

BMJ Open UK medical students' mental health and their intention to drop out: a longitudinal study

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ABSTRACT

Objective The attrition of medical students is an incredibly important problem feeding into healthcare workforce issues. This study seeks to explore the relationships between various mental health issues and dropout.

Design This is a longitudinal study where medical students completed an online questionnaire between November 2020 and February 2021 and those who took part were invited (February–May 2021) to complete the questionnaire again 3 months later.

Settings Students from nine geographically spread medical schools in the UK took part in this study.

Participants 792 (71.16%) participants filled in the baseline questionnaire and 407 (51.39%) of these students completed the follow-up survey (385 participants were lost to follow-up).

Outcome measures Dropout intentions.

Exposures Various mental ill-health symptoms using validated scales: emotional exhaustion, insomnia, somatisation, hazardous drinking, anxiety/depression, anorexia tendencies, obsessive-compulsive disorder (OCD), paranoia and bipolar.

Results A large number of students met the criteria for mental health disorders (eg, 54.1% insomnia, 37.9% anxiety/depression, 19.4% paranoia) and 19.4% (79) said that they considered dropping out from medical school. Those students who were more emotionally exhausted ($B_{\text{adjusted}} = -0.94$, $p < 0.0001$) and expressed higher anxiety/depression symptoms ($B_{\text{adjusted}} = 1.12$, $p < 0.0001$), insomnia symptoms ($B_{\text{adjusted}} = 0.69$, $p < 0.0001$), somatisation symptoms ($B_{\text{adjusted}} = 0.77$, $p < 0.0001$), anorexia tendencies ($B_{\text{adjusted}} = -0.84$, $p < 0.0001$), OCD symptoms ($B_{\text{adjusted}} = 0.61$, $p < 0.0001$) and paranoia symptoms ($B_{\text{adjusted}} = 0.52$, $p < 0.0001$) expressed significantly stronger intentions to leave their medical education. Hazardous drinking and bipolar symptoms did not predict students' intention to drop out ($p > 0.05$).

Conclusions A substantial number of UK medical students experienced mental ill-health symptoms, about one in five medical students considers leaving medical school, and mental ill-health symptoms contributed to students' intentions to leave their medical education. Medical schools should improve the learning environment for students and encourage them to seek help to reduce the stigma of mental ill-health symptoms (eg, through education, signposting). It may be useful for medical schools to help applicants/medical students understand whether medical school is the right decision

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ A strength of this study is the elaborate data collection approach, which used inclusive recruitment materials both spoken and written and disseminated across various platforms.
- ⇒ The geographical and demographic spread represented in the sample is more likely to contribute to the generalisability of results.
- ⇒ The limitation of this survey study is the inability to calculate a response rate due to the recruitment strategy.
- ⇒ The work relies on self-reported data by students.

for them and provide them with resources should they wish to leave.

INTRODUCTION

The ever-increasing doctor shortages are a huge cause for concern, with the current shortfall reported as being over 6.4 million doctors worldwide.^{1,2} A recent survey of The National Health Service (NHS) in the UK, which has experienced a chronic shortage of doctors over the past decade, reported that 4 in 10 junior doctors wanted to leave the NHS as soon as possible.³ Doctor shortages have an undeniable impact on healthcare systems—resulting in increased workload, decreased doctors' well-being and a lower quality of care.⁴ These environments of chronic stress and decreased morale that occur due to doctors being unable to provide optimal care for patients, in turn, increase pressure on existing staff, resulting in them leaving the NHS and further contributing to staff shortages.^{5–7} In other words: the continuous shortfall of doctors and increase in vacancies have created a vicious cycle within the workplace.

