ORIGINAL ARTICLE

Psychological stress and burnout in medical students: a five-year prospective longitudinal study

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SUMMARY

The aim of this study was to assess psychological morbidity and symptoms of burnout in medical students during their undergraduate training, and to identify baseline factors that predict psychological morbidity in students in the final year of the course. It was a 5-year prospective longitudinal cohort study. Students were assessed in years 1, 4 and 5 of their medical undergraduate training by means of the GHQ-12 and the Maslach Burnout Inventory.

172 (84.3%), 157 (77.0%) and 155 (75.9%) students out of an original group of 204 completed assessments in years 1, 4 and 5, respectively. 18 students were above threshold on the GHQ-12 on all three occasions, 25 on two occasions and 43 on one occasion; 69 students were never a 'case'. Students who were cases on two or more occasions were more likely to find the medical course stressful during the first year, but not subsequent years. There was no significant difference between the percentages of men and women who scored as cases on the GHQ-12 in any of the years. The best predictor of psychological morbidity in the final year of the course was the GHQ-12 score in year 1.

This study suggests that a small group of students repeatedly experience psychological distress during their medical training.

INTRODUCTION

Medical undergraduate training is long and emotionally taxing. Several studies have revealed high rates of psychological morbidity[1–3] in medical students at various stages of their training. Firth[1] screened a large sample of fourth-year medical students at three universities and detected evidence of psychological morbidity in about one-third. Surtees and Miller[2] studied medical students in their first year of medical training at Edinburgh and found that half disclosed high levels of neurotic symptoms at the beginning of the academic year, one-third reporting symptoms at follow-up six months later. Guthrie *et al.*[3] found strikingly similar rates of psychological morbidity in medical students at Manchester University, with one-third showing evidence of psychiatric morbidity midway through the first year.

The Edinburgh study indicated that a small number of students (n=15, 8.6%) were continuously symptomatic throughout the first year of their training[4], and Firth-Cozens found that 22% of 302 fourth-year students had psychological symptoms both as students and as house officers, when they were followed up 2 years later[5].

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We report the only study to date which has followed UK medical students throughout their undergraduate training. The study had two main aims. First, we wanted to establish whether a particular group of students would report psychological difficulties regularly throughout their training and, if so, to identify baseline predictors for this group. Secondly, we wished to identify factors in the first-year students that would predict psychological morbidity in the final year of the course, just before qualifying to become doctors. Data from the assessment of students in year 1 of the course have already been published[3].

METHODS

All first-year undergraduate medical students during one year's intake at Manchester University were approached to take part in the study, with the cooperation of the course organizers and the approval of the University of Manchester's ethics committee. They were asked to complete a series of psychological self-report measures midway through the first year of their course. Those who responded were subsequently asked to complete further assessments in the fourth and fifth year of their training. Students who did not respond in the first year to the questionnaire were not sent assessments in later years, since no baseline data (from year one) would be available for this

group and longitudinal comparisons would thus be impossible.

The questionnaire included the following: demographic details, questions about general health and psychological health before entering medical school, whether a parent was a doctor, alcohol intake, work performance and questions about the medical course including whether the students were thinking of dropping out. The students were also asked to complete standardized questionnaires.

The 12-item General Health Questionnaire (GHQ-12)[6] was chosen because of its well established validity in student samples[7] and young populations in the community[8]. It is short and straightforward to complete. The standard method of scoring 0-0-1-1 for each item was used, which allows a maximum score of 12. The GHQ-12 was validated by an interview conducted in the fifth year of the study by one of the researchers (HB). 113 students, who were then in their final year of training, were interviewed by use of the Clinical Interview Schedule-Revised[9]. 19 (16.8%) were 'cases'. The estimated sensitivity of the GHQ-12 was 79%, 70% and 62% for threshold scores of 2/3, 3/4 and 4/5, and the estimated specificity was 76%, 87% and 90%. The positive predictive values for thresholds of 2/3, 3/4 and 4/5 were 40%, 54% and 62%. This suggested that a threshold of 3/4 on the GHQ-12 provided the best conservative estimate of psychiatric morbidity.

