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2 Qualitative Systematic Review

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



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1 **ABSTRACT.**

2 Background: This study investigated the causes of stress in medical students and the impact of stress on their
3 academic outcomes. Much is known about the impact of stress on medical students but there is a gap in
4 knowledge regarding the collated overview of literature in this area. This study sought to pull together disparate
5 research to gain a clearer overview of the core drivers of stress.

6

7 Methods: Taking a meta-level approach, a narrative qualitative systematic review of previous systematic reviews
8 was undertaken, following the PRISMA guidelines. This systematic review covered literature published from
9 2009-2023 where the focus was stress in students studying at medical schools in the United Kingdom. Findings
10 were then assessed for commonly emerging themes.

11

12 Results: From an initial tranche of 3394 articles, a final set of eight systematic reviews was identified. The eight
13 reviews drew on over 309 separate research projects and involved over 500,000 participants. A review of the
14 key findings from each of the eight studies identified five themes: academic pressure, the impact of the
15 institution, students' personality traits, social relationships, and financial stress. The analysis provided clear
16 evidence that stress amongst medical students results in negative academic outcomes.

17

18 Conclusion: The findings suggest a need to reduce stress to help medical students prevent a decline in their
19 academic outcomes and health. From these findings it is recommended that medical schools examine their
20 curriculum to identify areas where they feel they put undue academic pressure on their students and work on
21 ways to remediate this situation.

22

23 **Key Words:** Psychological Stressors, Medical Students, Medical School, Analysis (Source: MeSH-NLM).

24

1 INTRODUCTION.

2 Stress can cause emotional, psychological, and physical turmoil.¹⁻² There are several reasons why stress can
3 be experienced, for example there are daily causes of stress - perhaps due to situations at work or home, and
4 there are one-off drivers of stress such as the loss of a loved one or sudden unemployment.³ Usually when
5 encountering stressful situations, we assess the problem and determine if we have the appropriate resources
6 to manage it. Our body also makes various biological changes to endure this increased demand and to
7 heighten our performance, which in consequence increases our survival prospects. As such, stress can be
8 seen as both a physical and mental process and can even lead to positive outcomes. However, when this
9 stress becomes chronic and continues for a long period of time, it can lead to detrimental outcomes.⁴⁻⁵

10
11 Stress affects a large number of people. Approximately half a million people experience work-related stress in
12 the UK and, in a study from 2018, 74% of respondents report feeling overwhelmed.⁶ Similarly, stress has been
13 increasingly reported amongst university students. The Office for National Statistics reported that first-year
14 students in the UK scored an average life satisfaction of 6.6 out of 10 which is lower than their non-university
15 peers, who scored 7.1.⁷ As a whole, university students can be considered as a vulnerable group due to the
16 number of stressors that come into play when facing a new environment, new people, new friendships, and
17 new accommodation. This can be exacerbated by factors such as living away from home for the first time,
18 managing their own finances, adjusting to new routines, and ensuring their learning needs are met.⁸

19
20 In addition to the stressors which occur as a student moves from school to university, medical students also
21 report that their new life starts to evolve around studying in a competitive environment – something that can
22 lead to a fear of failure.⁹⁻¹¹ Applying to study medicine generally requires getting good grades, writing a
23 personal statement, completing admissions tests, and attending an interview. This rigorous application
24 process seeks to filter students to ensure the 'best of the best' are selected. Once, students are on their
25 academic programme, they are then faced with years of study and assessment. Over time, such high and
26 consistent levels of stress amongst medical students can lead to burnout, which is characterized by increased
27 levels of emotional exhaustion, depersonalization, and a reduced acuity of personal achievement. From this,
28 we can see that stress is likely to have a detrimental effect on student wellbeing and is therefore likely to
29 impact their academic outcomes.

30
31 The term 'academic outcomes' is often used interchangeably with the terms such as 'academic attainment' or
32 'academic performance' but there are subtle differences between these terms. This study focuses on the
33 concept of academic outcomes as this is a broad measure of success. The term 'academic outcomes' refers
34 to a wide-ranging sense of achievement based upon factors such as interaction, engagement, attendance,
35 and assessment.¹² By focusing on the overarching concept of academic outcomes this study looks beyond
36 test results and examines stress in relation to the development of academic skills such as logical thinking,
37 practical ability, technical dexterity, and communication skills.¹³ Terms such as 'academic attainment' and
38 'academic performance' mainly focus on measuring student success based on the results of their
39 assessments but being a medical student is more complicated than this.¹⁴⁻¹⁵ By focussing on academic
40 outcomes this paper looks at the impact of stress on the broader experience of being a medical student.