A complete resolution of the staffing crisis has been deemed to be unlikely for the near future, due to the health and social care sector facing the most acute recruitment and retention crisis in its history.⁸ To combat this workforce crisis, medical students—as our future doctors—play a pivotal role. Medical

students' attrition rates are reported to vary from 3.8% to 26% in different countries, such as the UK, Pakistan, Saudi Arabia and Nigeria.⁹ Attrition of medical students is therefore an incredibly important problem feeding into healthcare workforce issues. To be better able to address the worldwide doctor shortages, we must understand the reasons why certain students are more likely to leave their medical training, so that we may retain these valuable individuals and prevent future students from dropping out.

There are many similarities between doctors and medical students, specifically their work environments; both populations are subjected to high levels of competition, insufficient support systems and isolation.^{10 11} Evidence-based theoretical occupational health psychology models such as the job demands and resources (JD-R) model demonstrate how such a stressful work environment that is high in demands and scarce in resources can trigger stress reactions and hamper motivation and productivity.¹² Thus, the work environment of an individual has a strong impact on their well-being.¹³ How this affects mental health may be challenging to quantify, with the literature reporting 20–78% of medical students worldwide have been reported to be suffering from mental health issues.^{14–18} Despite it being evidenced that medical students are highly likely to face mental health issues and burnout, little research has been conducted into the influence this has on students' dropout rates. In addition, although the Diagnostic and Statistical Manual of Mental Disorders¹⁹ emphasises that mental health issues are often accompanied by functional impairment, including academic, and so the assumption that mental health issues impact students' dropout intentions seems to follow logically from that knowledge, concrete scientific proof of this relationship for our study context is missing. Student attrition might have a significant impact on an overall already overstretched healthcare workforce, and thus, a better understanding of what aspects contribute to this problem is needed. We therefore believe it is of great value to researchers and practitioners to explore the relationship between mental health and academic outcomes in medical education and training. It is also particularly uncertain which specific mental health issues have a larger influence on students dropping out of medical school. Therefore, the aim of this study is to explore the relationships between various mental health issues and dropout intentions. This can help us ascertain which medical students need to be prioritised for mental health support with the aim of preventing them from dropping out of medical school.

METHODS

Study setting

This study is part of a larger research project funded by the British Medical Association consisting of a survey, documentary analysis and interviews.^{16 20 21} The current study will focus on the data obtained through the survey.

The reporting follows Strengthening the Reporting of Observational Studies in Epidemiology reporting guidelines.

Data collection

For this study, we selected nine geographically spread medical schools from England, Scotland, Wales and Northern Ireland varying in size and type of curriculum (integrated combining preclinical and clinical study years vs non-integrated separating preclinical and clinical study years). Students from all study years were invited to fill in a web-based survey (platform: *Online surveys*) between November 2020 and February 2021 and those who took part were invited (February–May 2021) to complete the questionnaire again 3 months later. The 3-month mark for the follow-up was made based on the medical students' education schedules avoiding any substantial curriculum changes (eg, moves between university years) and examination periods. This was done to avoid any peaks of stress that would potentially have impacted students' responses. Recruitment material was distributed through various channels by medical school staff (eg, newsletter or lecture announcement). As recruitment strategies varied per school depending on their policies and preferences, it was not possible to calculate response rates. Of the 1113 medical students who consented to take part in the study, 310 did not fill in the questionnaire and another 11 were ineligible (9 duplicates, 1 from an unparticipating university and 1 missing more than 50% of answers). 792 (71.16%) participants filled in the baseline questionnaire and 407 (51.39%) of these students completed the follow-up survey (385 participants were lost to follow-up). There were no substantial differences between those who completed the follow-up survey (407) and those who did not (385) (see the study authored by Medisauskaite *et al*¹⁶).

Patient and public involvement statement

The survey was piloted with five medical student volunteers who filled in the survey and provided us with their feedback. After amendments, the survey was discussed with advisory group members which consisted of medical students, doctors, other academics, researchers and practitioners working at organisations responsible for medical education provision and student support. The survey was then finalised based on their feedback.