The Maslach Burnout Inventory[10], a 22-item self-report questionnaire, is a widely used measure of burnout in relation to occupational stress. For the purposes of the present study, the questionnaire was modified so that questions about work were replaced by identical questions about the medical course. The questionnaire has three subscales—personal accomplishment (feelings of competence and achievement), which is measured by 8 items; emotional energy (feeling emotionally drained by work), which is measured by nine items; and depersonalization (feeling detached and uninvolved with people), measured by five items. The last subscale is most relevant to students in their clinical year, but was included from the beginning for the sake of consistency. The total score for each subscale is categorized 'low', 'average' or 'high' according to predetermined cut-off scores based on normative data from a sample of American health professionals. A high degree of burnout is indicated by high scores on the emotional energy and depersonalization subscales and low scores on the personal accomplishment subscale.

Although burnout is conceptualized as a state which develops cumulatively over years of experiencing chronic stress, we wished to use the Maslach Burnout Inventory to determine whether there was any evidence of burnout symptoms beginning early in the training.

Course stress questionnaire: students were asked to complete a 22-item questionnaire that asked them to rate on a 4-point scale (0 = no stress, 1 = mildly stressful, 2 = moderately stressful, 3 = very stressful) various aspects of the course including examinations, vivas, examining patients, presenting patients on ward rounds, talking with patients about emotional matters and relationships with nurses. In the first 2 years, many of the clinical items were irrelevant, and students were limited to rating five aspects of the preclinical course—dissection, workload, relationships with tutors, examinations, and relationships with peers. The scale was scored by totalling the overall score and dividing this by the number of questions appropriate to each year of the course. For the purpose of some analyses, students with an overall score of above 2 on the course stress questionnaire were considered to be 'high scorers'.

In the year before the study, a group of over 100 medical students were canvassed regarding 'course stressors' and were then asked to complete a course stress questionnaire. This consisted of items from Firth[1] plus items generated by the students themselves. Items which were incomprehensible or left blank by the students were removed from the final measure.

The results were analysed by use of the Statistical Package for the Social Sciences. The scores from the psychological questionnaires were not normally distributed, so non-parametric statistics were used; results are therefore expressed as medians and interquartile ranges. Continuous variables were compared by means of the Mann–Whitney U test and Kruskal–Wallis one-way analysis of variance, and categorical variables with the χ^2 test. Scores between different years of the course were compared by use of the Wilcoxon test and the McNemar test. Bonferroni adjustments were made to the McNemar tests to allow for multiple comparisons. A forward stepwise regression analysis was undertaken to determine which factors from year 1 of the course predicted psychological morbidity in students in the final year of the course.

RESULTS

Response rates

204 students were sent questionnaires during the first year of their training. 172 (84.3%) replied, of whom 88 (51.2%) were men. There was no difference in demographic characteristics between responders and non-responders in year 1[3]. 157 (77%) students returned questionnaires in year 4, plus a further 10 who had dropped out from the course, making 167 returned questionnaires in total (83 men; 49.7%). 155 (76.0%) students returned questionnaires in year 5 (78 men; 50.3%).

Psychological distress

The number and percentage of students scoring above threshold on the GHQ-12 are shown in Table 1. The

percentages of students scoring above threshold are very similar in years 1 and 4, but numerically lower in year 5. However, there was no statistical difference between the percentage of students who were cases in year 5 versus year 1, when an adjusted McNemar test was used ($\chi^2 = 4.01$, $P = 0.04 \times 3$ [Bonferroni correction] $P = 0.12$), and there were no significant differences between year 1 and year 4 ($P = 0.76$) or year 4 and year 5 ($P = 0.69$).

There was no significant difference between the percentages of men and women who scored as cases on the GHQ-12 in any of the years (year 1 men = 34.1%, women =39.2%, $P = 0.53$; year 4 men 28.9%, women 34.5%, $P = 0.51$; year 5 men = 17.9%, women = 25.9%, $P = 0.25$).