41

1 As well as cognitive ability, some of the factors that affect academic outcomes include support networks, self-
2 management, organizational skills, resilience, finance, the accessibility of study resources, and the input of
3 teachers.¹⁶⁻¹⁸ These factors are quite diverse but generally suggest that academic outcomes are dependent
4 on the student, the institution, and the environment. As well as having different factors that affect academic
5 outcomes, there are many different factors that affect stress levels and there are different ways that stress can
6 affect the individual. For example, stress can impact an individual's physical, social, and/or emotional
7 development. Here we can see that academic outcomes are dependent on many factors and that stress has
8 the capacity to affect the individual in several different domains.¹⁹

9
10 Medicine is known for being a very stressful course in comparison to other degrees – mainly due to a larger
11 than average workload and course content, stricter rules regarding attendance and professionalism, frequent
12 examinations, and the responsibility of treating patients.²⁰ In addition to the stressful nature of undertaking a
13 medical degree, medical students can experience further stress related to their financial circumstances and
14 personal relationships.²⁰ For example, a study investigating the causes of stress in a medical school in
15 Thailand reported that the main cause of stress experienced by the majority of the students related to
16 academic activity - such as assessment (99%), increased workload (96.3%) and poor results (92.9%).²¹ This
17 shows how stress itself can be caused by academic demands, but at the same time, stress can result in
18 poorer academic outputs; which results in a vicious cycle of academic burden causing further stress which
19 results in reduced academic performance which further contributes to stress, and so on.²² Furthermore, stress
20 amongst medical students can result in burnout, anxiety, depression throughout their academic studies and
21 clinical placements.²⁰ At the personal level, stress can also cause detrimental outcomes, such as abuse of
22 alcohol and drugs, strained relationships, and suicidal behaviour.²²

23
24 Stress can clearly have an impact on medical students and their likelihood of achieving academic success.
25 This narrative qualitative systematic literature review explores the causes of stress amongst medical students,
26 examines how it can affect their academic outcomes, and offer some guidance as to how stakeholders might
27 start to address this issue.

1 **METHODS.**

2 The purpose of this qualitative study was to conduct a narrative qualitative systematic review which explored
3 the reasons stress occurs in medical student in the United Kingdom and the impact it has on academic
4 outcomes. The primary aim of this narrative qualitative systematic review was to identify the causes of stress
5 amongst students studying at medical schools in the United Kingdom, as described in the extant literature. The
6 intended secondary outcome was to identify any action points that should be addressed by universities and
7 governing bodies. It is hoped that by undertaking such actions changes can be made that might reduce the
8 impact of stress on medical students with the intention of developing more resilient, confident, and safer future
9 doctors. This study highlights core messages in the extant literature and research, provides an account of how
10 well this topic is investigated, and highlights what can be done to address perceived weaknesses. A systematic
11 review was used to explore this topic and was conducted following the Preferred Reporting Items for Systematic
12 Reviews and Meta-Analyses (PRISMA) guidelines.²³ A systematic review was identified as the most suitable
13 approach for this type of study as it would allow for oversight of all relevant data.

14

15 *Search Strategy*

16 This review started by identifying relevant articles. This involved a Boolean search using keywords formed of
17 derivatives of 'medical student', 'stress' and 'skill'. Furthermore, these were used in combination with a series
18 of Boolean "AND/OR" operators and asterisk wildcards which have been summarized in Table 1. These terms
19 were used with other terms which aligned with the Medical Subject Headings (MeSH). These terms were used
20 to search three databases: PubMed, Education Research Complete, and Scopus. Three databases were used
21 to increase the likelihood of identifying all relevant literature - as recommended by the PRISMA guidelines.²³ To
22 ensure parity of investigation, the same combinations of search terms were applied to each of the three
23 databases. To assess potential biases in the selected studies, scrutiny of each article was conducted using the
24 Joanna Briggs Institute (JBI) evidence-based critical appraisal tools.²⁴ The appropriate JBI critical appraisal tool
25 was applied to each article that met the inclusion criteria to ensure trustworthiness across different studies and
26 different populations. To enhance credibility the article that met the inclusion criteria were also assessed using
27 the Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework.²⁵ The start
28 date was established in relation to the General Medical Council (GMC) publication 'Tomorrow's Doctors' which
29 outlines standards for undergraduate medical education in the UK. This is a core guidance document for UK
30 Medical Schools and was originally published in 2009.²⁶ The end date for the review was 2023, as this was the
31 year the project was undertaken and would allow for the most recent literature.

