

# Assessing Mental Health and Psychological Wellbeing in Medical Students: A Systematic Review

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## ABSTRACT

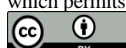
Medical students' psychological wellbeing is a growing concern. However, the methods used and outcomes measured in studies evaluating psychological wellbeing lack consistency given their wide and diverse array. This systematic review aims to characterise and comprehensively evaluate the outcomes measured and methods used in studies assessing psychological wellbeing among medical students. A consensus on the constructs and methods used in indexing psychological wellbeing can lead to more effective assessments and consequently more effective interventions aimed at promoting wellbeing in medical students. *Methods:* Multiple databases were searched, including Medline, PsycINFO, Cochrane Library, and Web of Science. Grey literature was searched through Google Scholar, and reference lists of the included studies were further searched. *Results:* Forty-five studies were included, and findings were integrated into a narrative synthesis. The results showed that various methods were used and various outcomes were measured to index medical students' mental wellbeing; outcomes tapped on stress, depression, anxiety, burnout, and minor psychiatric disorders as wellbeing indicators while commonly used measures were the General Health Questionnaire, Oldenburg Burnout Inventory, Perceived Stress Scale and Depression Anxiety Stress Scale. Self-reported measures and quantitative designs predominated, focusing on negative indicators of wellbeing. The findings of this systematic review highlighted the vast heterogeneity in outcomes measured and methods used in studies assessing psychological wellbeing in medical students. *Conclusions:* Homogeneity in the measures and outcomes used to assess wellbeing is necessary to improve the comparability and reliability of findings among studies. Future research should also use validated measures that capture both positive and negative aspects of psychological wellbeing to gain a more comprehensive understanding of the factors that can promote positive psychological wellbeing; and consequently, to inform the development of more effective interventions tailored to the mental health needs of medical students.

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## **1. Introduction**

Over the past decade, the literature on the mental health challenges faced by medical students has been rapidly expanding as the multifaceted problems experienced by medical students during their training continue to be on the rise (Bhugra et al., 2019; Dunn et al., 2008; Dyrbye et al., 2006; Fares et al., 2016; Kötter et al., 2019; Pacheco et al., 2017; Vizheh et al., 2020). Medical education is a career path intended to provide personal and professional progression opportunities within a supportive environment that fosters students' pursuit of a highly competitive career in medicine (Dyrbye & Shanafelt, 2016; Sovold et al., 2021). However, it has been alarmingly highlighted that medical students' mental health and wellbeing can be adversely affected during their program (Bhugra et al., 2019; Dyrbye & Shanafelt, 2016; Fares et al., 2016; Hope & Henderson, 2014). Crucially, acknowledging the evolving dynamics of medical education and its impact on students' mental health becomes imperative, especially in the face of global adverse events such as the COVID-19 pandemic; recent studies have highlighted a concerning trend of deteriorating mental health among medical students, calling for ongoing research and support implementation (Gold, 2020; Jia et al., 2022; Mittal et al., 2021).

The poor mental health levels associated with studying for a medical degree have been reported worldwide (Belayachi et al., 2016; Dyrbye et al., 2006; Moffat et al., 2004; Tan et al., 2023; Thiemann et al., 2020; Vizheh et al., 2020; Yusoff et al., 2010b). While a pre-diagnosis of psychopathological issues has been markedly linked with high levels of stress in medical students (Dunn et al., 2008; Farrell, Molodynski, et al., 2019; Goebert et al., 2009), several academic as well as personal factors have been also reported to contribute to psychological wellbeing and mental health problems (Chau et al., 2019; Dunn et al., 2008; Dyrbye et al., 2006; Fares et al., 2016) ranging from the academic pressures imposed by the rigorous course curriculum and structure (Dunn et al., 2008; Farrell, Molodynski, et al., 2019; Goebert et al., 2009) to financial and other personal problems such as relationship issues (Bergmann et al., 2019; Cohen et al., 2013; Ramadianto et al., 2022). Commonly reported factors causing high levels of stress in medical students have also included relationship difficulties with senior academics as well as exposure to too little or excessive responsibility and potential embarrassment during placements (Quince et al., 2012; Slavin, 2018). While maladaptive perfectionism tendencies and impostor phenomenon symptoms have also been recognised as problematic attitudes in medical students, specific personality traits, such as neuroticism, have been associated with maladaptive coping strategies that might be contributing to high levels of mental distress too (Afshar et al., 2015; Mohamed et al., 2022; Sivailango et al., 2020).

