Stress and depression among medical students: a cross-sectional study

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OBJECTIVE To assess the exposure to different stressors and the prevalence of depression among medical students at different levels of education, taking gender differences into account.

DESIGN Students were asked to complete a new stress inventory called the Higher Education Stress Inventory (HESI), the Major Depression Inventory (MDI), slightly modified, and questions on suicidal ideation developed by Meehan.

SETTING The study was carried out at the Karolinska Institute Medical University, Stockholm, Sweden. Matched controls from the general population were used.

PARTICIPANTS All registered students in Years 1, 3 and 6 were enrolled in the study ($n = 342$). The response rate was 90.4%.

RESULTS Year 1 students gave high ratings to the workload and lack of feedback stressors. Year 3 students gave high ratings to 'Worries about future endurance/competence' and 'Pedagogical shortcomings'. In Year 6, both the latter factors were rated highly, but Year 6 students also gave higher ratings than the 2 other groups to 'Non-supportive climate'. In all 3 cohorts students complained of lack of feedback. Female students gave higher ratings than males to 4 out of 7 factors. Several stress factors were identified as being associated with depression. The prevalence of depressive symptoms among students was 12.9%, significantly higher than in the general population, and was 16.1% among female students versus 8.1% among males. A total of 2.7% of students had made suicide attempts, but none during the previous year.

CONCLUSION Year 1 students indicated experiencing the highest degree of pressure from studies. A gender difference regarding stress levels was also seen, where women reported higher levels of stress than men. Medical students had higher depression rates than the general population, and women students had higher rates than men.

KEYWORDS education, medical, undergraduate/ *psychology; stress psychological/ *aetiology; adaptation psychological; depressive disorders/ *aetiology; sex factors; students, medical; cross-sectional study.

INTRODUCTION

Medical education is perceived as being stressful, although it is doubtful whether it differs in that respect from other higher education.[1] Stress during education can lead to mental distress and have a negative impact on cognitive functioning and learning.[2] High rates of psychological morbidity among students, such as anxiety and depressive symptoms, have been reported in several studies from different western countries,[3–9] as well as from other parts of the world.[10,11] A wide range of different measures has been used to address these phenomena. Depressive symptomatology in medical students has been assessed with, for example, Beck's Depression Inventory (BDI),[4,9–11] the 12-item General Health Questionnaire (GHQ-12)[12,13] and different versions of the

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Overview

What is already known on this subject

Many studies have found that medical students suffer from stress and mental distress and have questioned whether they differ from other populations in this respect. Stressors may change during education.

What this study adds

This study presents a new study stress inventory, applicable in higher education, which enables comparisons to be made between students of different disciplines.

Different stressors operate at different stages of medical education.

Medical students are more distressed than the general population. Female students were more distressed than males.

Suggestions for further research

Longitudinal studies, using interview data, should be carried out to assess clinical significance of distress. Comparisons with other student populations should be made.

Symptom Check-List (SCL),[3,6] as well as less common instruments. The measures applied to monitor stress are equally varied: some address specific medical school stressors,[14] such as the Perceived Medical School Stress (PMSS) scale,[3,4,6,10,11] and others address burn-out[13] or more general aspects of stress.[2,15] The concepts of stress, mental distress and self-rated depression are in fact not entirely distinct from one another.

In a study of medical students at Karolinska Institutet, 12% reported feelings of anxiety or a depressed mood.[16] However, Canadian medical students were found to experience less stress than law students, graduate students and the general population,[15] although medical students had elevated scores on stress and depressed mood at the transition from basic to clinical training. Longitudinal studies have likewise examined at which stages along

the course of medical education stress and morbidity peak. Among UK medical students, those in Year 1 were found to have the highest levels of mental distress, a finding that also predicted problems later during studies.[13] Students of medicine at the University of Massachusetts[8] showed increased stress and depression rates in Years 2 and 4, and Thai students were found to be most stressed in Year 3.[2] These differences might be due to different curricula, differences in populations studied or to the different measures used.