32

33 [Table 1 near here]

34

35 *Inclusion Criteria*

36 Studies were included if they addressed the following criteria:

37

- 38 • Studies published from 2009-2023
- 39 • Studies that are meta-analyses, reviews, or systematic reviews.
- 40 • Studies relating to medical students on undergraduate programmes.
- 41 • Studies exploring the difficulties and stress experienced by medical students.
- Studies where the full text is available in English language.

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Exclusion Criteria

Studies were excluded if they address the following criteria:

- Studies published before 2009.
- Studies that are randomised controlled trials, clinical trials.
- Studies reported in books or other non-peer-reviewed documents.
- Studies that are not related to medical students.
- Studies that do not explore the difficulties and stress experienced by medical students.
- Full text not available on PubMed in English language.

The selection process involved TJ carrying out the initial search and reviewing the titles and abstracts of the first tranche of literature. This screening checked to see whether papers met the inclusion criteria. After this there was a full screening of the included papers to identify any derivatives of key search terms. This two-stage screening model allowed for clear data identification. When uncertainty arose, guidance was sought from EKB and, based upon the recommendation provided, TJ and EKB came to an agreement of what should be done. For example, when carrying out the initial search, TJ came across studies that were not carried out in the United Kingdom alone. A collaborative decision was made to include such studies if the United Kingdom was one of the countries included. In this way, concerns were discussed, and the reviewers worked to develop a mutual agreement. No significant disputes were identified.

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1 RESULTS.

2 Following the initial search, 6040 studies were identified. There were 2502 duplicates identified and excluded,
3 and a further 17 papers were excluded as they did not have full texts. The titles and abstracts of the remaining
4 3521 results were then reviewed using the inclusion criteria, leading to 26 papers being identified as suitable.
5 The 26 results were then read in full and screened using derivatives of key search terms. After review, 18 studies
6 were excluded. Sixteen of these papers were clearly outside the scope of this review. Two further studies were
7 excluded: one study investigated methods that can be used to assess student wellbeing and the other explored
8 how mindfulness might reduce stress.²⁷⁻²⁸ As neither study addressed the causes of stress, they were excluded
9 resulting in a total of eight studies to be included as part of this systematic review. A full account of the screening
10 system, following the PRISMA guidelines, can be seen in Figure 1.

11
12 [Figure 1 near here]

13
14 A total of eight systematic reviews were identified and included as part of this review. Through manual screening
15 and scrutiny of the eight systematic reviews some recurring themes were identified. In identifying these themes,
16 we deliberately avoided using content or thematic analysis as these approaches have been criticized for
17 reducing analysis to a simple mathematical counts of repeated terms.²⁹ Instead, we took a holistic approach to
18 assessing the central themes of each paper – by focusing on the concluding messages of each paper to
19 examine what was central to their findings.³⁰⁻³¹ Data was extracted and examined through close reading
20 following the JBI guidance for Umbrella Reviews – all key findings were identified in the abstracts of the papers
21 and were verified in their results and discussion sections.²⁴ Following the JBI guidance on data extraction, core
22 results from each paper were identified and a synthesis of findings was developed. Through close reading of
23 these syntheses, a meta-synthesis was developed that collated the core findings under emerged thematic
24 headings. The eight studies drew on over 309 separate research projects and involved over 500,000
25 participants. The results are summarized in Table 2. Of the eight studies, five used standardised critical
26 appraisal tools such as the Medical Education Research Study Quality Instrument and the Consolidated Criteria
27 for Reporting Qualitative Studies. Interestingly none used the same standard tool. The meta-synthesis of the
28 key findings from each of the eight studies identified five thematic headings: academic pressure, the impact of
29 the institution, students' personality traits, social relationships, and financial stress.

30
31 [Table 2 near here]

32 33 *Academic Pressure*

34 Across scoping, narrative, and systematic reviews, one of the key features found to be a factor in driving
35 academic stress was academic pressure.³²⁻³⁵ This was discussed as the workload demanded from a medical
36 degree as well as the outcomes students feel they must meet - whether from their own targets; the expectations
37 of the academic staff, and/or the confidence placed in them by family and friends. Dealing with high expectations
38 during difficult phases of their learning journey was also found to contribute to stress. For example, Atherley et
39 al. conducted a scoping review of 45 articles investigating the struggles experienced by undergraduate medical
40 students in the transition from the preclinical to clinical years of the medical programme.³² The review found
41 that educational, social, and developmental expectancy can contribute to such struggles. The findings revealed

1 that students can be overwhelmed by factors such as perceived lack of skills and knowledge, requirements of
2 the programme, expectations of staff and a genuine feeling of not being prepared. This was further emphasized
3 by Gaston-Hawkins et al. who conducted a review exploring the causes and solutions of burnout amongst
4 medical students and trainee doctors and reported that academic demand can cause individuals to sacrifice
5 their own personal interests for the sake of pursuing their academic goals, which can result in their wellbeing
6 becoming compromised.³³ A limitation of this study was that the review was mainly narrative rather than
7 systematic – thus it could be suggested to be cherry-picking data. Furthermore, Gaston-Hawkins et al. only
8 reported on two studies from the UK of which one was associated with medical students and the other
9 associated with residents.