Questionnaire

The survey included previously validated questionnaires where possible. The survey consisted of demographic variables that were considered empirically or theoretically relevant to the study, a dropout measure asking medical students about their intention to drop out in the recent past (ie, the past month), and mental ill-health measures (see [table 1](#) for a detailed description of the operationalisation of these measures). Identical questionnaires were collected at both time points.

Table 1 Overview of variables and measures used in the current study

Variables	Measure/author	No of items/scoring	Example item	Cronbach α
Dropout	Created by authors	1 item (yes/no)	Have you considered dropping – out of medical school in the past month?	
Emotional exhaustion	Maslach burnout inventory – General survey for students ³⁸	5 items, 0 (never) to 6 (every day)	I feel emotionally drained from my studies	0.894
Insomnia	The Insomnia Severity Index ³⁹	7 items, 0 (scores showing no insomnia) to 4 (showing severe insomnia)	How SATISFIED/dissatisfied are you with your current sleep pattern?	0.866
Somatisation	The Somatic Symptom Scale–8 ⁴⁰	8 items, 0 (not at all) to 4 (very much)	During the past 7 days, how much have you been bothered by stomach or bowel problems?	0.770
Hazardous drinking	The Alcohol Use Disorders Identification Test – C ⁴¹	3 items, 0 (never; 1 or 2) to 4 (daily or mostly daily; 10 or more)	How often do you have a drink containing alcohol?	0.780
Anxiety/depression	The Patient Health Questionnaire–4 ⁴²	4 items, 0 (not at all) to 3 (nearly every day)	Over the last 2 weeks, how often have you been bothered by little interest or pleasure in doing things?	0.852
Anorexia tendencies	The Eating Disorder Diagnostic Scale ⁴³	3 items, 0 (not at all) and 6 (extremely)	Have you had a definite fear that you might gain weight or become fat?	0.922
Obsessive-compulsive disorder	Obsessive-Compulsive Inventory – Revised ⁴⁴	3 items, 0 (not at all) to 4 (extremely)	I find it difficult to control my own thoughts.	0.916
Paranoia	The persecution and deservedness scale ⁴⁵	10 items, 0 (not at all) to 4 (certainly true)	There are times when I worry that others might be plotting against me.	0.883
Bipolar	Hypomanic Personality Scale ⁴⁶	6 items, 0 (false) and 1 (true)	There have often been times when I had such an excess of energy that I felt little need to sleep at night.	0.713
Demographic characteristics	Self-developed items by the authors of this paper	9 items, variety of question types (described in table 2)	Which of the following best describes your gender identity?	n/a
Cronbach α calculated for all baseline participants.				

Analysis

SPSS V.26.0 was used for the analysis. Participants were allowed to miss up to one-third of the data for each scale and mean scores were computed over the remaining items. All scales were approximately normally distributed (skewness and kurtosis between –2 and 2; no extreme outliers). Internal consistency (Cronbach's α) was deemed sufficient (>0.7). Exploratory statistics were performed to gain insight into associations between main constructs (see online supplemental appendix 1 for results).

Longitudinal data were used to investigate what mental ill-health symptoms were associated with students' dropout intentions. Unadjusted and adjusted generalised estimating equations (GEEs) were performed to investigate what mental ill-health symptoms were associated with students' dropout intentions. Adjusted models included six out of nine measured demographic

characteristics (table 4 and table 5); three variables were not included due to multicollinearity or lack of variation in data. GEEs were considered appropriate for handling the longitudinal data as they allowed us to include data from both time points and specify dependency between the data from similar subjects. The best fit for the covariance matrix for each analysis was determined by comparing the Fisher scoring of an unstructured covariance matrix to the simpler independent matrix. Missing data were automatically removed from the analysis ($<5\%$). Power calculations for GEE models are less accurate than traditional power calculations. Our sample size of 407 participants exceeds the rules of thumb for GEE; we have >20 subjects (clusters) in our study. P values <0.05 , <0.01 and <0.001 for two-sided tests were calculated and reported, as were the regression coefficient and the 95% CI. We also present results