As emphasised in a recent General Medical Council report (GMC, 2013), it is highly important for UK medical schools to ensure access to appropriate academic as well as welfare support for medical students in order to actively and proactively promote their wellbeing. Enhancing students' wellbeing is fundamental to their current mental health state and academic performance. It is also critical for their future mental health and competence as doctors, as well as for the quality of patient care provision and the overall public healthcare system (West & Coia, 2019). However, the lack of consensus on defining psychological wellbeing is a challenge that has been acknowledged (Dodd et al., 2021; Macleod & Moore, 2000) with several different concepts having been applied to measure aspects pertinent to the construct of psychological wellbeing.

Additionally, the majority of studies with medical students have looked primarily at how their mental health and wellbeing levels have been adversely affected, overlooking any positive indicators of wellbeing present in medical students' lives. A limited number of studies have indicated that aspects such as self-efficacy and good quality of life may positively enhance

medical students' quality of life during their medical training (Angkurawaranon et al., 2016; Haider et al., 2022; Siddiqui, 2018). Psychological wellbeing intervention studies (Hu et al., 2019; Phang et al., 2016; Slavin et al., 2014) have included measures such as the Perceived Stress Scale (PSS)(Cohen et al., 1983), General Health Questionnaire (GHQ-12)(Goldberg et al., 1997) the State-Trait Anxiety Inventory (STAI)(Spielberger, 1970) to primarily assess post-intervention changes in levels of stress, anxiety and depression in medical students. Generally, though, cross-sectional and other types of studies have used different varieties of questionnaires or self-report measures to assess stress, anxiety, depression and other aspects of psychological wellbeing. Arguably, the apparent discrepancies in the use of measures or the outcomes measured may fail to depict what constitutes a robust assessment of the construct of psychological wellbeing; the different outcomes that have been assessed may not capture the full spectrum of students' mental health and psychological wellbeing consistently while in their majority they don't seem to be considering positive aspects of mental wellbeing in medical students that could be augmented through intervention-based or other curricula-based frameworks within medical education.

This review adopted the theoretical framework of The Dual Continua Model of Mental Health and Mental Illness (Keyes, 2002; Keyes, 2005; Westerhof & Keyes, 2010). Within this framework, optimal mental health is determined not just by the absence of mental illness but also by the presence of positive mental health. Aligned with the positive psychology approach (Seligman & Csikszentmihalyi, 2000) individual strengths and positive experiences, events, influences and other positive states and traits can play a pivotal role in people's optimal functioning and wellbeing. Therefore, enhancing or promoting aspects of mental health and psychological wellbeing that could positively affect the lives of medical students may be equally important as identifying and trying to reduce the impact of negative indicators of wellbeing, fostering resilience and promoting personal and professional growth.

## **1.1. Objectives**

The current systematic review aims to identify, characterise, and comprehensively consolidate and evaluate the outcomes measured and methods employed in studies focusing on the psychological wellbeing of medical student populations. In particular, the objectives of this review will be addressed by aiming to answer the following questions:

1. What outcomes have been used as negative and/or positive indicators of mental health and psychological wellbeing in studies with medical student populations?
2. What methods have these studies used in order to measure or evaluate mental health and psychological wellbeing outcomes?

## **2. Methods**

### **2.1. Inclusion and Exclusion Criteria**

This systematic review will focus on research studies published in peer-reviewed articles and relevant grey literature that primarily investigated graduate and undergraduate medical students' mental health and psychological wellbeing. Only studies published in English will be considered for inclusion. Studies that mainly focus on outcomes directly related to medical students' mental health and psychological wellbeing, such as anxiety, depression, stress, burnout and life satisfaction, will be eligible for inclusion. Other aspects can be included as long as discrete psychological wellbeing descriptions can be extracted. Both quantitative and qualitative data obtained through self-report scales or interviews respectively are applicable for

inclusion. On the other hand, exclusion criteria include studies that compare medical students with other populations without providing raw data for each sample; and studies involving non-medical students. The review protocol has been registered in the PROSPERO database with the registration number CRD42020183361.