Gender differences have sometimes been recorded and sometimes not. At the University of Saõ Paolo, female students were found to be more affected by both depressive and anxiety symptoms than males.[9] A Norwegian study of medical students found no gender difference in mental health or medical school stress.[6] At Karolinska Institutet, female students were found to have consulted psychiatric or psychological help more often than males.[16]

The present study addresses the following questions. Does study stress among medical students vary between different stages of education and are there gender differences? How prevalent is depressive symptomatology among medical students, with respect to both stage of education and gender, and does it differ from that in the general population?

METHODS

Subjects

The study population consisted of all registered students at Karolinska Institutet in their first, sixth and eleventh terms during the autumn of 2001 (first term) and the autumn of 2002 (sixth and eleventh terms). In total 342 students were approached, of whom 59.1% were women and 40.9% were men, with similar distributions in all 3 subsamples. The mean age of the entire sample was 26.1 years, ranging from 18 to 44 years. The mean ages in the 3 subsamples were, in chronological order, 23.7, 26.6 and 27.8 years, respectively.

We chose to approach students at the beginning and end of medical school and at the point of their introduction to clinical training (sixth term). The curriculum of the first term is pre-clinical, predominantly consisting of a course in the structure and function of the cell. In the sixth term internal medicine is taught, and the 11th term is a compilation of short courses of 1–4 weeks, in oncology,

geriatric medicine, family medicine, public health and emergency medicine, as well as an 8-week elective. The 3 stages will be referred to as Years 1, 3 and 6 (final year) in the following text.

We informed the students of the study at lectures, some weeks prior to sending out the questionnaires, which also included written information. The questionnaires were sent by mail and we used telephone numbers and/or e-mail addresses to contact respondents when we needed to clarify answers or complete missing data. Two reminders were made by mail and 2 by telephone. The answers were obtained over a period of 10 weeks. After this procedure, the forms were processed anonymously.

The Students' Health Service was engaged and referred to in case of any distress related to answering the questionnaire. Approval of the study was obtained from the Ethics Committee at Karolinska Institutet.

Study stress

The Perceived Medical School Stress (PMSS) scale,[3] used frequently to monitor stress among medical students, sometimes with local modifications,[6,10,11] aims to quantify specific stressors within medical education. It comprises 11 or 13 items[3,4] in 4 areas: the medical school curriculum and environment; personal competence/endurance; social/recreational life, and finances.

Because we found that the scale was not suitable for the Swedish educational system, we constructed an inventory based on some of the items from the PMSS scale. Table 1 shows our items displayed in abbreviated form. Items 2, 6, 8, 10, 13, 17, 19, 26, 27 and 33 are presented in reversed versions. Items borrowed from the PMSS scale[3] are items 1, 3, 4, and 14; and slightly modified PMSS items are items 9, 11 and 12. To identify additional issues of importance, we carried out interviews with medical students, who were asked to describe stressful situations during their education. Aspects they highlighted were difficulties with role modelling, value conflicts, limited possibilities to influence the curriculum and schedule, issues of discrimination, concerns regarding their future profession and unsatisfied needs for feedback. The new inventory, called the Higher Education Stress Inventory (HESI), is designed to capture a wide variety of stressful aspects and, in contrast to the PMSS scale, to be applicable within different higher educational settings, so that comparisons can be made with other student populations. It comprises 33 statements indicating the presence or absence of stressful aspects, to be rated on a 4-point Likert scale, where 1 = does not apply at all, 2 = does not apply very much, 3 = applies fairly well, and 4 = applies perfectly. The order is reversed for items that describe the absence of stressors. In the presentation below, all items have been transcribed to denote the presence of stress.