Burnout

The scores on the Maslach Burnout Inventory in year 1 for the depersonalization and personal accomplishment subscales are not shown since very few students completed these subscales (many of the questions were inappropriate for preclinical students). The scores on the emotional energy subscale show a small but non-significant rise from year 1 to years 4 and 5 (Table 1). There was no difference between any of the years in the number of students drinking above the recommended safe limits (14 units per week for women and 21 units per week for men).

Longitudinal comparisons

18 (11.6%) students out of the 155 for whom complete data were available scored above threshold on the GHQ-12 on every occasion that they were assessed. 25 (16.1%) were above threshold on two occasions, and 43 (27.7%) on one occasion; 69 (44.5%) were always below threshold.

Students who were above threshold on three occasions, two occasions, one occasion and never were compared. There was no significant difference between the four groups on most of the variables from the general baseline questionnaire including 'general health before medical school', 'psychological health before entering medical school', 'parent a doctor', 'alcohol intake', and 'work performance'. The only variable from the baseline questionnaire which was different between the four groups was 'thinking of dropping out' (Table 2). The scores from the course stress questionnaire in years 1, 4 and 5, and the scores from the Maslach Burnout Inventory in years 4 and 5 are shown in Table 2 for each of the four groups.

There were significant differences between the groups on the overall stress score in year 1, the stress induced by work in year 1, and the scores on the emotional energy subscale of the burnout inventory. Students who were above threshold on all three occasions had the highest scores and students who were never above threshold obtained the lowest scores.

Predictors of psychological morbidity in the final year

The students who completed questionnaires in year 5 of the course were divided into those who scored above and below threshold. Their scores on the stress questionnaire, GHQ-12 and Maslach Burnout Inventory for years 1 and 4 were

Table 1 **Number of students scoring above threshold on the GHQ-12 and high scorers on the stress questionnaire and the Maslach Burnout Inventory for years 1, 4 and 5**

	First year (n=172)		*Fourth year (n=157)*		*Fifth year (n=155)*	
	n	*(%)*	*n*	*(%)*	*n*	*(%)*
GHQ-12 scores						
number of cases (above 3)	63	(36.6)	48	(30.6)	34	(21.9)
Stress questionnaire						
high scorers	96	(55.8)	81	(51.6)	91	(58.7)
Maslach Burnout Inventory						
Emotional exhaustion						
high scorers	9	(5.2)	15	(9.6)	20	(12.9)
Personal accomplishment						
high scorers	—		22	(14.0)	25	(16.1)
Depersonalization						
high scorers	—		6	(3.8)	11	(7.1)
Number drinking above recommended safe limits:	(*n*=88)		(*n*=79)		(*n*=78)	
Men (>21 units per week)	25	(28.4)	22	(27.8)	19	(24.3)
Women (>14 units per week)	(*n*=84)		(*n*=78)		(*n*=77)	
	13	(15.4)	9	(11.5)	11	(14.3)

Table 2 **Stress scores and subscales of the Maslach Burnout Inventory for 155 students who completed questionnaires on three occasions: cases on the GHQ-12 on 3 occasions, 2 occasions, once and never a case**

