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Medical students' distress – quality, continuity and gender differences during a six-year medical programme

P.M. NIEMI[1] & P.T. VAINIOMÄKI[2]

[1]Department of Teacher Education, University of Turku, Finland; [2]Department of Family Medicine, Turku University Hospital, University of Turku, Finland

ABSTRACT *Research observations suggest an increase in distress during the course of medical education, but it is not known whether this distress is chronic and persistent or episodic because follow-ups covering the whole training programme are lacking. We explored stress symptoms among undergraduate medical students (n = 110) at five points during the six-year medical training programme. The quality and continuity of symptoms and gender differences in stress reports were analysed. Questionnaire and interviews were used to assess stress symptoms, perceived health and severity of distress. Stress symptoms, such as fatigue, sleeping problems, anxiety, irritability and depression, were common. No significant gender differences were seen, but there was a consistent increase of stress reports throughout the medical programme in both sexes. Those who were most distressed at the beginning of training also reported more stress later. To conclude, we need interventions that help students to cope with stress, to make a smooth transition from school to medical school, and also to adjust to different learning environments during the different phases of medical education.*

Practice points

- Stress, health concerns and emotional problems increase during medical education.
- Medical students reported high rates of fatigue, sleeping problems, anxiety and depressive mood, although they perceived their health to be good.
- A significant and consistent increase of stress symptoms was found during the entire six-year medical programme in both sexes.
- Those most distressed at the beginning of the training also reported more symptoms at the end of the training.
- Wellness electives and mental health programmes are needed to help students to make smooth transitions between different learning environments with changing learning demands and a growing burden.

Introduction

Attention has been paid to the increase of stress, health concerns and emotional problems among medical students. This has given rise to concern of how students' distress affects their learning, professional development and patient contacts. Medical school stress is likely to predict later mental health problems, but students seldom seek help for their problems (Tyssen *et al.*, 2001).

The prevalence of medical students' mental health complaints, such as anxiety and depression, overrides the corresponding prevalence of primary health care patients, and medical students also show elevated scores for stress, fatigue, headache and eating problems (Roberts *et al.*, 2001). Of medical undergraduates and postgraduates, 17–33% have psychiatric problems and a need for treatment (Firth, 1986; Miller & Surtees, 1991; Henning *et al.*, 1998; Tyssen *et al.*, 2001; Paice *et al.*, 2002). Stress and health concerns increase during the medical programme (Vitaliano *et al.*, 1989; Helmers *et al.*, 1997; Rosal *et al.*, 1997; Niemi and Vainiomäki, 1999; Aktekin *et al.*, 2001; Roberts *et al.*, 2001; Moffat *et al.*, 2004). Not all studies reveal differences between medical and other students (Henning *et al.*, 1998; Stecker, 2004). At the beginning of their education, medical students do not differ from the normal population in, for example, the prevalence of depression (Rosal *et al.*, 1997).

It is still unclear whether the distress shown by medical students is chronic and persistent or episodic, and what its magnitude is (Rosal *et al.*, 1997; Tyssen, 2001). Only a small number of prospective studies have been done, and the available longitudinal studies do not cover the whole curriculum. Guthrie *et al.* (1998) found out that the percentages of students with psychological morbidity were very similar in the first and fourth years of medical school. The best predictor of psychological morbidity in the final year was the GHQ-12 score obtained in the first year. On the other hand, Firth-Cozens (1997) observed only a weak association between the stress level of the first year and that seen several years later.

The critical periods for the increase of psychological distress are not known. The transition from school to medical school, the beginning of a new course, and the shift from preclinical classroom training to the clinical setting have been suggested as potential periods of increased burden (Helmers *et al.*, 1997; Stewart *et al.*, 1997; Radcliffe & Lester, 2003). Especially vulnerable students may find it difficult to adjust to the changes they face at critical transitions, such as the first year at university (Guthrie *et al.*, 1998).