## **2.2. Information Sources and Search Strategy**

An initial search of selected databases was conducted before the systematic searches occurred to identify keywords relevant to the systematic review question. An information specialist contributed to refining and finalising the search terms and strategies. The electronic bibliographic databases searched were: Medline, PsycINFO, Embase through the Ovid platform, and Cochrane and Web of Science. The search spanned from inception to May 2020, with subsequent updates conducted in February 2023 and January 2024. To construct the search strategy, terms were incorporated related to the population group and wellbeing outcomes, utilising a combination of index terms (Medical Subject Headings) and free-text expressions. Challenges persisted as existing literature demonstrated inconsistent measures and concepts relating to psychological wellbeing. Boolean terms and connectors were used to maximise the search result, and no restrictions or limitations at this stage were applied. Relevant grey literature through Google Scholar and reference lists of included studies were examined by the author (AH) (See Appendix 3 for a complete outline of search strategies).

## **2.3. Study Selection**

This systematic review has been reported following the Preferred Reported Items for Systematic Review and Meta-Analysis statement (Moher et al., 2015). A total of 2217 studies were identified through the literature search. Studies were screened independently by two authors (AH and AD) after removing 986 duplicates. A title and abstract of the remaining 1231 studies were screened for their relevance to be considered for potential eligibility. Of these, 1187 did not meet the inclusion criteria for review. A full text of 49 papers was examined in detail against the inclusion criteria, and reference lists were hand-searched for additional relevant papers. To further lower any probability of selection bias, two authors (AH and AD) independently reviewed the retrieved full text. Seven studies were excluded due to ineligibility, and three additional studies were included by checking the reference list of identified eligible studies, resulting in a final review that included 45 studies (see Figure 1 - PRISMA Flowchart Diagram).