	Non-case n=69		*Case × 1 n=43*		*Case × 2 n=25*		*Case × 3 n=18*				
	n	*(%)*	*n*	*(%)*	*n*	*(%)*	*n*	*(%)*	χ^2	*df*	*P*
Stressed by workload in year 1	42	(60.8)	33	(76.7)	21	(84.0)	16	(88.8)	9.1	3	0.02
Thinking of dropout (year 1)	9	(13.0)	13	(30.2)	10	(40.0)	9	(50.0)	14.2	3	0.003
	Med	*IQR*	*Med*	*IQR*	*Med*	*IQR*	*Med*	*IQR*	*Kruskal–Wallis* χ^2	*P*	
Stress Q (year 1)	1.0	(0.8–1.4)	1.2	(1.0–1.6)	1.6	(1.2–1.9)	1.4	(1.2–1.9)	18.2	<0.001	
Stress Q (year 4)	1.0	(0.6–1.3)	1.3	(1.1–1.4)	1.2	(1.1–1.4)	1.2	(1.1–1.5)	5.7	0.127	
Stress Q (year 5)	1.3	(0.9–1.6)	1.4	(1.2–1.6)	1.3	(1.2–1.6)	1.5	(1.3–1.7)	4.9	0.179	
Emotional exhaustion (year 4)	14.5	(10.2–19.0)	19.0	(11.5–23.0)	22.0	(19.5–26.0)	24.0	(20.0–33.0)	4.6	<0.001	
Emotional exhaustion (year 5)	11.0	(6.0–19.0)	19.0	(121.0–23.8)	19.0	(14.0–26.0)	25.0	(20.0–33.0)	28.1	<0.001	
Personal accomplishment (year 4)	36.0	(29.0–41.3)	36.0	(83.0–42.7)	34.0	(27.5–40.0)	37.0	(28.3–42.7)	1.4	0.697	
Personal accomplishment (year 5)	37.0	(29.5–42.0)	38.0	(26.5–44.0)	38.0	(31.5–43.3)	38.0	(29.0–41.0)	1.0	0.796	
Depersonalization (year 4)	6.5	(4.0–9.7)	7.0	(3.5–10.0)	9.0	(5.7–11.5)	7.0	(5.0–11.0)	3.9	0.274	
Depersonalization (year 5)	7.0	(4.0–11.0)	8.0	(4.0–11.0)	9.0	(5.0–12.0)	9.0	(7.8–12.3)	4.6	0.204	

IQR=interquartile range; Q=questionnaire; Med=median

compared to establish whether any variables predicted being a case in year 5 (Table 3). The GHQ-12 scores in year 1 and year 4 were significantly higher in students who were above threshold in year 5 than those below. The scores on the stress questionnaire in year 1 were also significantly higher for students who scored above threshold compared with those who were below threshold in year 5. There was no difference between the two groups on the depersonalization or personal

Table 3 **Scores on the stress questionnaires, GHQ-12 and Maslach Burnout Inventory for years 1 and 4: cases versus non-cases (on the GHD-12) in year 5**

	Non-case (year 5) n=121		*Case (year 5) n=34*		*U test*	
	Median	*IQR*	*Median*	*IQR*	*z*	*P*
GHQ-12 (year 1)	2.0	(0.8–4.0)	4.0	(2.0–6.0)	−3.26	<0.001
GHQ-12 (year 4)	1.0	(0.0–4.0)	4.0	(2.0–6.0)	−3.85	<0.001
Stress questionnaire (individual items)						
Dissection	0.0	(0.0–1.0)	1.0	(0.0–2.0)	−2.22	0.026
Examinations	2.0	(1.5–3.0)	2.0	(2.0–3.0)	−0.54	0.589
Academic workload	2.0	(2.0–2.5)	2.0	(2.0–3.0)	−2.15	0.031
Tutors	0.0	(0.0–1.0)	1.0	(0.0–1.0)	−0.28	0.0773
Other students	0.0	(0.0–1.0)	1.0	(0.0–1.0)	−2.18	0.029
Overall stress score (year 1)	1.2	(0.8–1.6)	1.4	(1.2–1.7)	−2.05	0.040
Overall stress score (year 4)	1.1	(0.8–1.3)	1.2	(1.1–1.4)	−0.69	0.490
Maslach Burnout Inventory Emotional exhaustion (year 4)	18.0	(11.0–12.0)	21.0	(15.0–25.0)	−2.30	0.021
Depersonalization (year 4)	6.0	(4.0–10.0)	7.0	(5.0–11.0)	−0.35	0.722
Personal accomplishment (year 4)	35.0	(28.0–39.0)	33.0	(25.0–37.0)	−0.89	0.370

IQR=Interquartile range

accomplishment subscales of the Maslach Burnout Inventory, although students in year 5 who were above threshold were significantly more likely than students scoring below threshold to report emotional exhaustion in year 4. A forward stepwise regression analysis was performed to determine which baseline factors best predicted 'caseness' on the GHQ-12 in year 5. Variables from the general baseline questionnaire (including gender, above/below recommended safe limits for alcohol consumption), the total baseline course stress questionnaire and the total baseline GHQ-12 were entered into the equation. The only significant predictor was the GHQ-12 score in year 1, which increased the correct classification from 74.4% to 79.8% ($P = 0.013$).