10 *Impact of the Academic Institution*

11 A second theme that emerged from the studies was the impact of the academic institution.³⁴⁻³⁶ Discussion in
12 this area referred to matters within the control of the medical school, such as the curriculum, exams, and the
13 delivery of teaching. The reviews found that the curriculum itself can cause stress due to the overwhelming
14 volume of content that students are expected to know, and the competitive culture of medicine. The studies
15 gathered measured resilience, mental wellbeing, academic outcomes, interpersonal dynamics, and the extent
16 to which the activity was considered acceptable by students. The studies also reported on ways to address this.
17 For example, the review of 19 papers by Mohmand, Montero and Solomonian found that improvements to the
18 medical curriculum can decrease stress and increase student wellbeing.³⁵ These improvements included
19 changing pre-clinical modules to pass/fail; reductions in the level at which some materials are taught, and
20 initiatives to reduce the feeling that gaining good grades was a matter of competition rather than ability. Here
21 we see that the impact of stress on academic outcomes can be alleviated through curricular changes.

22 *Personality Traits*

23 A few studies emphasized how personality traits, such as being an extrovert or introvert, as well as having
24 emotional stability can impact the level of stress experienced by students.³³⁻³⁶ For example, Gaston-Hawkins et
25 al. found evidence that the personality of a medical student can influence the extent to which the individual will
26 experience depression, and that extroverts were less likely to experience a severe form of depression in
27 comparison to introverts.³³ In these studies, we can see that the impact of stress might be personally negotiated
28 by the individual student based on personal characteristics. Further to this, evidence found by Ahmady et al
29 found that emotional resilience, being conscientious and motivated can positively correlate with academic
30 performance.³⁴ This finding can be thought of as robust as it was the result of a systematic review of 89 research
31 articles. Emotional resilience relates to the concept of tolerance of ambiguity explored through another
32 systematic review: Hancock and Mattick.³⁶ Tolerance of ambiguity refers to how an individual manages an
33 unclear and vague situation without getting frustrated or seeking immediate help or guidance. In such
34 circumstances, high levels of tolerance are less likely to lead an individual to feel unduly stressed. Hancock and
35 Mattick looked at a total of 11 studies and found that having a low tolerance of ambiguity indicates that an
36 individual would find it difficult to manage confusing situations and, as a result, their psychological wellbeing
37 would be negatively impacted – a situation that is then likely to impact their academic outcomes. The concept
38 that personality can influence stress and, in consequence, result in the development of depressive symptoms
39 is further supported by Yang et al. whose systematic review of 73 papers explored the factors contributing to

1 symptoms of depression among undergraduate students.³⁷ This review identified that the six factors contributing
2 to depressive symptoms were relational, psychological, occupational, sociodemographic, lifestyle and one's
3 likely response to trauma.

4 *Social Relationships*

5
6 The connection between social relationships and stress was identified in three reviews.^{32,36,38} These studies
7 highlighted how different types of relationships can influence stress and the academic outcomes of medical
8 students. The types of relationships discussed included social relationships and clinical relationships - between
9 students, the medical team, and peers. Clearly, building relationships is important in clinical work, where
10 communication skills, with patients and colleagues, are vital; however, the reviews also highlighted issues in
11 this area. For example, Atherley et al. reviewed the struggles faced by undergraduate medical students in the
12 transition from preclinical to clinical years and found that students experienced uncertainties regarding the
13 importance of their role in a team.³² This led students to prioritise blending in and building a relationship (with
14 the medical team and their peers) rather than learning – a decision that is likely to lead to lower levels of
15 academic outcome. This concept of feeling anxious due to the uncertainty of the clinical environment was also
16 explored in Hancock and Mattick's systematic review where it was reported that individuals who are highly
17 anxious when approaching an uncertain situation experience a negative effect on their psychological
18 wellbeing.³⁶ Furthermore, Ong et al. identified that social hierarchy can contribute towards moral distress –
19 where students may be particularly wary of their relationships with senior clinicians.³⁸ The review by Ong et al.
20 was a systematic scoping study of 20 papers, so it carries some weight; also, their findings are anecdotally and
21 instinctively supported. Feeling worried about not integrating with the medical team during clinical placements
22 can increase students' stress levels and can also result in a reduction in empathy.^{32,36,38}