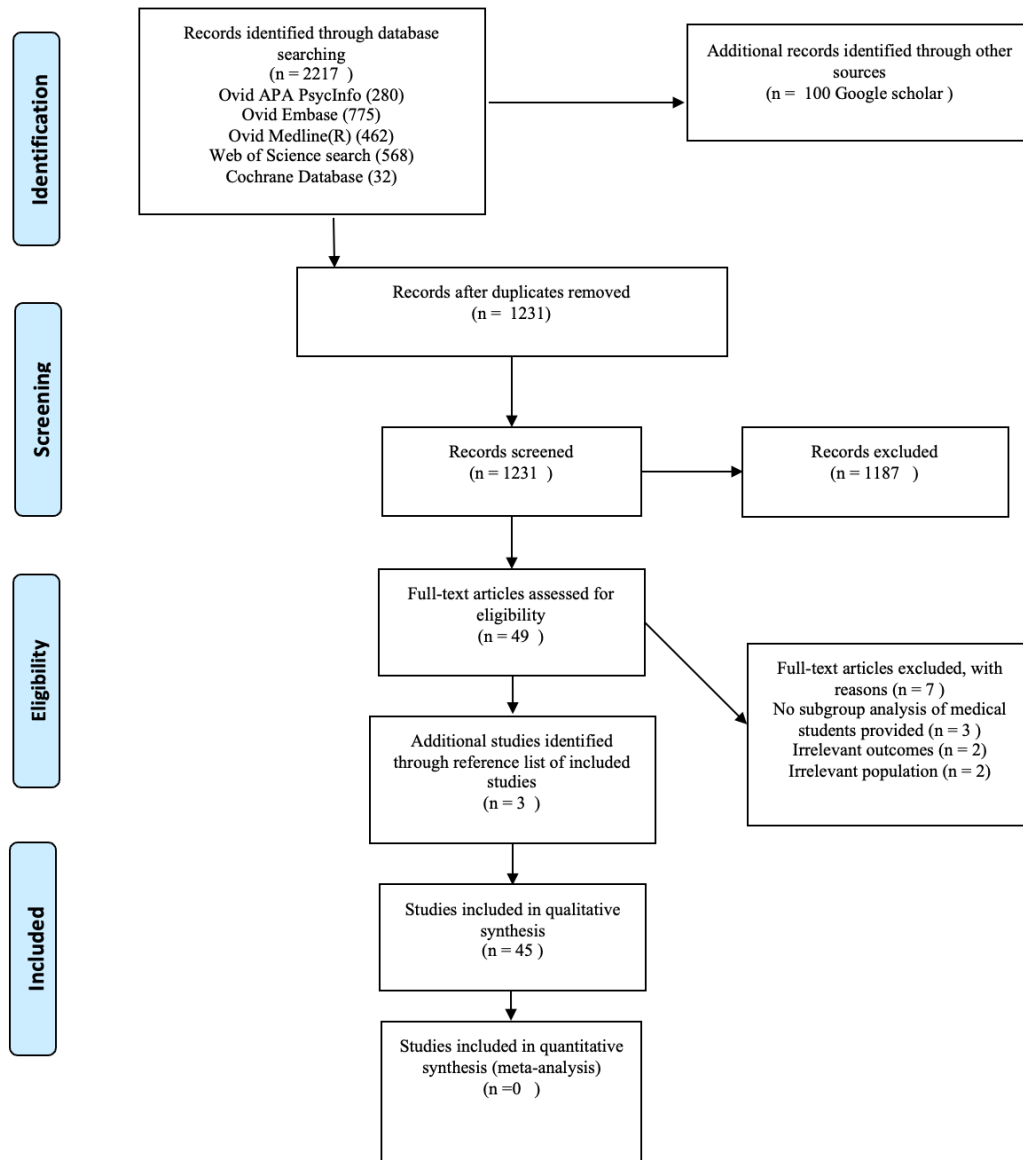


Figure 1. PRISMA Flowchart Diagram

## 2.4. Data Items

Extracted data included the authors' names, year of publication, study sites, sample, population and study design. The measures and measured outcomes of psychological wellbeing studies were further extracted by AH and AD.

## 2.5. Assessment of Methodological Quality

Two authors (AH and AD) independently rated the study qualities using the Medical Education Research Study Quality Instrument (MERSQI) (Reed et al., 2007) and The Critical Appraisal Skills Program (CASP) Qualitative Checklist (Healthcare BV, 3 May 2020). The MERSQI tool was developed to assess the methodological quality of quantitative medical education research. MERSQI rates study quality based on study design, sampling, data type, content validity, the complexity of the analysis and outcomes. Scores of 1-3 were determined in each domain and summed to calculate an overall score that ranged from 2-18. A high-ranking score of 14 or greater indicated higher methodological quality, highlighting a high-quality study (Reed et al.,

2007). The Critical Appraisal Skills Program (CASP) Qualitative Checklist (Healthcare BV, 3 May 2020) was used to assess the quality of eligible qualitative studies, which is recommended by the Cochrane Collaboration qualitative methods groups (Noyes et al., 2018). The checklist consists of 10 questions that rate the research methodology, credibility, and relevance of findings. The answers to each question can be scored as "Yes," "Can't Tell," or "No," and the total score determines the overall quality of the study. A score  $>9/10$  "Yes" answers is considered "High" quality, a score between 8-6 /10 "Yes" answers is rated as "Moderate" quality, and a score  $<5/10$  "No" answers are classified as "Low" quality. Discrepancies in the scoring between the two reviewers, AH & AD, were resolved by consensus or discussion with a third reviewer and co-author (EN).