Progression through medical training

Not all the students completed their medical training without interruption. 16 who were assessed in year 1 subsequently dropped out of the course, and 11 others had to repeat years because of poor exam performance. Baseline GHQ-12 scores and overall stress scores were examined to ascertain whether there was a difference in the baseline scores of students who subsequently dropped out, failed examinations and had to resit a year, intercalated ($n = 27$) or continued through the course without interruption ($n = 118$). Figure 1 shows the median, interquartile range and full range for each group. Students who dropped out or failed examinations had slightly higher numerical scores than those who intercalated and those who continued through the course uninterrupted. There was, however, no statistical difference between the groups.

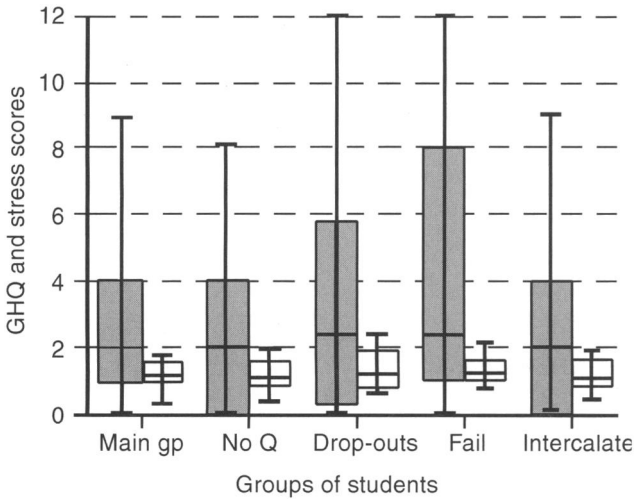

Figure 1 **Baseline GHQ-12 (General Health Questionnaire) scores and stress scores expressed as median, interquartile range (box) and full range (whiskers) for: students who continued through the course, uninterrupted (main group), students who did not return the questionnaire in year 5 (No Q), students who dropped out, students who were kept back a year because of examination failure, and students who intercalated. ■ GHQ scores; □ stress scores**

Responders versus non-responders

Baseline scores of the 17 students who completed a questionnaire in the first year but did not complete an assessment in year 5 were compared with the 155 students in year 5 who completed a baseline assessment. There was no difference in terms of gender (50.3% responders, 52.3% non-responders were male) or percentage of 'cases' on the GHQ-12 (31% and 35.2%).

DISCUSSION

This study suggests that a small percentage of medical students experience psychological distress throughout their medical undergraduate training. Although these students found the first year of the medical course more stressful than did their fellow students, this was not true of subsequent years. It is possible that emotionally vulnerable students find it more difficult than their peers to adjust to change, and thus find the first year at university particularly stressful.

There was some evidence (not statistically significant) that psychological distress is associated with poor performance on the course, since those who failed examinations or dropped out had numerically higher initial median scores on the GHQ-12 than those who intercalated (usually the brightest students) or continued through the course in an uninterrupted fashion. A larger study would be required to confirm or refute this possibility.

Scores on the burnout questionnaire did not seem to be associated with psychological distress, except for the emotional exhaustion subscale of the Maslach Burnout Inventory. Students who were experiencing psychological distress did not feel more detached from patients, or report less personal satisfaction from their work, than their colleagues with no psychological distress. This is strikingly different from hospital consultants, who display a highly significant association between psychological distress, high emotional exhaustion and depersonalization[11]. Probably even psychologically distressed students find interaction with patients interesting and rewarding, and the overall scores on the burnout inventory were lower than those recorded in other groups[10,11]. We did not in fact expect to find high levels of burnout in the student group. One of the main reasons for including the Maslach Burnout Inventory in our baseline questionnaire was to use it as a reference point, in case the student cohort is followed up in later years, after they have qualified.