Depression, suicidal ideation

Depression was measured by a slightly revised version of the Major Depression Inventory (MDI),[17] using a 4-point rating scale instead of the original 6-point scale. Fulfilment of the DSM-IV diagnostic criteria A and C for major depressive episode was demanded for a subject to be diagnosed with depression. Criterion A requires that 5 depressive symptoms must be rated as present for either 'most of the time' or 'all the time' for at least 2 weeks, and among them at least 1 core symptom. Criterion C requires the symptoms to cause significant distress or impaired social functioning. Questions on present and past suicidal ideation were asked, using the inventory developed by Meehan.[18]

Statistics

Results were analysed using the Statistical Package for the Social Sciences (SPSS Version 12.0.1). For the 'item-level' presentation of stress, the answers were dichotomised between values 2 and 3. We compared subgroups through 4-field cross-tabulation; significances were calculated using Pearson's chi-squared test. Due to the amount of calculations to be made on the same material (4 × 33), significance levels were adjusted according to Bonferroni.

A principal axis factoring with Varimax rotation was performed on the stress inventory, using the Kaiser criterion with eigenvalues > 1. Factor scores were computed as means of the scores for the items pertaining to each factor. As the subgroups were of similar sizes, differences in factor scores between the 3 stages of education were analysed as parametric by 1-way ANOVA (Sheffe), in order to enable the performance of post hoc tests, although factors were not normally distributed. Factor scores per gender were compared by independent t-test.

The association of depression with stress factors was analysed by multiple logistic regression with backward elimination, and the correlation of depression with gender through bivariate logistic regression.

Table 1 Study stress: HESI (Higher Education Stress Inventory). Proportions of high stress per stage at medical school and per gender in the entire sample

Alpha = 0.845	Year 1	Year 3	Year 6	Men (total)	Women (total)
1 Studies control my life, little time for other activities	77.9% (88)†	80.0% (76)‡	34.7% (35)†‡	58.5% (72)	68.3% (127)
2 Lack of respectful treatment from teachers	6.2% (7)	9.5% (9)	10.0% (10)	8.4% (8)	9.7% (18)
3 Worried not to master the pool of knowledge	46.0% (52)	62.1% (59)	59.4% (60)	43.9% (54)	62.9% (117)
4 Anonymity among students	9.7% (11)	9.5% (9)	14.9% (15)	8.9% (11)	12.9% (24)
5 Lack of clarity regarding aim of studies	19.5% (22)*§	54.7% (52)*	44.6% (45)§	39.8% (49)	37.6% (70)
6 Personal development not stimulated through studies	8.8% (10)	16.8% (16)	26.0% (26)	17.9% (22)	16.2% (30)
7 Professional role in conflict with personal values	3.5% (4)	10.5% (10)	7.0% (7)	8.1% (10)	5.9% (11)
8 Lack of encouragement from teachers	70.8% (80)	47.4% (45)	55.0% (55)	55.3% (68)	60.5% (112)
9 Competitive attitude among students	6.2% (7)	4.2% (4)	9.9% (10)	4.1% (5)	8.6% (16)
10 Not satisfied with choice of career	2.7% (3)	0.0% (0)	4.0% (4)	2.5% (3)	2.2% (4)
11 Cold and impersonal attitude enhanced by education	2.7% (3)	4.2% (4)	13.9% (14)	6.5% (8)	7.0% (13)
12 Worries over financing during education	54.9% (62)	58.9% (56)	57.4% (58)	59.3% (73)	55.4% (103)
13 Lack of support from peers	8.8% (10)	13.7% (13)	12.9% (13)	8.9% (11)	13.4% (25)
14 Worries over workload in the future	50.4% (57)	64.2% (61)	63.4% (64)	48.8% (60)	65.4% (122)
15 No acceptance towards weakness and personal shortcomings	27.4% (31)	33.7% (32)	37.6% (37)	26.0% (32)	36.6% (68)
16 Unclear role and function as student	17.7% (20)*†	75.8% (72)*	78.2% (79)†	56.1% (69)	54.8% (102)
17 Not proud of profession	2.7% (3)	1.1% (1)	3.0% (3)	3.3% (4)	1.6% (3)
18 Being less well treated because of my sex	2.7% (3)	8.4% (8)	14.0% (14)	2.4% (3)	11.9% (22)
19 Lacking opportunities for influencing studies or curriculum	49.6% (56)*†	81.1% (77)*	79.2% (80)†	69.1% (85)	68.8% (128)
20 Worries over stress in future profession	43.4% (49)	54.7% (52)	55.4% (56)	39.0% (48)	58.6% (109)
21 Passive reception of knowledge rather than active learning	32.7% (37)	36.8% (35)	42.6% (43)	38.2% (47)	36.6% (68)
22 Expectation from family has too strongly steered my choice of career	5.3% (6)	3.2% (3)	7.9% (8)	8.1% (10)	3.8% (7)
23 Worries about housing	32.7% (37)	31.6% (30)	22.8% (23)	26.8% (33)	30.6% (57)
24 Being less well treated because of my ethnic background	1.8% (2)	2.1% (2)	2.0% (2)	0.8% (1)	2.7% (5)
25 Perceiving many future colleagues as dissatisfied or dejected in their profession	27.4% (31)	29.5% (28)	49.5% (50)	36.6% (45)	34.4% (64)
26 Sense of education not giving adequate preparation for profession	10.6% (12)	18.9% (18)	27.0% (27)	14.6% (18)	21.1% (39)
27 Student union activities not promoting sense of community	35.7% (40)	64.2% (61)	58.4% (59)	41.2% (63)	52.4% (97)
28 Worries over future economy (debts from studies)	23.9% (27)	15.8% (15)	10.9% (11)	16.3% (20)	17.7% (33)
29 Too much student-controlled group-activities, resulting in unclear curriculum	22.1% (25)	12.6% (12)	17.8% (18)	19.5% (24)	16.7% (31)