### **3. Results**

Table 1 & 2 provides a detailed overview of the main characteristics of the 45 included studies. The total number of medical students included in the studies was 17,917, with the sample size reported by all the studies ranging from 20 to 4,400 participants. The studies were carried out in 21 countries worldwide, including the USA (n:7), UK (n:6), Brazil (n:6), India (3), Malaysia (n:2), Italy (n:2), Tunisia (n:1), Serbia (n:1), Portugal (n:1), Paraguay (n:1), Pakistan (n:1), Oman (n:1), New Zealand (n:1), Morocco (n:1), Saudi Arabia (n:2), Jordan (n:1), Ireland (n:1), Indonesia (n:1), Hong Kong (n:1), China (n:2), Canada (n:1) and Australia (n:1). Most of the studies reported the gender of participants (Castaldelli-Maia et al., 2019; Chau et al., 2019; Chew-Graham et al., 2003; Farrell, Kadhum, et al., 2019; Farrell, Kar, et al., 2019; Farrell, Moir, et al., 2019; Farrell, Molodynski, et al., 2019; Ghali et al., 2022; Machado et al., 2019; Malpass et al., 2019; Masri et al., 2019; Mirilovic et al., 2022; Rich et al., 2023; Saleem & Saleem, 2017; Srivastava et al., 2007; Torales et al., 2019; Wilkes et al., 2019; Winter et al., 2017), and these studies consistently showed a higher proportion of female participants.

Most studies surveyed students in both pre-clinical and clinical years (Byrnes et al., 2020; Christophers et al., 2021; Farrell, Kadhum, et al., 2019; Farrell, Kar, et al., 2019; Farrell, Moir, et al., 2019; Farrell, Molodynski, et al., 2019; Ghali et al., 2022; Malpass et al., 2019; Mirilovic et al., 2022; Saleem & Saleem, 2017; Srivastava et al., 2007; Torales et al., 2019; Wilkes et al., 2019; Winter et al., 2017; Zhang et al., 2021), while a few focused exclusively on medical students in pre-clinical year (Bloodgood et al., 2009; Damião Neto et al., 2020; Fino et al., 2021; Hu et al., 2019; Lattie et al., 2019; Reed et al., 2011; Yusoff, 2011) or clinical year (Almaqbal, 2019; Chew-Graham et al., 2003; Machado et al., 2019; Phang et al., 2016). All studies were published in peer-reviewed journals in English (see Tables 1 & 2).

Table 1.

*Systematic Review-Characteristics of Included Studies*

<b>Study</b>	<b>Country</b>	<b>Sample size</b>	<b>Study design</b>	<b>Measure of psychological wellbeing</b>	<b>Indicators of psychological wellbeing or outcomes measured</b>	<b>Significant wellbeing findings</b>	<b>EA</b>	<b>MERSQI Score</b>
(Almaqbal i, 2019)	Oman	189	CS	MSWBI (Liselotte N Dyrbye et al., 2010)	Psychological distress, i.e. burnout, depression, fatigue, stress, mental quality of life	Medical students scored very high in all distress domains, except for fatigue, scoring 29.5 %. Medical students reported the highest scores in mental quality of life 79.9%	Yes	8
(Almeida et al., 2019)	Portugal	622	CS	GHQ-12 (Goldberg et al., 1997) OLBI (Demerouti & Bakker, 2008)	Minor psychiatric disorder, Burnout	(15%) of medical students have been diagnosed with a mental health condition during medical school (91%) of them scored positive on the GHQ-12; (81%) of medical students were classified as disengaged and (89%) as suffering from exhaustion on OBI	No	8
(Bloodgood et al., 2009)	USA	141	Intervention	Dupuy General wellbeing schedule (Dupuy, 1984)	Anxiety, depression, positive wellbeing, self-control, vitality, and general health	The implementation of a pass/fail grading system led to a noticeable improvement in the wellbeing of medical students during the initial three semesters of their program	Yes	8.5
(Castaldelli-Maia et al., 2019)	Brazil	129	CS	GHQ-12 (Goldberg et al., 1997) OLBI (Demerouti & Bakker, 2008)	Minor psychiatric disorder, Psychological, distress, Burnout	(19%) of medical students had been diagnosed with mental health disorders before starting medical school, whereas (16%) reported a diagnosis of a mental health disorder during the medical course. (72.9%) of medical students experienced a high level of psychological distress, according to GHQ-12. (82%) of medical students classified as disengaged and (88%) as suffering from exhaustion on the Oldenburg Burnout Inventory	No	7