The best, albeit very modest, predictor of psychological distress in the final year of the course was the score on the GHQ-12 during the first year of training. Firth-Cozens has recently found no significant relation between stress levels reported by doctors when they were fourth year medical students and stress levels reported 10 years later when the

same individuals were working as general practitioners[12]. She did, however, find that self-criticism in student days was highly correlated with later stress levels during work as a general practitioner. Our study suggests that psychological stress, if measured during the first year of medical training, is associated with psychological distress levels several years later, but this relation is weak. Our follow-up period is half the length of Firth-Cozens', and it will be important to ascertain whether the vulnerable students whom we have identified go on to report psychological distress when actually working as doctors.

As in previous UK studies there was no difference in gender between students on any of the psychological distress questionnaires[1,2]. It is clear, however, that later in postgraduate training, female doctors report higher rates of psychological distress than males[13].

There was no association between the amount of alcohol consumed and scores on the GHQ-12, for any year of the course. Other factors such as social pressure are far more likely to influence drinking behaviour than psychological factors in this young group of people.

The main findings of this study should be treated with caution, since most of the data were obtained from self-report questionnaires. In addition, not all students completed the questionnaire in year 1 and there was a decline in response rate from year 1 to year 5, although the response rates were still high. The demographic characteristics of the non-responders in year 1 were similar to those of responders, but we were unable to establish any details of the psychological status of the non-responders in year 1. The 17 students who completed questionnaires in year 1 but did not complete assessments in year 5 did not seem to be different from responders, in terms of either demographic characteristics or prevalence of psychological morbidity.

The GHQ-12 was validated in year 5 by clinical interview, and acceptable levels of sensitivity and specificity were found. Use of a high cut-off of 3/4 gave a positive predictive value of 54%. This means, were the GHQ-12 to be used as a screening device, about half of those scoring above threshold would in fact be non-cases. Thus, some other kind of secondary screen would then have to be used, to identify students with serious psychological difficulties. It is noteworthy, however, that the cut-off of 3/4 which we used is the same as that found by Borrill and colleagues to best distinguish cases from non-cases in National Health Service staff[13]. Thus we are unlikely to have drastically overestimated the degree of psychopathology in the medical students in years 1 and 4. In addition, our overall prevalence rates are very similar to those in other studies of UK medical students[1,2], conducted in different universities. Differences in the type of university or the style of medical course do not seem greatly to affect the overall prevalence of psychiatric morbidity in medical students[14].

It cannot be assumed that the students who were cases on all three occasions were continuously symptomatic throughout their training, since the GHQ-12 was used in a snapshot fashion. We can reasonably assume, however, that these students experienced at least three episodes of psychological distress during their training, and were more likely to experience psychological difficulties than the students who never scored above threshold.

Scoring above threshold on the GHQ-12 should not be regarded as necessarily a bad thing since some of the students who had low scores on the GHQ-12 might have been denying emotional difficulties. Firth-Cozens found that students who were above threshold on the GHQ were more empathic (i.e. more aware of other people's emotional problems) than non-cases[1]. This maybe another explanation for why we found no relation between scores of depersonalization (feelings of detachment in relation to patients) on the Burnout Inventory and psychological distress. In addition, it is possible that the repeated high scores of psychological distress as measured by the GHQ-12 were reflecting certain trait-like characteristics which were stable in students over time. Unfortunately, we did not use any measures of personality.

Our findings suggest that medical schools are currently admitting a small group of students who are distressed at the beginning of their training and may remain distressed throughout. These few individuals are at high risk of emotional disturbance during postgraduate training. Further work needs to be done so that they can be identified either before they have entered medical school or early in their medical training. The instruments used in this study were crude. More detailed psychological profiling of students might help to identify those who are psychologically unable to cope with medicine as a career, while distinguishing them from students who are empathic and receptive to the distress of others.

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