23 *Financial Stress*

24
25 A final cause of stress related to economic hardships and debt. Financial stress was identified as important in
26 three reviews.³⁷⁻³⁹ For example, the systematic review conducted by Pisaniello et al. reported that, while there
27 is either a negative or zero correlation between the level of debt and academic performance, the impact on
28 mental health caused by debt is significant.³⁹ While Pisaniello et al. did not find any immediate causal
29 relationship between debt and performance, it is likely that this level of financial hardship creates the urge for
30 students to seek coping mechanisms such as alcohol and other forms of self-medication, and these practices
31 might impact on an individual's capacity to study. The review also revealed that financial stress can lead
32 students to select specialties that have high pay rates such as surgical specialties, ophthalmology, neurology,
33 and dermatology - which suggests that finance is a key factor in the short and long term. However, a limitation
34 of this review is that, of the 52 studies included, only one was based in the UK which concluded that 42% of
35 students believed that financial stress only contributed to 25% of their overall stress. Other studies in the review
36 were based in the USA, New Zealand, Canada, and Australia where university funding models are different and
37 where medical structures and wages differ. The study by Pisaniello et al. is a robust piece of work, the findings
38 are sound and supported by the scoping reviews of Yang et al. and Ong et al. but may need to be interpreted
39 at the local level.³⁷⁻³⁸

1 DISCUSSION.

2 Current literature supports the argument that studying medicine is a stressful undertaking because of the
3 extensive course content and high levels of assessment.²⁰ Moreover, academic stress can be exacerbated by
4 the academic pitch of the taught content caused by the curricular and teaching choices of medical schools.¹⁸
5 The findings here show clear evidence to support the argument that academic pressure is a cause of stress in
6 medical students.^{32-34,37} Alongside the stress that comes from the act of studying, this review also identified
7 support for the argument that stress is further impacted by institutional features such as curricular structure,
8 exams, and the delivery of teaching.³⁴⁻³⁶

9
10 Since medical schools are responsible for providing the appropriate support for students and their needs it is
11 important that they consider students' needs and provide the appropriate resources and support.¹⁶⁻¹⁷ All
12 university students have the potential to feel vulnerable when faced with a new environment and the challenges
13 it brings.⁸ For medical students this might be further impacted by the longer study period and the concomitant
14 social, emotional, and financial pressures. An example of this was found in this review where economic
15 hardships and debt were identified as causes of stress and where debt was found to have a negative impact on
16 mental health.³⁷⁻³⁹ These results are similar to that of existing literature which describes that living away from
17 home and managing their own finances can contribute to stress for any university student and that finance plays
18 a further role in terms of education regarding the accessibility and availability of study resources.^{8,18}

19
20 Personality traits were identified as impacting emotional stability and emotional resilience.^{33-34,36-37} Existing
21 literature also supports this finding and outlines the relationship between self-management and academic
22 outcomes.¹⁷ This can be illustrated through the concept of tolerance of ambiguity which was found in this review.
23 Tolerance of ambiguity is used to describe the way in which an individual can address a confusing situation
24 without getting flustered or asking for help; where a low tolerance of ambiguity is more likely to contribute to
25 stress.³⁶ This personality trait affects an individual's ability to control their emotions and manage the way in
26 which thoughts, emotions and actions are processed. In such turbulent circumstances, high emotional stability
27 is likely to allow individuals to adopt purposeful learning strategies, thus allowing them to manage their stress
28 levels.

29
30 Fear of failure is an added stressor for medical students; therefore, it is important that individuals and institutions
31 look at what causes such fear.¹⁰ The fear of failure relates to the five emergent thematic headings found in this
32 review: academic pressure, the impact of the institution, students' personality traits, social relationships, and
33 financial stress. This fear of failure may be a result of personal or familial expectations (or indeed perceived
34 expectations)³⁷⁻³⁹ or as a result of situational changes³²⁻³⁴ but there is evidence here that it can be addressed
35 through reflection, personal tutoring, and managed expectations.³⁴⁻³⁶ These findings align with previous studies
36 that have identified the impact of change on stress levels, and that have identified methodologies for individual
37 and institutions to help mitigate the impact of stress.^{9-11,16-20,22} Medical schools should reflect on what can be
38 done to reduce the fear of failure – offering safety nets such as academic and clinical mentors – and working to
39 reduce the feeling that success in medicine is about competition to be at the top.

