for recovery score (NFR) score (0-100) - mean ± SE	46.61 ± 1.13

SD=standard deviation, IQR=interquartile range, SE=standard error of the mean

* 5 missing values

Table 2: Comparisons between 433 non-clinically active medical students with and without burnout-related symptoms (N=433)

	Univariate			Multivariate	
	No burnout (n=235)	**Burnout** (n=199)	**P-value**	**OR (95% CI)**	**P-value**
Socio-demographic variables					
Female sex - n (%)	184 (78.6)	143 (71.9)	0.10	0.67 (0.40-1.10)	0.11
Age, yr - mean ± SE	21.0 ± 0.13	21.3 ± 0.16	0.23	1.04 (0.93-1.16)	0.55
Time since start of medical school, yrs - mean. ± SE	2.80 ± 0.08	2.88 ± 0.11	0.56		
Partnership status - n (%)					
• Living together with partner/ married	15 (6.4)	13 (6.5)	0.96		
• Not married	219 (93.6)	186 (93.5)			
Housing situation - n (%)					
• With parents	52 (22.2)	34 (17.1)	0.18		
• Student housing (shared facilities)	151 (64.5)	128 (64.3)			
• Private housing (own facilities)	31 (13.2)	37 (18.6)			
Having children - n (%)	**5 (2.1)**	**0 (0.0)**	**0.04**		
Native language Dutch - n (%)	209 (89.3)	185 (93.0)	0.19		
Part of fraternity - n (%)	116 (49.6)	105 (52.8)	0.51		
Part of study association - n (%)	55 (23.5)	45 (22.6)	0.83		
Having a side job - n (%)	161 (68.8)	124 (62.3)	0.16		
Possible correlates for burnout- related symptoms					
>48 hours per week spent on studying - n (%)	11 (4.7)	9 (4.5)	0.68		
<6 hours sleep per night - n (%)	**23 (9.8)***	**49 (24.6)****	**<0.001**	**2.00 (1.12-3.60)**	**0.02**
High amount of sleep loss due to medical school – n (%)	**18 (7.7)**	**42 (21.1)**	**<0.001**		
Worries about own financial situation - n (%)	**83 (35.3)**	**94 (47.2)**	**0.01**		
Poor self-rated physical health - n (%)	**46 (19.7)**	**71 (35.7)**	**<0.001**		
Ten or more sick leave days in past year - n (%)	**15 (6.4)**	**29 (14.6)**	**0.005**		
Consulted study adviser for psychological distress before - n (%)	**38 (16.2)**	**55 (27.6)**	**0.004**		
Optimism (LOT-R) score (0-24) - mean ± SE	**15.3 ± 0.23**	**13.4 ± 0.29**	**<0.001**		
Happiness score (0-10) - mean ± SE	**8.19 ± 0.08**	**7.01 ± 0.12**	**<0.001**	**0.50 (0.38-0.66)**	**<0.001**
Need for recovery score (NFR) score (0-100) - mean ± SE	**39.7 ± 1.39**	**54.8 ± 1.65**	**<0.001**	**1.66 (1.31-2.11)**	**<0.001**

Bold items are statistically significant at a p-value <0.05; OR=odds ratio; CI=95% confidence interval; SE=standard error of the mean.

* 1 missing value

** 4 missing values

Table 3: Comparisons between 433 non-clinically active medical students with and without depression-related symptoms (N=433)