Table 2 Study characteristics

Variables	407 participants N (%) or M (SD)
Gender (female)	305 (74.9)
Missing	3 (0.7)
Age	21.49 (3.24)
Ethnicity (white)	263 (64.6)
Missing	5 (1.2)
Sexuality (heterosexual)	311 (76.4)
Missing	13 (3.2)
Relationship status (single/never married)	362 (88.9)
Widening participation student (yes)*	62 (15.2)
Parents/guardians/carers occupation (higher managerial)	324 (79.6)
University year	
First	121 (29.7)
Second	74 (18.2)
Third	58 (14.3)
Fourth	75 (18.4)
Fifth	56 (13.8)
Sixth	22 (5.4)
Missing	1 (0.2)
University (UNI)	
UNI1	38 (9.3)
UNI2	3 (0.7)
UNI3	127 (31.2)
UNI4	92 (22.6)
UNI5	30 (7.4)
UNI6	16 (3.9)
UNI7	39 (9.6)
UNI8	28 (6.9)
UNI9	34 (8.4)

*Widening participants is a scheme that aims to support and encourage students from under-represented backgrounds to study in higher education.

corrected for multiple testing (nine tests, p value with Bonferroni correction equals 0.006).

RESULTS

Participants

Please refer to [table 2](#) for more details on study characteristics.

19.4% (79) of medical students said that they considered dropping out of medical school. [Table 3](#) presents the prevalence of students meeting screening criteria for mental ill-health in our sample. Over 1 in 2 students were drinking hazardously (60.2%), experienced insomnia symptoms (clinical or subthreshold; 54.1%)

and somatisation symptoms (medium–very high; 52.1%), and had obsessive-compulsive disorder (OCD) symptoms (51.8%). Nearly half of our participants expressed having anorexia tendencies (44.7%). Approximately 1 in 3 students were emotionally exhausted (36.1%) and had anxiety/depression symptoms (37.9%). 19.4% of students had paranoia symptoms and 2.9% had bipolar symptoms.

Predicting students' intentions to drop out

All mental ill-health symptoms predicted medical students' dropout intentions except for hazardous drinking and bipolar symptoms (see [table 4](#) and [table 5](#)). Those students who were more emotionally exhausted ($B_{\text{adjusted}}=0.94$, 95% CI: 0.68 to 1.21, $p<0.0001$) and expressed higher anxiety/depression symptoms ($B_{\text{adjusted}}=1.12$, 95% CI: 0.84 to 1.39, $p<0.0001$), insomnia symptoms ($B_{\text{adjusted}}=0.69$, 95% CI: 0.43 to 0.94, $p<0.0001$), somatisation symptoms ($B_{\text{adjusted}}=0.77$, 95% CI: 0.48 to 1.06, $p<0.0001$), anorexia tendencies ($B_{\text{adjusted}}=-0.84$, 95% CI: -1.29 to -0.38, $p<0.0001$), OCD symptoms ($B_{\text{adjusted}}=0.61$, 95% CI: 0.44 to 0.79, $p<0.0001$), paranoia symptoms ($B_{\text{adjusted}}=0.52$, 95% CI: 0.31 to 0.73, $p<0.0001$), expressed significantly stronger intentions to leave their medical education. Hazardous drinking and bipolar symptoms did not predict students' intention to drop out ($p>0.05$).

DISCUSSION

The pressure on health services is bound to increase in the future: considering the ageing population, the NHS Long Term Plan foresees a healthcare shortage of 260 000–360 000 staff by 2036/2037.²² Dropout across the medical training pathway, alongside practising healthcare professionals leaving the NHS early in their careers, is contributing to the staffing concerns and service pressures.²³ To better understand why medical students are dropping out of medical school, this study aimed to explore to what extent mental ill-health symptoms lead to medical student attrition intentions. The study revealed that a substantial number of UK medical students experienced mental ill-health symptoms, about one in five medical students considered leaving medical school, and mental ill-health symptoms contributed to students' intentions to leave their medical education.