40

1 This narrative qualitative systematic review revealed that both positive and strained relationships with family
2 and/or friends can contribute to stress and affect academic performance.^{34,38} Students might feel that any self-
3 perceived weaknesses let their support network down, and this might lead to them failing to share when times
4 are tough. Conversely, students coming from traumatic or abusive backgrounds might already arrive at medical
5 school with emotional scars that can impact their psychosocial wellbeing.³⁸ Current literature also highlights the
6 importance of stressors regarding students building new relationships at university.⁸ This suggests that students
7 may experience an additional burden if they are trying to manage new friendships alongside existing
8 relationships. However, it can also be said that, as well as relationships contributing to stress, the outcome of
9 stress can also result in strained relationships - most probably due to students neglecting their social circle and
10 spending more time studying.²² Besides relationships with family and friends contributing to stress, this review
11 also highlighted that clinical relationships with the medical team and peers also contributes to a level of stress.³³
12 Medical schools may be able to relieve some of this pressure through better signposting of emotional and
13 psychological support (and the removal of any stigma for accessing such support). Medical schools could also
14 work to ensure that all teaching staff are aware of the possibility that there will be students in their classroom
15 who are feeling under pressure.

16 17 *Limitations*

18 All the papers used were also systematic reviews and were, in turn, dependent on the papers they drew from.
19 Across the eight studies, there was no standardised critical appraisal of literature; therefore, what was deemed
20 significant may have varied slightly across all the selected reviews. There are limitations is only selecting
21 systematic reviews as each of these will have screened out papers in line with their exclusion criteria; therefore,
22 some papers may exist that are not part of the original reviews and, as such, not part of this one. This is likely
23 to be a minor concern as excluded papers are excluded for specific reasons; however, it might be a small
24 limitation. Another possible bias might be potential publication bias. Journals select articles based on their own
25 aims and scope; therefore, there may be unpublished findings that may have been relevant if we had had access
26 to them. The analysis of the eight studies used a holistic approach to assess the central themes rather than a
27 statistical analysis, a process that may have allowed for some researcher bias. The screening process
28 undertaken was enhanced through inter-rater checking but both researchers may be subject to some biases of
29 interpretation; however, this approach was typical of many systematic reviews and was like that used in five of
30 the selected studies.^{32-33,35,37-39} Some of these possible biases were countered through ongoing reflexive
31 discussion. In this way, the assurance of quality comes from the rigor of the review, rather than from quantitative
32 measures.

33 34 *Conclusion*

35 The data gathered from this narrative qualitative systematic review of systematic reviews is important for the
36 current and future wellbeing of medical students. Being able to identify and address the causes of stress means
37 that medical students and medical schools can work to improve outcomes. It is recommended that medical
38 schools and stakeholders such as the General Medical Council work to create guidelines to ensure the
39 protection of the physical and mental wellbeing of medical students. Factors contributing to stress in medical
40 students include academic pressure, the institution, social relationships, financial stress, and the personality
41 traits of students. The impact of these factors includes economic and social hardship, emotional insecurity, and

1 difficulties identifying effective study techniques and resources. Such circumstances corrode social and familial
2 bonds and are likely to be exacerbated if medical schools do not intervene. The academic outcomes of stress
3 include poor academic outputs, burnout, depression, anxiety, low self-esteem, self-doubt, and a reduction in
4 empathy - all of which can influence the likelihood of a successful educational outcome. Although there were
5 only a few studies found that were based in the UK, the breadth of existing literature suggests that this is an
6 experience shared by medical students across the globe.

7
8 This review identified eight studies that drew on over 309 separate research projects and involved over 500,000
9 participants, as such there is clear evidence of the factors causing stress in medical students and their impact
10 on academic outcomes. From this analysis, five themes were identified: academic pressure, the impact of the
11 institution, students' personality traits, social relationships, and financial stress. The results of this review support
12 core messages in the extant literature and align with the idea that the impact of stress is exacerbated for medical
13 students as they face particular challenges.^{19-20,32,36,38} While previous studies have identified that starting
14 medical school is a particularly stressful time,⁹⁻¹¹ this review was able to identify that the environment has a
15 continued effect on stress levels.³⁴⁻³⁶ Previous research also identified that stress can lead to poor academic
16 outcomes – creating a cycle of stress and poor performance.²² This study was able to identify that this cycle
17 can be broken if students are able to develop specific coping strategies.³³⁻³⁶ As well as supporting previous
18 research, the findings of this systematic review add further emphasis in relation to the impact that wider learning
19 support networks can have on the stress and academic outcomes of medical students.