Female students report symptoms, e.g. stress, fatigue, anxiety, depression, headache, gastrointestinal symptoms

Correspondence: Professor P.M. Niemi, Department of Teacher Education, University of Turku, FIN-20014 Turun yliopisto, Turku, Finland. Tel: +358-2-3338837; fax: +358-2-3338800; email: paivi.niemi@utu.fi

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and pain, more often than their male peers (Roberts *et al.*, 2001; Peterlini *et al.*, 2002). Rosal *et al.* (1997) found out that female students demonstrated a large and significant increase in emotional distress. They concluded, in the absence of baseline gender differences, that this represents a true and significant increase in depressive symptoms among women, not merely a general tendency among women to over-report, as suggested by Peterlini *et al.* (2002). There are also conflicting results indicating no gender differences (Guthrie *et al.*, 1998; Henning *et al.*, 1998; Tyssen *et al.*, 2001; Moffat *et al.*, 2004). Tyssen *et al.* (2001) further pointed out that male medical doctors override their male peers in mental health problems, whereas female doctors do not differ from the generally high prevalence rates of women.

The present study was part of a six-year longitudinal research programme (consisting of nine inquiries) on the professional development of medical students during their education (12 terms) at the Medical School of the University of Turku, Finland. We focused on the quality and continuity of stress symptoms reported by female and male students at the five points of time that we considered potential major transitions involving elevated distress. At the baseline of the research project, the medical curriculum was traditionally organized. The 2.5-year preclinical period had a theoretical, biomedical and basic science emphasis. The overload of information to be mastered in examinations was the main source of preclinical stress (Niemi & Vainiomäki, 1999). Only the academically most successful half of the class could directly proceed from the preclinical to the clinical studies (3.5 years), while the others had to wait for six months. At this time and during the clinical period, students often made personal rearrangements or took breaks (e.g. military service, working in health care, or international student exchange).

Aims of the study

This six-year longitudinal study aimed: (1) to describe and compare the prevalence and quality of male and female medical students' reported stress symptoms and (2) to analyse the continuity of and changes in distress during their six-year medical training.

Method

Participants and procedure

The participants consisted of the 110 students who started their six-year medical education in August 1991. Half of them were male and half female. Their average age was 21 years at the baseline. The students' development was followed from the first day of their studies to their graduation in 1997–1998. The students responded anonymously by using personal numerical codes, which made it possible to combine the responses of each student to the different inquiries. The inquiries always took place at the end of the term, when all courses and examinations were over. There were examinations in the course of the term – not only at the end. The present study on stress covered five inquiries out of the total of nine included in the whole research programme (Table 1). Most drop-outs occurred at the time of graduation. Altogether 60 students responded to four inquiries, but missed the one at the time of graduation, while 33 students (i.e. 'the longitudinal sample') participated in all the five inquiries. The drop-out analyses revealed that female (chi square = 4.44, df = 1, $p = 0.0351$) and younger students were slightly over-represented in 'the longitudinal sample' ($t = 2.56$, df = 87, $p = 0.0121$). They did not, however, differ from the others in, for instance, achievement strategies and stress reports at the beginning of the studies, nor in their academic success during the preclinical phase.

Methods

The students filled in questionnaires and they were also interviewed at the end of the preclinical training. To measure subjective stress symptoms, the students were asked the following question: 'How often during the past month have you had the following symptoms?' (scale: 1 = not at all; 2 = once/twice a month; 3 = weekly; 4 = almost every day). The students rated 11 somatic and emotional symptoms (Table 2). This type of self-report questionnaire of symptoms corresponds to the standard procedures widely used in the measurement of stress symptoms (Helmers *et al.*, 1997; Kunttu *et al.*, 2004). The assessment of depressive mood was added to the questionnaire in the clinical phase as a response to the growing attention paid to the increase of depressive symptoms in the Finnish population. A sum score of ten

Table 1. The time points of the five inquiries related to the curriculum and the number of students who participated in the inquiries, the response rates in relation to the sample size at Time 1 and the number of the completely filled stress questionnaires.