Table 1 Continued

Alpha = 0.845	Year 1	Year 3	Year 6	Men (total)	Women (total)
30 Literature too difficult and extensive	16.8% (19)	12.6% (12)	8.9% (9)	13.0% (16)	12.9% (24)
31 Pace of studies too high	50.4% (57)*†	20.0% (19)*	15.8% (16)†	24.4% (30)	33.3% (62)
32 Must attend situations that are ethically offending	8.9% (10)	5.3% (5)	11.9% (12)	7.3% (9)	9.7% (18)
33 Lack of feedback from teachers	87.6% (99)	74.7% (71)	77.2% (78)	75.6% (93)	83.3% (155)

* P < 0.001 Year 1 versus Year 3.
† P < 0.001 Year 1 versus Year 6.
‡ P < 0.001 Year 3 versus Year 6.
§ P < 0.05 Year 1 versus Year 6.
Pearson's chi-squared, adjusted according to Bonferroni.
All items have been transcribed into negatively worded statements and all statements abbreviated to yield a feasible overview. The percentages given refer to the proportion of each subset rating > 2 on each item. Figures in brackets refer to the number of subjects.

RESULTS

A total of 342 students were approached. The response rates were 90.4% ($n = 309$) overall, 89.0% ($n = 113$) in Year 1, 96.9% ($n = 95$) in Year 3 and 86.3% ($n = 101$) in Year 6. The age and sex distributions among non-responders did not differ.

Study stress

Stages of medical school

Table 1 displays all items of the HESI and shows the distribution of highly rated stress on each item between the 3 different subsamples of medical students, as well as between males and females. The internal consistency reliability, with Cronbach's alpha of 84.5%, was good.