The prevalence for each of the mental health conditions varied in our sample, but results showed that a substantial number of medical students met screening criteria for mental ill-health. Over half of the students were drinking hazardously (60.2%) and experienced insomnia (54.1%), somatisation (52.3%) or OCD symptoms (51.8%). Over one in three students was experiencing anorexia tendencies, emotional exhaustion or depressive/anxiety symptoms. These results may partly be attributed to the study demographic; medical students are young adults that face significant life challenges and often prioritise socialising over healthy life choices.^{24 25} Drinking and staying up late are therefore behaviours often seen among students. In fact, studies show that undergraduate students in the

Table 3 Prevalence of mental ill-health symptoms

	Prevalence	Cut-off points
Emotional exhaustion		
High	36.1% (147)	The lower, middle and higher tertiles represent 'low', 'moderate' or 'high' emotional exhaustion
Moderate	34.6% (141)	
Low	29.2% (119)	
Missing	0	
Anxiety/depression symptoms		
Severe	12.8% (52)	Severe symptoms: 9–12
Moderate	25.1% (102)	Moderate symptoms: 6–8
Mild	31.2% (127)	Mild symptoms: 3–5
No symptoms	30.7% (125)	No symptoms: 0–2
Missing	0.3% (1)	
Insomnia symptoms		
Clinical insomnia (severe insomnia)	1.5% (6)	Clinical insomnia (severe insomnia): ≥ 22
Clinical insomnia (moderate severity)	17% (69)	Clinical insomnia (moderate severity): 15–21
Subthreshold insomnia	35.6% (145)	Subthreshold insomnia: 8–14
No signs of insomnia	44% (179)	No signs of insomnia: 0–7
Missing	2% (8)	
Somatisation symptoms		
Very high	14.7% (60)	Very high: 16–32
High	13.8% (56)	High: 12–15
Medium	23.8% (97)	Medium: 8–11
Low	30.2% (123)	Low: 4–7
No to minimal symptoms	16.5% (67)	No to minimal symptoms: 0–3
Missing	1% (4)	
Hazardous drinking		
Yes	60.2% (245)	'Yes' was coded if 3–4 or more drinks are consumed containing alcohol on a typical day of drinking or consumption of 6 or more drinks on one occasion
No	39.6% (161)	
Missing	0.3% (1)	
Anorexic tendencies		
Yes	44.7% (182)	'Yes' was coded if scoring 4 or more on expressing a definite fear of gaining weight or becoming fat and 4 or more aspects around weight/body shape influencing self-evaluation
No	55% (224)	
Missing	0.3% (1)	
OCD symptoms		
Yes	51.8% (211)	Yes: ≥ 4
No	47.9% (195)	
Missing	0.3% (1)	
Paranoia symptoms		
Yes	19.4% (79)	Yes: $>\text{mean}+1$ SD No: $<\text{mean}+1$ SD
No	80.6% (328)	
Missing	0	
Bipolar symptoms		
Yes	2.9% (12)	Yes: >6 No: <6
No	96.8% (394)	
Missing	0.3% (1)	
OCD, obsessive-compulsive disorder.		

Table 4 Association between intentions to drop out and emotional exhaustion, anxiety/depression, insomnia, somatisation symptoms and hazardous drinking (controlling for socio-demographic characteristics)