	Time of the inquiry during the medical education	Number of respondents	Response rate %	Number of completely filled stress questionnaires		
				Males	Females	Total
Time 1	First day of studies	109	99	52	53	105
Time 2	End of first study year (second term)	91	83	43	43	86
Time 3	end of preclinical period (fifth term)					
	Interview	92	84			
	Questionnaire	83	76	31	40	71
Time 4	End of first clinical year (seventh term)	69	63	26	37	63
Time 5	Time of graduation (twelth term)	46	42	14	28	42

Table 2. Prevalence of different stress symptoms. Percentage of students who reported the symptom to occur once a week or more often during the past month.

Symptom	Time 1 $n=105$	Time 2 $n=86$	Time 3 $n=71$	Time 4 $n=63$	Time 5 $n=42$
Abdominal pain	2	9	10	20	23
Anxiety, nervousness	4	19	32	30	48
Headache	6	13	26	20	36
Tremor of hands	3	2	4	2	7
Irritability	11	18	22	27	53
Fatigue, weakness	9	30	48	41	61
Difficulties in falling asleep	8	15	21	22	22
Dizziness	6	10	4	8	7
Awakening during nights	5	21	21	22	32
Pain in neck and shoulders	22	28	33	27	43
Low back pain	11	10	7	8	11
Depressive or low mood				17	36

Time 1 = first day of studies; Time 2 = end of first study year; Time 3 = end of preclinical period; Time 4 = end of first clinical year; Time 5 = time of graduation.

symptoms (range: 10–40) was calculated because the items were positively inter-correlated. One item ('tremor of hands') was excluded because of low correlations. The sum score was divided into two sub-scores on the basis of factor analyses executed on the consecutive inquiries: emotional stress symptoms (anxiety, irritability, fatigue, difficulties in falling asleep, dizziness, awakening during the night; range 6–24) and somatic stress symptoms (abdominal pain, headache, pain in the neck and shoulders, low back pain; range: 4–16). Cronbach's alpha scores of the sum score and sub-scores typically varied within 0.600–0.750 in different inquiries, indicating acceptable internal consistency of the measures. The results of the factor analyses were accordant with the present-day knowledge of the association between sleeping and emotional problems.

The students also rated their health and physical condition on a five-point scale (1 = very good; 5 = very poor) and answered the questions: 'How would you describe your psychological stress during the preclinical training?' (interview at Time 3) and 'Have you been suffering from stress during the last few terms?' (questionnaire at Time 4 and 5). The associations between these appraisals of distress ('not at all or tolerable stress' ... 'fairly strong or very much stress' ... 'problems of coping with stress or stress interferes with studying') and the stress symptom scores (Time 3: $p=0.0531$ for somatic score, Time 4: $p=0.0435$ for emotional score, Time 5: $p<0.0001$ for emotional score, $p=0.0093$ for somatic score and $p=0.0001$ for sum score) also speak for the validity of the symptom measure.

Study design and data analysis

The level and quality of stress symptoms were presented as group means and percentage distributions and analysed in a cross-sectional study design, i.e. all the students who responded to the inquiry at a certain point of the follow-up were included into the series. The continuity and changes in distress were analysed by analyses of variance for repeated measures for all the students who had responded to the inquiry at a certain point of time and for the 'longitudinal sample' consisting of the students who had participated in all the five inquiries. The significance of change between any two points of time was tested by the Tukey-Kramer test. Finally, correlations were computed between any two stress scores at different points of time to describe intra-individual continuity. Statistical computing was done using the GLM and MIXED procedures of the SAS System for Windows, release 8.1/2001, and p-values of less than 0.05 were considered statistically significant in all analyses.