Students in Years 1 and 3 gave higher ratings to 'Studies control my life, little time for other activities' (item 1), than those in their final year, although only Year 1 students indicated more often that the pace of study was too high (item 31). 'Lack of clarity regarding aim of studies' (item 5) and 'Unclear role and function as student' (item 16) were rated highly in the 2 later stages. While 'Lack of feedback from teachers' (item 33) was rated highly by vast majorities at all stages, there was an indication that Year 1 students reported 'Lack of encouragement from teachers' (item 8) more often than did their senior peers. The 2 more senior groups rated 'Lacking opportunities for influencing studies' (item 19) more highly more often (both around 80%) than Year 1 students. In the last year, about a quarter of the students indicated that their training was not giving them adequate preparation for the profession (item 26; not significant).

A low number of students in all groups found the literature difficult and extensive (item 30). Satisfaction with choice of profession was high in all groups (items 10, 17), although there was a stage by stage tendency for higher proportions of students to report that they perceived their teachers/future colleagues as being dissatisfied in their professions.

Gender

There were no significant gender differences on any item, although on 3 items describing concerns regarding negative expectations (items 3, 14, 20), there were tendencies towards higher ratings by a greater proportion of female students.

Factors

The factor analysis identified 10 factors, explaining 58.4% of the total variance, with 29 out of 33 items loading above 0.3 in any of them (Table 2). Further rotations did not produce fewer factors, and, as the performance of a Promax rotation did not add any relevant information it was discarded. Three of the factors were disregarded from further calculations due to their low Cronbach's alphas. Factor VII, 'Financial concerns', was included, despite a rather low alpha of 0.59, as we considered it to cover a relevant aspect of stress. The 7 remaining factors explained 48.7% of the total variance, with 24 items loading above 0.3.

Figure 1 shows mean scores for each of the 7 factors, by stage and gender. 'Worries about future endurance/competence' (I) and 'Faculty shortcomings' (III) gave higher means in the later stages than in Year 1. 'Non-supportive climate' (II) was rated most highly by Year 6 students. During Years 1 and 3, 'Workload' (IV), was rated more highly than in Year 6, with a peak at the initial stage. 'Insufficient feedback' (V) had the highest means of all factors at all 3 stages, but also peaked among Year 1 students. Female students gave higher ratings to 'Worries about future endurance/competence', 'Non-supportive climate', 'Workload' and 'Insufficient feedback' than did male students.

Depression

Controls matched for age and gender but not for educational level were collected from an ongoing Swedish study of the general population, providing comparative data on depression. Data were collected by similar questionnaires, the depression inventory being identical. The participation rate in the control population (49%) was lower than in the present study of medical students. Two matched individuals for each medical student were drawn from the population sample ($n = 618$).

Self-assessment of depression showed no significant differences between stages, but prevalence tended to fall by each stage. In total, 12.9% (SD 0.34) of the medical students fulfilled criteria for self-rated depression, versus 7.8% (SD 0.29) in the control group ($P < 0.05$). The prevalence among female students was 16.1% (SD 0.37) and differed from both male students (8.1%, SD 0.27) ($P < 0.05$), and females in the general population (9.9%, SD 0.30) ($P < 0.05$). Female students had an increased risk of depression according to the criteria by 2.43 ($P < 0.05$) (Table 3).

Stress and depression

Table 3 shows the associations of depression with stress and gender. The factors from the HESI (I: Worries about future endurance/competence, IV: Workload, V: Insufficient feedback and VI: Lack of commitment) were significantly associated with depression.

Suicidal ideation

Table 4 displays results on suicidal ideation. Slightly under a third of the students had had suicidal thoughts, with no significant differences between groups. In total, 2.7% reported having made a suicide attempt, including 1 man and 7 women. The suicide attempt had led to hospitalisation in 2 cases and to seeking medical advice in another 2, all of whom were women. Among the general population controls, 4.2% had made a suicide attempt (not significant).

DISCUSSION

The response rate of 90.4% renders an adequate sample of the population studied. Depression rates were higher than in the general population. Levels of stress varied between stages of education and were more pronounced among female students. Several stress factors were also related to depression.