Emotional exhaustion (B (95% Wald CI), p-value)	0.94 (0.68 to 1.21), p=0.000***sg				
Anxiety/depression symptoms	1.12 (0.84 to 1.39), p=0.000***sg				
Insomnia symptoms	0.69 (0.43 to 0.94), p=0.000***sg				
Somatisation symptoms	0.77 (0.48 to 1.06), p=0.000***sg				
Hazardous drinking (yes)	-0.36 (-0.81 to 0.10), p=0.123				
Gender (female)	0.06 (-0.54 to 0.65), p=0.847	0.11 (-0.46 to 0.68), p=0.703	-0.08 (-0.60 to 0.45), p=0.780	0.14 (-0.42 to 0.69), p=0.628	-0.19 (-0.71 to 0.34), p=0.480
Ethnicity (BME)	0.50 (-0.02 to 1.02), p=0.059	0.49 (-0.01 to 0.99), p=0.057	0.53 (-0.03 to 1.03), p=0.036*	0.42 (-0.08 to 0.92), p=0.097	0.31 (-0.18 to 0.80), p=0.208
Sexual orientation (LGBTQ)	0.17 (-0.42 to 0.76), p=0.575	0.25 (-0.35 to 0.85), p=0.416	0.25 (-0.36 to 0.86), p=0.416	0.23 (-0.36 to 0.81), p=0.447	0.03 (-0.54 to 0.61), p=0.910
Relationship status (married/co-habiting/civil partnership)	-0.53 (-1.11 to 0.05), p=0.072	-0.44 (-1.15 to 0.26), p=0.217	-0.72 (-1.33 to -0.11), p=0.021*	-0.72 (-1.36 to -0.09), p=0.026*	-0.74 (-1.34 to -0.15), p=0.014*
Widening participation (no)	0.51 (-0.10 to 1.12), p=0.102	0.52 (-0.11 to 1.15), p=0.106	0.59 (0 to 1.17), p=0.049*	0.58 (-0.03 to 1.18), p=0.060	0.72 (0.13 to 1.32), p=0.017*
Medical school year	-0.25 (-0.39 to -0.12), p=0.000***sg	-0.18 (-0.33 to -0.03), p=0.016*	-0.17 (-0.30 to -0.04), p=0.012*	-0.13 (-0.27 to 0), p=0.053	-0.16 (-0.30 to -0.03), p=0.020*
Dropout ref group 0=no; ***p<0.0001; **p<0.001; *p<0.05; Bonferroni correction indicates sg (nine tests, p value with Bonferroni correction equals 0.006).					

UK and Ireland consume similar amounts of alcohol as our study population.²⁶ However, the pressures from medical school and students' learning environments may exacerbate mental ill-health symptoms.¹⁶ Research shows that the high prevalence of mental ill-health also applies to nursing students. Meta-analyses of nursing students globally show that they also have similarly high levels of emotional exhaustion (41.1%)²⁷ and depression (34%).²⁸ Nursing and medical students share similarities in studying a healthcare curriculum. For instance, they may encounter stressful interactions with patients and other clinicians and responsibilities in clinical work which they feel unprepared for. A further similarity is that both medical students and student nurses report unwillingness to seek help for their own mental health because of fears of stigma and confidentiality.^{20 29} This may act as a considerable barrier to seeking help for both groups and may be partly responsible for the high levels of mental ill-health.

This current study additionally revealed that 19.4% of medical students considered dropping out of medical school. This is a higher number than actual medical student attrition, which has been estimated to be around 5%.³⁰ However, following the principles of the Theory of Planned Behaviour, we know that intentions are proxy

to action³¹ and considering the recent challenges of the pandemic and the difficulties after, the percentage of actual attrition might potentially have increased. Furthermore, the fact that students are considering leaving medical school is a sign that students may be unhappy during their education, even when staying in medical school. Students who complete medical school while doubting about their career trajectory may be more inclined to drop out of postgraduate training. This feeds into an already existing problem of attrition in postgraduate training: the number of doctors who pause their training after completing Foundation training has doubled from 34% in 2011/2012 to 70% in 2020/2021.²³ From this cohort of students pausing training, it is thought that 12% will not return to practice.²³ This is not only problematic for healthcare systems, but also for the medical students themselves. Dropping out of medical school can have significant personal, financial and psychological consequences for the individual. There is also the financial cost to the taxpayer, and the time and effort wasted by educators.³²