Results

Prevalence and quality of stress symptoms

About 95% of the students rated their health and physical condition as good during their education. At the beginning of their medical studies, students rarely reported somatic or emotional symptoms of stress, but especially at the time of graduation, fatigue and sleep disturbances were very common (Table 2). Anxiety, nervousness and irritability as well as headache and pain in the neck and shoulders became more common during the study years. Depressive mood was more common at the time of graduation than at the beginning of the clinical training (36% versus 17% reported daily or weekly depressive mood). At the end of the preclinical training, 47% of the students reported 'fairly strong stress' in the interview. However, only 8% reported problems with studying because of 'constant hurry or overload of examinations' and 8% because of 'fatigue or concentration difficulties' (Niemi & Vainiomäki, 1999). Altogether 36% of the students experienced 'very much stress' at the beginning and 40% at the end of the clinical training. Less than 10% of the clinical students (6% at the beginning and 9% at the end of the clinical period), however, reported 'problems of coping with stress or stress interfering with studying'.

Gender differences in distress

Gender differences in specific stress symptoms and in the overall level of stress were scarce. Female students reported

more frequently waking up during the night (Time 2, chi square = 4.25, $p = 0.0391$) and abdominal pain (Time 3, chi square = 5.71, $p = 0.0168$, Fisher's exact test: $p = 0.0182$). Only at the end of the preclinical studies did women score higher in somatic stress symptoms (Time 3, $F(1, 71) = 4.54$, $p = 0.0367$), and they also reported more distress than men in the interview (Time 3, chi square = 5.62, df = 1, $p = 0.0177$).

Gender explained the stress level moderately. Female students reported only slightly more stress (sum score: $F(1, 26) = 4.43$, $p = 0.0452$, emotional score: ($F(1, 26) = 4.13$, $p = 0.0524$) than their male peers in the 'longitudinal sample' (i.e. the students who participated in all inquiries).

Continuity and changes in male and female students' distress

The effects of time on stress were clearly visible during the medical education (sum score: $F(2, 256) = 28.93$, $p < 0.0001$; emotional score: $F(4, 257) = 32.13$, $p < 0.0001$, somatic score: $F(4, 263) = 9.37$, $p < 0.0001$) for both male and female students (Table 3 available on *Medical Teacher* website, www.medicalteacher.org). The comparisons of stress levels at different points of time revealed that the increase of emotional symptoms was already apparent during the preclinical period, while the increase of somatic symptoms appeared later during the clinical terms (Table 4 available on *Medical Teacher* website, www.medicalteacher.org). Furthermore, female students' distress increased during the first study year already, while in males, the evolution of stress started later and came out predominantly as emotional symptoms during the prelinical period. In females, the increase was seen during both the preclinical and the clinical periods, and it also manifested as somatic symptoms.

The significant increase of stress symptoms was also confirmed in the 'longitudinal sample' (Figure 1). The main effects of time were seen in the sum score: $F(4) = 11.88$, $p = 0.0001$, the emotional score: $F(4) = 15.75$, $p = 0.000$ and the somatic score: $F(4) = 3.12$, $p = 0.0179$).

The stress scores measured at the different points of time correlated statistically significantly with each other ($r = 0.363$–0.702). For example, the sum score and two subscores of stress on the first study day correlated significantly with the later stress levels during the preclinical ($r = 0.363$–0.540) and clinical periods ($r = 0.403$–0.486) and at the time of graduation ($r = 0.424$–0.515). The correlations were stronger among females than males. Among males, the stress level of the first study day, and among females, the stress level after the first study year correlated most clearly with later stress.

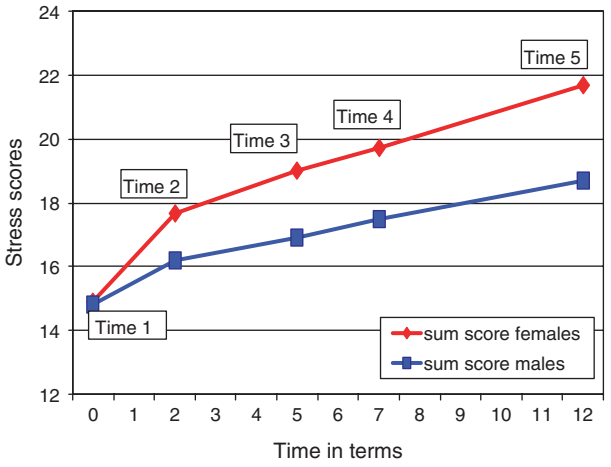

Figure 1. Means of sum scores of stress in the longitudinal sample ($n = 33$) during the medical curriculum.