The new stress inventory, the HESI, had good internal consistency reliability. Likewise, the 7 factors identified as feasible had acceptable Cronbach's alphas. They correspond fairly well to those identified by Vitaliano *et al.*[3] in the widely used PMSS scale, which also served as an inspiration for the HESI. This suggests a possibility for comparisons with results from studies using the PMSS. However, both the translation process and the fact that we used a 4-point Likert-scale, as opposed to the 5-point scale of the PMSS, raise obstacles. The validity of the HESI has not been rigorously investigated, but its face validity is supported by the fact that items are based on issues of stress reported in interviews with medical students and also by the correlation of several factors with self-rated depression. Self-rated depression should not be considered identical to clinical depression, although we have adopted quite conservative criteria. The MDI has not been used on medical students in any of the studies cited here.

In agreement with results from the UK study by Guthrie *et al.*,[13] measuring burn-out and depression, these Year 1 students were found to be under great

Table 2 Study stress: factor analysis of the stress inventory HESI

	I Worries about future endurance/competence	II Non-supportive climate	III Faculty short-comings	IV Workload	V Insufficient feedback	VI Low commitment	VII Financial concerns	VIII	IX	X
α	0.78	0.71	0.69	0.62	0.65	0.62	0.59	0.17	0.50	3.2
Variance explained %	**19.5**	**6.6**	**5.6**	**4.8**	**4.3**	**3.9**	**3.7**	**3.4**	**3.3**	**3.2**
3 Worried about not mastering the pool of knowledge	0.587									
14 Worried about workload in the future	0.765									
20 Worried about stress in future profession	0.775									
4 Anonymity among students		0.460								
7 Professional role in conflict with personal values		0.350				0.314				
9 Competitive attitude among students		0.610								
11 Cold and impersonal attitude enhanced by education		0.583								
18 Being less well treated because of my sex		0.336								
2 Lack of respectful treatment from teachers			0.390							
5 Lack of clarity regarding aim of studies			0.422							
6 Personal development not stimulated through studies			0.517							
16 Unclear role and function as student	0.313		0.551							
19 Lacking opportunities for influencing studies or curriculum			0.401							
21 Passive reception of knowledge rather than active learning			0.400							
26 Sense of education not giving adequate preparation for profession		0.301	0.331							
1 Studies control my life, little time for other activities				0.383						
30 Literature too difficult and extensive				0.488						

Table 2 Continued

	I Worries about future endurance/competence	II Non-supportive climate	III Faculty short-comings	IV Workload	V Insufficient feedback	VI Low commitment	VII Financial concerns	VIII	IX	X
α	0.78	0.71	0.69	0.62	0.65	0.62	0.59	0.17	0.50	
Variance explained %	**19.5**	**6.6**	**5.6**	**4.8**	**4.3**	**3.9**	**3.7**	**3.4**	**3.3**	**3.2**
31 Pace of studies too high				0.815						
8 Lack of encouragement from teachers					0.700					
33 Lack of feedback from teachers					0.589					
10 Not satisfied with choice of career						0.531				
17 Not proud of profession						0.738				
12 Worried about financing during education							0.696			
28 Worried about future economy (debts from studies)							0.561			
22 Expectations from family has too strongly steered my choice of career								0.670		
24 Being less well treated because of my ethnical background					0.308		0.348	0.457		
13 Lack of support from peers									0.543	
15 No acceptance of weakness and personal shortcomings		0.318							0.449	
29 Too many student-controlled group activities resulting in unclear curriculum										0.588