20
21 The task for stakeholders is to develop methodologies to address these factors. Having identified five themes it
22 is recommended that future studies explore ways in which each of these themes can be addressed. It is also
23 recommended that medical schools start by examining their medical curriculum to identify areas where they feel
24 they put undue academic pressure on their students and work on ways to remediate this. It is recommended
25 that future interventions take a person-centred, qualitative approach to gain specific insight into the lived
26 experiences of medical students. In doing so, future research may wish to consider the following list of research
27 questions:

- 28
29 - How can transition points, such as moving into clinical years or progressing through the various years
30 of study, be reworked so as to alleviate undue stress?³²⁻³⁴
31 - What personal and curricular measures to alleviate stress can be drawn from medical students?³⁵
32 - How can medical schools enhance students' tolerance to ambiguity?³⁶
33 - How can medical schools alleviate moral distress among medical students?³⁷⁻³⁹
34

1 **SUMMARY - The Factors Causing Stress in Medical Students and their Impact on Academic Outcomes**

2 This study investigated the causes of stress in medical students and the impact of stress on academic outcomes.
3 In highlighting the core drivers of stress, this study sought to identify what is already known in the extant
4 literature. Taking a meta-level approach, a systematic review of systematic reviews was undertaken, following
5 the PRISMA guidelines. This systematic review explored the causes of stress amongst students studying at
6 medical schools in the United Kingdom. Findings were then assessed for commonly emerging themes. From
7 an initial tranche of 3394 articles, a final total of eight systematic reviews were identified and included as part of
8 this review. The eight studies drew on over 309 separate research projects and involved over 500,000
9 participants. The breadth of existing data suggests that this is an experience shared by medical students across
10 the globe. Some key drivers of stress were found to include academic pressure, the institution, social
11 relationships, financial stress, and the personality traits of students. The academic outcomes of stress include
12 poor academic performance, burnout, depression, anxiety, low self-esteem, self-doubt, and a reduction in
13 empathy - all of which can influence the likelihood of a successful educational outcome. In identifying some of
14 the core causes of stress, it is suggested that medical schools and other stakeholders will have specific areas
15 of focus when it comes to curricular development and study support. The findings suggest a need to reduce
16 stress for medical students to prevent a decline in their academic outcomes and health.

17
18 The data gathered from this narrative qualitative systematic review of systematic reviews is important for the
19 current and future wellbeing of medical students. Being able to identify and address the causes of stress means
20 that medical students and medical schools can work to enhance the student learning experience. Most
21 importantly it means that medical schools and stakeholders can work to create guidelines to ensure the
22 protection of the physical and mental wellbeing of medical students. From this analysis, five themes were
23 identified: academic pressure, the impact of the institution, students' personality traits, social relationships, and
24 financial stress. The task for stakeholders is to develop methodologies to address these factors.

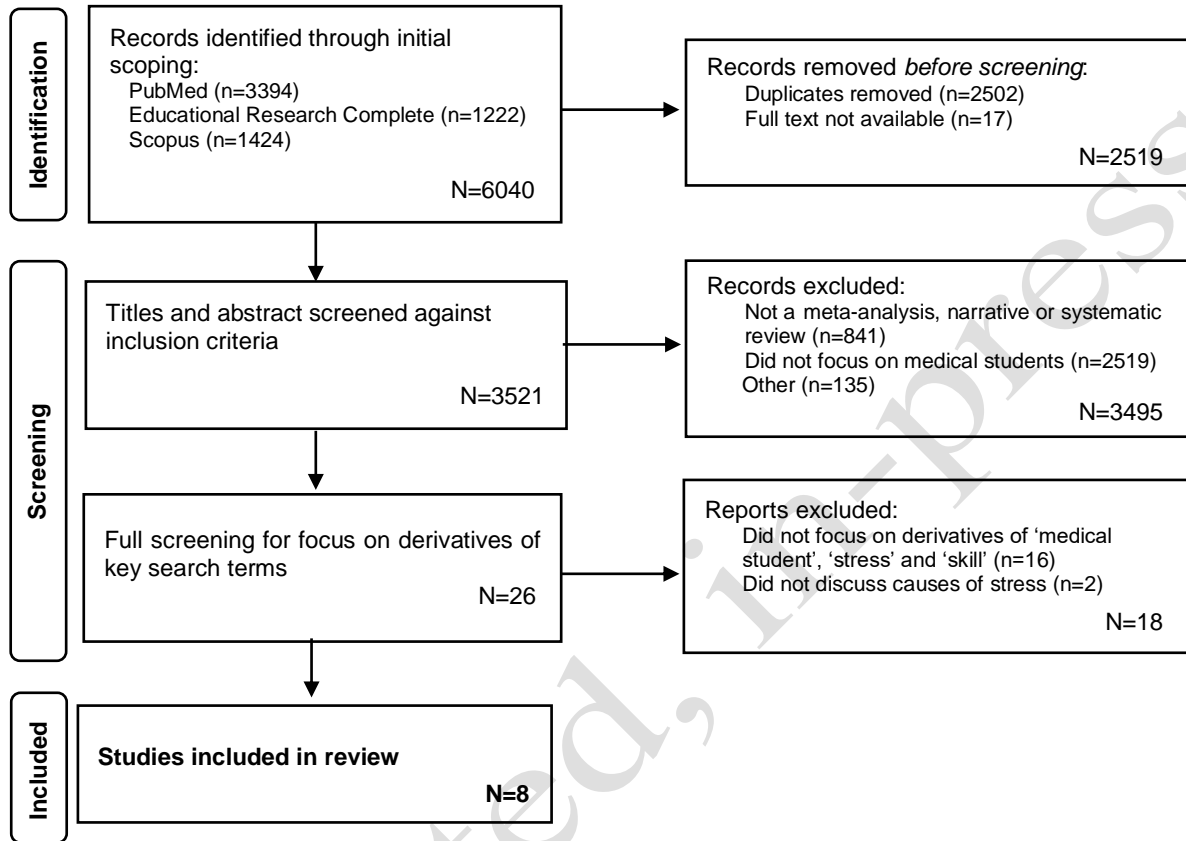
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4 [g](https://www.who.int/news-room/questions-and-answers/item/stress#:~:text=Stress%20can%20be%20defined%20as,to%20your%20overall%20well%20bein); updated [21 February 2023]; cited [28 July 2023].
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1 **FIGURES AND TABLES.**