To combat the loss of trainees and support the workforce in the future, the NHS Long Term Plan ambitiously sets out to double the number of medical school training

Table 5 Association between intentions to drop out and anorexic tendencies, obsessive-compulsive disorder (OCD), paranoia and bipolar symptoms (controlling for socio-demographic characteristics)

Anorexic tendencies (yes) (B (95% Wald CI), p-value)	-0.84 (-1.29 to -0.38), p=0.000***sg			
OCD symptoms	0.61 (0.44 to 0.79), 0.000***sg			
Paranoia symptoms	0.52 (0.31 to 0.73), p=0.000***sg			
Bipolar symptoms	0.51 (-0.27 to 1.28), p=0.199			
Gender (female)	0.14 (-0.41 to 0.69), p=0.618	0.10 (-0.43 to 0.64), p=0.708	-0.08 (-0.61 to 0.45), p=0.768	0.14 (-0.66 to 0.39), p=0.608
Ethnicity (BME)	0.47 (-0.01 to 0.95), p=0.055	0.66 (0.17 to 1.16), p=0.009**	0.45 (-0.03 to 0.92), p=0.067	0.46 (-0.03 to 0.94), p=0.064
Sexual orientation (LGBTQ)	0.15 (-0.44 to 0.74), p=0.614	0.13 (-0.48 to 0.74), p=0.675	0.15 (-0.43 to 0.73), p=0.614	0.09 (-0.49 to 0.66), p=0.764
Relationship status (married/co-habiting/civil partnership)	-0.72 (-1.34 to -0.10), p=0.022*	-0.67 (-1.32 to -0.02), p=0.042*	-0.71 (-1.35 to -0.07), p=0.030*	-0.69 (-1.29 to -0.09), p=0.025*
Widening participation (No)	0.74 (0.15 to 1.33), p=0.014*	0.57 (-0.01 to 1.14), p=0.054	0.61 (0.02 to 1.20), p=0.043*	0.69 (0.10 to 1.28), p=0.022*
Medical school year	-0.16 (-0.29 to -0.02), p=0.022*	-0.17 (-0.31 to -0.03), p=0.014*	-0.14 (-0.28 to -0.01), p=0.040*	-0.15 (-0.28 to -0.01), p=0.036*
Dropout <i>ref</i> group 0=no; ***p<0.0001; **p<0.001; *p<0.05; Bonferroni correction indicates <i>sg</i> (nine tests, p value with Bonferroni correction equals 0.006).				

spots, with the intention of achieving 15 000 places in 2031/2032.²² Furthermore, plans are to shorten the curriculum from the current 5 and 6 years to 4 years and to introduce medical school apprenticeships, with a focus on attracting those from under-represented backgrounds. These measures may seem promising at first glance, but the workload of medical students is already concerning in the current 5-year and 6-year curricula,²⁰ so adding pressure by shortening training may lead to increased dropout rates.

This reasoning can be further supported not only by our study results, but also by occupational health psychology theories. Our study linked mental ill-health to increased intentions to drop out and specifically those students who were emotionally exhausted and had anxiety/depression symptoms, insomnia, somatisation symptoms, anorexia tendencies, obsessive-compulsive or paranoia symptoms were more likely to consider dropping out from medical school. Using occupational health psychology theories such as the JD-R model can help to better understand the results of this study. According to the JD-R model, the higher the job demands and the lower the resources in a work environment, the more likely the occurrence of stress and a lack of work engagement and general well-being.³³ In turn, this can impact employees' productivity and potentially their decision to stay in or leave their workplace.^{34 35} Although this model is rarely used in the medical undergraduate setting,³⁶ similarly to the workplace students' learning environment brings on demands and resources that can impact students' well-being. From a JD-R model perspective, increasing demands such as the proposed curriculum change without offering sufficient

resources to handle these demands can be detrimental to medical students.