Discussion

This study analysed the prevalence, quality and continuity of the reported stress symptoms of 110 Finnish female and male medical students during their entire six-year medical education.

At the beginning, almost all students rated their health as good, and reports of stress symptoms were rare. During the first study year, approximately one-fifth of the students suffered at least weekly from anxiety, irritability, sleeping problems and fatigue. These findings correspond to the prevalence rates of symptoms in a population of Finnish university students (Kunttu *et al.*, 2004). In other words, medical students do not differ from other university students at baseline, as also pointed out by Rosal *et al.* (1997). During the education, the frequency of stress reports, especially reports of anxiety and fatigue, and the number of graduating students (30–60%) reporting fatigue, anxiety, irritability and sleeping problems clearly outnumbered the rates in the general university student population (Kunttu *et al.*, 2004). Also, the percentages of female (41%) and male (27%) medical students reporting depressive mood at least weekly at the time of graduation were higher than the corresponding rates (9 and 16%) in the general university student population (Kunttu *et al.*, 2004). Students reported more emotional than somatic symptoms, and the latter increased mainly during the later study years. This is probably due to the students' good physical health and indicates the stress-related origin of their symptoms, which was also suggested by Kunttu *et al.* (2004). Although around 40% of both preclinical and clinical students reported considerable stress, less than 10% seemed to have problems with their studies because of elevated stress, hurry or overload of work. As a whole, our observations on the quality and magnitude of perceived stress are accordant with the previous results on health concerns and emotional problems among medical students (Firth, 1986; Miller and Surtees, 1991; Guthrie *et al.*, 1998; Henning *et al.*, 1998; Roberts *et al.*, 2001; Tyssen *et al.*, 2001; Paice *et al.*, 2002; Stecker, 2004).

In the present study, gender did not turn out to be a significant factor in stress reporting, which is concordant with the observations made by Henning *et al.* (1998), Moffat *et al.* (2004) and Tyssen *et al.* (2001), but contrary to the findings suggesting greater stress and more symptoms among female students (Roberts *et al.*, 2001; Peterlini *et al.*, 2002; Kunttu *et al.*, 2004). The scarcity of gender differences may reflect the contemporary changes in medical schools and environments (Henning *et al.*, 1998), with more females entering, as is the case in Finland, too. This reasoning was further supported by the fact that, contrary to the findings of Rosal *et al.* (1997), but in accordance with those of Moffat *et al.* (2004), our study demonstrated a highly significant increase in stress symptoms in both male and female students during their six-year education. It is possible, as Tyssen *et al.* (2001)

point out, that male medical students actually override their male peers in their reporting of symptoms. For example, the male medical students in our sample reported more frequently symptoms of anxiety and nervousness than their male peers in the general university student population (Kunttu *et al.*, 2004). Future research is warranted to analyse whether females entering medical schools are more like their male peers than female students in other fields (Vaglum *et al.*, 1999).

Our findings indicate intra-individual continuity in stress level in accordance with the results by Guthrie *et al.* (1998); the most distressed first-year students later turned out to be the most distressed graduating students. The first year of medical school is a major transition, which challenges students' ability to cope with stress. But there were some signs pointing out that females and males respond differently to transition periods. The elevation of stress level during the first study year was visible among female students, whereas the increase of male students' stress started later during the preclinical period, when the overload of information (Niemi & Vainiomäki, 1999) and competition among students became intensive. The first day baseline level of stress correlated more strongly with the later stress level in males, whereas in females the level achieved by the end of the first study year was more indicative of later stress. In general, the earlier stress level correlated more strongly with the later stress level in females, suggesting greater persistence of stress among them. Furthermore, females more often than males reacted with increasing somatic symptoms and elevated stress even during the clinical period. This observation may be indicative of the burden resulting from females' greater empathy (Hojat *et al.*, 2002) and responsibility in patient contacts (Paice *et al.*, 2002). Female students also reflect more on ethical and professional issues in medical practice (Niemi *et al.*, 2003; Boenink *et al.*, 2004). Their patient-centred and self-reflective orientation may contribute positively to their sense of self-efficacy and professional competence, but may also dispose them to an extra burden. This conclusion is, however, tentative since the gender differences observed were modest, and the number of male respondents was small at the time of graduation.