2
3 **Figure 1. A PRISMA Diagram Illustrating the Identification and Screening Process of this Systematic**
4 **Review**



1 **Table 1.** Illustrating the Combination of Search Terms used in PubMed

Databases Searched	PubMed, Education Research Complete, and Scopus		PubMed, Education Research Complete, and Scopus		PubMed, Education Research Complete, and Scopus
Search Terms	Medical Student* OR Medical School* OR Undergraduate Education	AND	Stress* OR Burnout OR Lassitude OR Distress*	AND	Skill* OR Academic success* OR Knowledge OR Understanding

2

Accepted, in-progress

1 **Table 2. Illustrating the Key Findings from the Eight Studies**

Authors	Year	Title	Study Type	n	Key findings
Atherley et al. ³²	2019	Beyond the struggles: A scoping review on the transition to undergraduate clinical training	Scoping review	45	In the transition to clinical years of medical school the causes of stress are the gap between pre-clinical and clinical training; learning to fit in, developing personal and clinical relationships, and developing reflective strategies.
Gaston-Hawkins et al. ³³	2020	The Silent Epidemic: Causes and Consequences of Medical Learner Burnout. Current psychiatry report	Narrative/ Selective review	n/a	Burnout increases with progression through medical school. Emotional fatigue can cause stress. Extroverts less likely to exhibit stress. Spiritual students less likely to experience burnout.
Ahmady et al. ³⁴	2019	Factors related to academic failure in preclinical medical education: A systematic review	Systematic review	89	Instructional design and personal factors can contribute to stress and academic failure in pre-clinical years.
Mohmand, Montero & Solomonian ³⁵	2022	How are Medical Institutions Supporting the Well-being of Undergraduate Students? A Scoping Review	Systematic scoping review	19	Voluntary measures put in place by medical schools to promote wellbeing can reduce stress. However mandatory activities increase stress.
Hancock & Mattick ³⁶	2020	Tolerance of ambiguity and psychological well-being in medical training: A systematic review	Systematic review	11	A decreased in levels of tolerance of ambiguity or uncertainty correlates to a decrease in psychological wellbeing.
Yang et al. ³⁷	2023	Influencing factors of depressive symptoms among undergraduates: A systematic review and meta-analysis	Systematic review	73	Factors contributing to depressive symptoms were categorised as relational, psychological, occupational, sociodemographic, lifestyle and one's likely response to trauma.
Ong et al. ³⁸	2022	A systematic scoping review moral distress amongst medical students	Systematic scoping review	20	Moral distress is influenced by combined factors, including gender, religion, culture and year of study. Moral distress can lead to stress, anxiety and lack of empathy.
Pisaniello et al. ³⁹	2019	Effect of medical student debt on mental health, academic performance, and specialty choice: a systematic review	Systematic review	52	A positive correlation between student debt and stress. A negative correlation between student debt and academic performance.

2