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

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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.

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 (Tysen 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; Tysen 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).

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.

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; Tysen, 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...
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>
<thead>
<tr>
<th>Time of the inquiry during the medical education</th>
<th>Number of respondents</th>
<th>Response rate %</th>
<th>Number of completely filled stress questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 First day of studies</td>
<td>109</td>
<td>99</td>
<td>52 males</td>
</tr>
<tr>
<td>Time 2 End of first study year (second term)</td>
<td>91</td>
<td>83</td>
<td>43 females</td>
</tr>
<tr>
<td>Time 3 End of preclinical period (fifth term)</td>
<td>Interview</td>
<td>92</td>
<td>84</td>
</tr>
<tr>
<td>Time 4 End of first clinical year (seventh term)</td>
<td>Questionnaire</td>
<td>83</td>
<td>76 males</td>
</tr>
<tr>
<td>Time 5 Time of graduation (twelfth term)</td>
<td>46</td>
<td>42</td>
<td>14 males</td>
</tr>
</tbody>
</table>
The associations between these appraisals of distress (‘not at all or tolerable stress’ ... 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’.

### 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, 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 4 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 preclinical 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.

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 Surrtes, 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., 1998).

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 (Hoijt 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.

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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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