The approach taken in this study—exploring a variety of specific mental ill-health symptoms—is novel and differs from studies linking more generic mental health indicators to dropout, such as a recent longitudinal study of Thai medical students.³⁷ The authors collected medical students' self-reported mental health screening data on admission and found a significant association between students' mental health and dropout. Our specific approach allows for differentiation between the various mental health conditions, bringing insight into which student groups might most benefit from support. Those mental ill-health issues not related to dropout, such as hazardous drinking and experiencing bipolar symptoms, might require a different approach or policy when trying to reduce attrition in medical school.

Implications

The findings of this study suggest that medical students' mental health is an important contributor to students dropping out and reinforces the importance of supporting students at medical school. Mental health symptoms can be difficult to pinpoint, like emotional exhaustion, somatisation symptoms and insomnia, due to students actively trying to conceal their problems. To combat this, regular well-being checks can be implemented through meetings with personal tutors. The various mental health symptoms that have been found to predict dropout are particularly difficult to recognise in medical students, due to the 'toxic' and competitive work culture of medical school normalising the idea of individuals experiencing

them. We know the context in which medical students learn impacts their well-being.^{16–20} Medical schools should improve the learning environment for students and encourage them to seek help to reduce the stigma of mental health symptoms. This can be through educating students on warning signs of mental decline through workshops or courses, and signposting clearly where they can go for help. Medical schools should also actively clarify that seeking help will not jeopardise their careers, but rather improve their chances of completing their degree. There should be no discrimination against individuals with these diagnoses, as with appropriate interventions and more supportive learning environments many students can flourish.

While medical schools can take action to improve their environment, it is important to acknowledge that medical school is not for everyone and to provide resources for those medical students who are deciding whether to continue and those who choose to leave. It may be useful for medical schools to have systems in place that can help new applicants (and existing medical students) consider whether medical training is for them by setting realistic expectations of the demands of medical training.

Strengths and limitations

The sample in this study may be skewed as students with mental health issues may be keener to respond. Although the researchers tried their best to work with medical schools to guarantee a representative sample, due to the role of medical schools in the recruitment process the researchers were unable to fully control the recruitment strategy. A strength of the study is the elaborate data collection approach, which used inclusive recruitment materials both spoken and written (eg, newsletter or lecture announcement) and disseminated across various platforms. Furthermore, the geographical and demographic spread represented in the sample is more likely to contribute to the generalisability of results.

The various mental health conditions represented in this study bring new insights into the existing discourse of similar work in this field. However, some of the conditions, such as experiencing bipolar symptoms, were only prevalent for a small subset of the sample. This means that analysis conducted for these conditions was less reliable. In addition, despite bipolar symptoms potentially affecting students' time at university, they might not deliberately leave medical school because of their mental state (grandiose ideation) due to this condition. This may explain why we did not find any significant links for those experiencing bipolar symptoms.

We did not measure the action of dropping out but measured intentions with one item. However, we believe that the findings are valuable as (1) intentions are a proxy of action and (2) findings provide insight into various signs of dropout intentions, including students contemplating leaving as well as students having serious considerations of leaving. This is a strength as it allows us to understand what factors contribute to students' intentions to leave

medical school and plan for early interventions to help retain these students.

Furthermore, the work relies on self-reported data by students. Considering the sensitive nature of the research, this may mean that students under-reported their mental ill-health symptoms. In terms of the dropout measure, we were only able to ask about students' intentions. We consider this relevant as even having the intention to leave medical school is an important measure in itself and an indication that students are unhappy. However, for future research, it is key to consider actual dropout statistics to get a better sense of the true scale of the problem.

We also acknowledge that the relationships between different mental ill-health issues and students' personal/medical school circumstances are complex and might have an impact on their dropout intentions. Psychiatric symptoms also can co-occur. This study did not aim to investigate the path looking at how different diagnoses relate to each other but rather focuses on investigating symptoms and their link to such medical school outcomes such as dropout. We encourage future researchers to investigate this topic in more depth, using quantitative and qualitative methods.

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