Principal axis factoring, Varimax rotation with Kaiser normalisation. Rotation converged in 11 iterations. Loadings > 0.300. Cronbach's alpha and variance explained displayed for each factor.
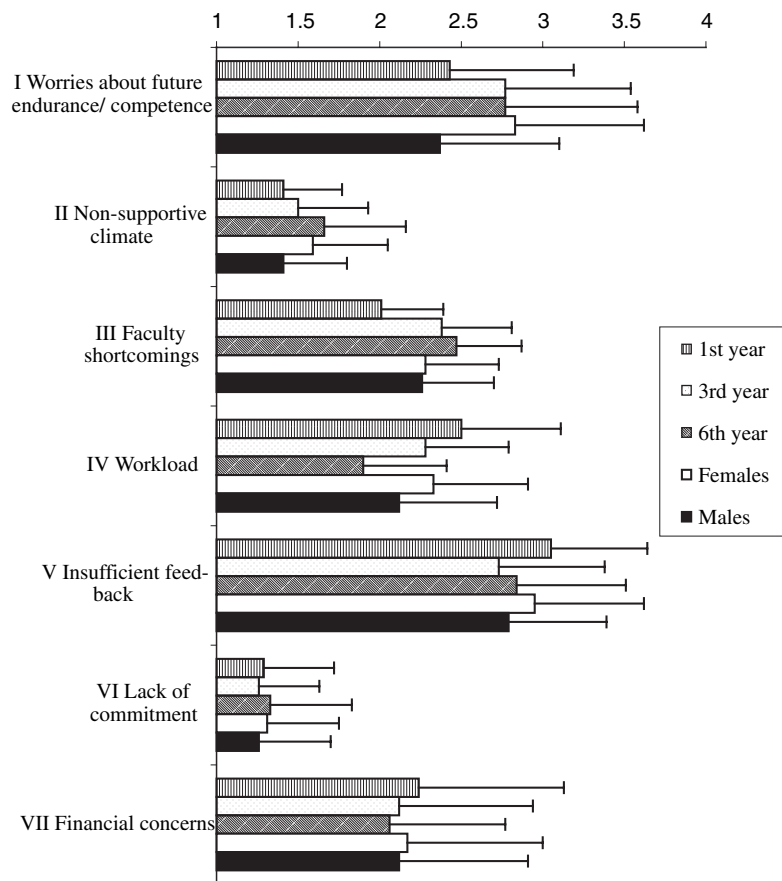
Figure 1 Study stress: HESI factor scoring by stage of medical school and gender. Values are means of rated items pertaining to each factor for the given subsets. Standard deviations indicated in 1 orientation only. Significant differences between stages (ANOVA, Sheffe) and between gender (Independent t-test). Factor I: Y1 versus Y3 ($P = 0.01$), Y1 versus Y6 ($P < 0.01$), males versus females ($P < 0.0001$). Factor II: Y1 versus Y6 ($P < 0.0001$), Y3 versus Y6 ($P < 0.05$), males versus females ($P = 0.001$). Factor III: Y1 versus Y3 ($P < 0.0001$), Y1 versus Y6 ($P < 0.0001$). Factor IV: Y1 versus Y3 ($P < 0.05$), Y1 versus Y6 ($P < 0.0001$), Y3 versus Y6 ($P < 0.0001$), males versus females ($P < 0.05$). Factor V: Y1 versus Y3 ($P < 0.01$), males versus females ($P < 0.05$).

Table 3 Female gender and factors I, IV, V and VI of the stress inventory HESI, explaining self-rated depression

Factor/explaining variable	Beta	Wald χ^2	d.f.	P	Odds ratio	95% CI
VI Low commitment*	1.64	19.67	1	0.000	5.13	2.10–9.58
V Insufficient feedback*	0.87	6.34	1	0.012	2.39	1.05–4.34
IV Workload*	0.81	5.75	1	0.017	2.25	1.20–4.53
I Worries about future endurance/competence*	0.69	6.39	1	0.011	2.00	1.06–3.22
Female gender†	0.89	4.94	1	0.026	2.43	1.11–5.32

* Multiple logistic regression analysis, with backwards elimination of insignificant variables. Cox and Snell $R^2 = 0.177$, Nagelkerke $R^2 = 0.331$.
† Bivariate logistic regression analysis.