	Univariate			Multivariate	
	No depression (n=316)	**Depression** (n=117)	**P-value**	**OR (95% CI)**	**P-value**
Socio-demographic variables					
Female sex - n (%)	242 (76.6)	85 (72.6)	0.40	0.74 (0.36-1.49)	0.40
Age, yr - mean ± SE	21.1 ± 0.10	21.3 ± 0.25	0.54	0.93 (0.80-1.08)	0.33
Time since start of medical school, yrs - mean. ± SE	**2.72 ± 0.07**	**3.15 ± 0.14**	**0.003**		
Partnership status - n (%)					
• Living together with partner/ married	17 (5.4)	11 (9.4)	0.13		
• Not married	299 (94.6)	106 (90.6)			
Housing situation - n (%)					
• With parents	**55 (17.4)**	**31 (26.5)**	**0.02**		
• Student housing (shared facilities)	**216 (68.4)**	**63 (53.8)**			
• Private housing (own facilities)	**45 (14.2)**	**23 (19.7)**			
Having children - n (%)	4 (1.3)	1 (0.9)	0.72		
Native language Dutch - n (%)	290 (91.8)	104 (88.9)	0.35		
Part of fraternity - n (%)	**171 (54.1)**	**50 (42.7)**	**0.04**		
Part of study association - n (%)	80 (25.3)	20 (17.1)	0.07		
Having a side job - n (%)	212 (67.1)	73 (62.4)	0.36		
Possible correlates for depression-related symptoms					
>48 hours per week spent on studying - n (%)	13 (4.1)	7 (6.0)	0.48		
<6 hours sleep per night - n (%)	**41 (13.0)***	**31 (26.5)****	**0.001**		
High amount of sleep loss due to medical school - n (%)	**33 (10.4)**	**27 (23.1)**	**0.001**		
Worries about own financial situation - n (%)	**116 (36.7)**	**61 (52.1)**	**0.004**		
Poor self-rated physical health - n (%)	**68 (21.5)**	**49 (41.9)**	**<0.001**		
Ten or more sick leave days in past year - n (%)	**22 (7.0)**	**22 (18.8)**	**<0.001**		
Consulted study adviser for psychological distress before - n (%)	**51 (16.1)**	**42 (35.9)**	**<0.001**		
Optimism (LOT-R) score (0-24) - mean ± SE	**15.6 ± 0.19**	**11.2 ± 0.34**	**<0.001**	**0.44 (0.31-0.62)**	**<0.001**
Happiness score (0-10) - mean ± SE	**8.26 ± 0.06**	**6.00 ± 0.16**	**<0.001**	**0.18 (0.11-0.29)**	**<0.001**
Need for recovery score (NFR) score (0-100) - mean ± SE	**41.5 ± 1.24**	**60.3 ± 2.00**	**<0.001**	**1.42 (1.03-2.00)**	**0.03**

Bold items are statistically significant at a p-value <0,05; OR=odds ratio; CI=95% confidence interval; SE=standard error of the mean.

* 4 missing values

** 1 missing value

Table 4: Comparisons between 433 non-clinically active medical students with and without anxiety-related symptoms (N=433)

	Univariate			Multivariate	
	No anxiety (n=308)	**Anxiety** (n=126)	**P-value**	**OR (95% CI)**	**P-value**
Socio-demographic variables					
Female sex - n (%)	231 (75.2)	96 (76.2)	0.84	0.94 (0.52-1.73)	0.85
Age, yr - mean ± SE	21.1 ± 0.11	21.2 ± 0.21	0.86	0.96 (0.85-1.09)	0.56
Time since start of medical school, yrs - mean. ± SE	2.79 ± 0.08	2.95 ± 0.13	0.27		
Partnership status - n (%)					
• Living together with partner/ married	**15 (4.9)**	**13 (10.3)**	**0.04**		
• Not married	**292 (95.1)**	**113 (89.7)**			
Housing situation - n (%)					
• With parents	62 (20.2)	24 (19.0)	0.65		
• Student housing (shared facilities)	200 (65.1)	79 (62.7)			
• Private housing (own facilities)	45 (14.7)	23 (18.3)			
Having children - n (%)	5 (1.6)	0 (0.0)	0.15		
Native language Dutch - n (%)	278 (90.6)	116 (92.1)	0.62		
Part of fraternity - n (%)	152 (49.5)	69 (54.8)	0.32		
Part of study association - n (%)	70 (22.8)	30 (23.8)	0.82		
Having a side job - n (%)	208 (67.8)	77 (61.1)	0.19		
Possible correlates for anxiety-related symptoms					
>48 hours per week spent on studying - n (%)	13 (4.2)	7 (5.6)	0.62		
<6 hours sleep per night - n (%)	**39 (12.7)***	**33 (26.2)****	**0.001**		
High amount of sleep loss due to medical school - n (%)	**32 (10.4)**	**28 (22.2)**	**0.001**		
Worries about own financial situation - n (%)	**111 (36.2)**	**66 (52.4)**	**0.002**		
Poor self-rated physical health - n (%)	**66 (21.5)**	**51 (40.5)**	**<0.001**		
Ten or more sick leave days in past year - n (%)	**25 (8.1)**	**19 (15.1)**	**0.03**		
Consulted study adviser for psychological distress before - n (%)	**47 (15.3)**	**46 (36.5)**	**<0.001**		
Optimism (LOT-R) score (0-24) - mean ± SE	**15.5 ± 0.20**	**11.7 ± 0.32**	**<0.001**	**0.46 (0.34-0.63)**	**<0.001**
Happiness score (0-10) - mean ± SE	**8.06 ± 0.08**	**6.64 ± 0.16**	**<0.001**	**0.61 (0.45-0.81)**	**0.001**
Need for recovery score (NFR) score (0-100) - mean ± SE	**40.7 ± 1.20**	**61.1 ± 2.04**	**<0.001**	**1.90 (1.43-2.52)**	**<0.001**

Bold items are statistically significant at a p-value <0,05; OR= odds ratio; CI=95% confidence interval; SE=standard error of the mean.

* 3 missing values

** 2 missing values