The sources of stress were likely to be inherent in the medical curriculum and environment, because medical students did not differ from other students at baseline (Kunttu *et al.*, 2004), but later demonstrated a highly significant increase of symptoms. The evolution of stress symptoms continued throughout the medical curriculum instead of showing single peaks at transition points. The sources of stress are likely to be different in the preclinical and clinical periods (Niemi & Vainiomäki, 1999; Lee & Graham, 2001; Roberts *et al.*, 2001; Moffat *et al.*, 2004), and it is possible that female and male students respond and cope differently with the changing demands in the medical environments. Different personality factors (Rosal *et al.*, 1997) and learning strategies (Chaput de Saintonge & Dunn, 2001) may prove critical for the academic stress experienced by women and men.

In the present study, we explored students' self-reports of stress. Our findings pointed out a significant increase of stress in male and female students with a good physical condition and health. It was not possible to make standardized psychiatric interviews in a large research programme consisting of a large number of students and several consecutive inquiries. Consequently, conclusions concerning psychiatric morbidity would be premature. Our sample consisted of one class of students in one Finnish medical school. Since the medical curricula and student admission practices – based on the scores gained in entrance examinations or the marks in school leaving certificates – are similar in all Finnish medical schools and resemble those of many western medical schools, the present results can be generalized to apply to at least Finnish medical schools. Although we reached a satisfactory number of respondents in all four inquiries before the graduation, the drop-outs at the time of graduation warrant cautious conclusions on the evolution of stress during the clinical period. 'The longitudinal sample' might have been somewhat biased. We might have reached better the most conscientious young female students who had progressed according to the pre-planned curriculum and, perhaps, missed more male and older students with more changes in their study schedules and personal life (e.g. family, working). Further prospective studies with larger samples are needed on the predisposing factors, e.g. personality characteristics, professional orientation, achievement and coping strategies, and on the early, sub-clinical signs of evolving medical school stress in male and female students. Also, the potential impact of stress on medical learning and performance both during the education and later in professional life should be studied.

Wellness electives and mental health programmes are needed to promote effective coping with the growing burden and to help students to make smooth transitions between different learning environments with changing learning demands (Michie & Sandhu, 1994; Henning *et al.*, 1998; Lee *et al.*, 2001; Peterlini *et al.*, 2002; Radcliffe & Lester, 2003). Attention should be paid to stress responses during the first study year already because they may easily remain hidden at that point and only manifest later as detectable somatic or emotional symptoms. Although the experience of academic distress was common, only a small minority reported difficulties with stress and studies. We do not know how accurate these subjective appraisals are, and whether substantial problems are left unnoticed and students go without adequate help. The increase of stress during the first study year and its associations with later stress levels also raise questions concerning the student recruitment criteria.

Notes on contributors

PÄIVI M. NIEMI, PhD, is a professor in Educational Psychology, Department of Teacher Education, University of Turku, Turku, Finland.

PAULA T. VAINIOMÄKI, MD, PhD, is a Senior Lecturer in Family Medicine, Department of Family Medicine, University of Turku, Turku, Finland.

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Ethical approval

Permission for the study was provided by the Medical Faculty of University of Turku, and the participants responded voluntarily and anonymously. They were also able to withdraw from the study at any time. Finnish legislation does not explicitly stipulate ethical approval for research on medical education.

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