pressure, especially when compared with Year 6 students. They seemed to be more heavily burdened by the curriculum, and the perceived stress might also be a feature of the process of adjusting to the educational setting, as proposed by a recent qualitative study carried out in the UK.[19] Different stressors appeared to be at work at the 3 stages studied, with role conflicts and a seemingly growing degree of

Table 4 Suicidal ideation, per gender and stage of medical school. Proportions and absolute numbers (in brackets)

	Year 1		Year 3		Year 6		Total		
	Males	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**All**
Suicidal thoughts ever	15.6% (7)	30.9% (21)	21.6% (8)	34.5% (20)	31.7% (13)	33.3% (20)	22.8% (28)	32.8% (61)	28.8% (89)
Suicidal thoughts in last 12 months	2.4% (1)	3.0% (2)	5.7% (2)	3.5% (2)	2.7% (1)	13.3% (8)	3.4% (4)	6.6% (12)	5.4% (16)
Suicide attempt ever	2.5% (1)	3.0% (2)	0	5.3% (3)	0	3.3% (2)	0.8% (1)	3.8% (7)	2.7% (8)
Suicide attempt in last 12 months	0	0	0	0	0	0	0	0	0

cynicism developing throughout the course of education, also noted among North American students.[20] At the transition to clinical training, students still found their studies to be dominating their lives. However, the pace of study was no longer a major problem, while the role confusion reported indicates stress. This might align with the increased levels of stress and depressive moods found in Canadian students at this stage by Helmers *et al.*,[15] although no significant increase in depressed mood was recorded at this stage in our population. The measures of depression may not, however, be readily comparable. Students in the final stages of education were not burdened by their studies, but were more critical of the education and less satisfied with the psychosocial climate. If it is true, the recorded dissatisfaction with the education as preparation for life within the medical profession is serious.

Gender differences were found, with women scoring more highly for stress and depression. This is noteworthy, particularly as more than half the medical students in Sweden are women. Although this has not been studied in detail, a frustrating notion is that female medical students at the end of their studies have been subjected to a significant degree of gender discrimination. Previous findings that female students seek psychological help more often than males[16] suggest that the reported distress is of clinical significance. Among Norwegian medical students, no gender difference was recorded regarding mental distress or stress, as mentioned in the Introduction. Further, the authors found no difference in stress levels between medical students and the general population, except that male medical students scored more highly on mental distress. Our results show the opposite relationship, with a higher prevalence of depressive symptoms among medical students than in the general population, also significant between the

female groups in these 2 samples. This difference might even be underestimated, considering that the identity of the subjects was not unknown to the investigators during the data collection. As reported by Chew-Graham *et al.*,[21] students are often reluctant to express signs of vulnerability, even at supportive opportunities made available through the faculty. The lifetime prevalence of suicidal ideation did not differ from that of the general population controls and was of the same order as in the general population in Sweden,[22] while somewhat lower than among Norwegian final year medical students.[23] In this study, 2.7% of all students and 3.3% of Year 6 students reported having made a suicide attempt, as compared to 1.4% in the Norwegian study. Although different measures were used, the figures all fall within a narrow range.

An additional limitation to this study is its cross-sectional design, where the different subgroups may differ in respects not directly attributable to the stage of education. Our stress inventory is also new and was used here for the first time, and its validity has yet to be investigated in greater detail in new and larger populations. Further, the fact that we have data from only 1 medical school limits generalisation.

Implications

Important issues for the faculty, according to our results, include increasing awareness of the particular needs of female students and the need for feedback and support from teachers. Teachers should be made more aware of their function as role models. An enhanced structuring of clinical training may improve conditions.

The clinical significance of the recorded depressive states among students is not known. Longitudinal

interview studies, following cohorts through their medical education and further into the profession, should be performed to gain knowledge of the development of mental distress among medical students and doctors.

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