Study	Country	Sample size	Study design	Measure of psychological wellbeing	Indicators of psychological wellbeing or outcomes measured	Significant wellbeing findings	EA	MERSQI Score
(Chau et al., 2019)	Hong Kong	123	CS	GHQ-12 (Goldberg et al., 1997) OLBI (Demerouti & Bakker, 2008)	Minor psychiatric disorder, Psychological, distress, Burnout	87% of medical students specified as cases on the GHQ-12 questionnaire Female students reported significantly higher GHQ-12 scores compared to male students 95% screen positive on the burnout scale in both disengagement and exhaustion 98% of respondents reported that medical studies were the primary source of stress	No	7
(Chootong et al., 2022)	Thailand	325	CS	PHQ-9 (Kroenke et al., 2001) GAD-7 (Spitzer et al., 2006)	Depression Anxiety	Findings showed that a considerable number of medical students experience moderate to severe levels of anxiety and depression, with 12.9% and 31% respectively	Yes	6
(Christophers et al., 2021)	USA	1139	CS	PHQ-8 (Kroenke et al., 2009) GAD-7 (Spitzer et al., 2006)	Depression and anxiety	Most respondents (61%) reported experiencing depressive symptoms, with 24% meeting criteria for major depression. Similarly, 58% reported symptoms of anxiety, with 20% meeting the criteria for an anxiety disorder	Yes	6
(Dyrbye et al., 2012)	USA	4,400	CS	MHC-SF (Keyes, 2009)	Anguishing, moderate and flourishing	Findings indicated that 1.409 (53.1%) were considered to be flourishing, 1.128(42.5%) were moderately mentally healthy and 114(4.3%) were experiencing a state of languishing	Yes	8.5
(Damiano et al., 2021)	Brazil	431	CS	DASS-21 (Henry & Crawford, 2005)	Depression, anxiety, stress	The results showed that stress was the most severe psychological symptom experienced by medical students (M = 8.43, SD = 5.04), followed by depression (M = 4.89, SD = 4.35) and anxiety (M = 3.98, SD = 4.12. Additionally, female students reported more anxiety and stress than their male counterparts. Conversely, higher family income was associated with less depression in medical students	Yes	7



Study	Country	Sample size	Study design	Measure of psychological wellbeing	Indicators of psychological wellbeing or outcomes measured	Significant wellbeing findings	EA	MERSQI Score
(Damião Neto et al., 2020)	Brazil	141	Intervention	DASS-21 (Henry & Crawford, 2005)	Depression, anxiety, Stress	Findings showed a link between the level of mindfulness and overall quality of life, levels of anxiety, stress, and depression	Yes	11
(Farrell, Kadhum, et al., 2019)	England	84	CS	GHQ-12 (Goldberg et al., 1997) OLBI (Demerouti & Bakker, 2008)	Minor psychiatric disorder, psychological, distress burnout	(29%) of students reported having mental health diagnoses whilst at medical school compared to (17%) who reported being diagnosed with mental illness before medical school. (77%) A high percentage of medical students scored as cases on the GHQ-12 (82%) of medical students classified as disengaged and (85%) for the exhaustion component on the Oldenburg Burnout Inventory	No	7
(Farrell, Kadhum, et al., 2019)	Wales	266	CS	GHQ-12 (Goldberg et al., 1997) OLBI (Demerouti & Bakker, 2008)	Minor psychiatric disorder, Burnout	(15%) has been diagnosed with a mental health condition during medical school, whereas (21%) reported going to a GP for their mental health (89%) of medical students, scored as cases on the GHQ-12 (84%) and (87%) of medical students suffering from disengagement and exhaustion on the Oldenburg Burnout Inventory	No	7
(Farrell, Kar, et al., 2019)	India	597	CS	GHQ-12 (Goldberg et al., 1997) OLBI (Demerouti & Bakker, 2008)	Minor psychiatric disorder, Psychological, distress Burnout	(11%) had been diagnosed with mental health disorder before starting medical school, whereas (6%) reported that they were currently seeing a GP or Allied Healthcare Professional (AHP) for their mental ill-health, and 7% of students were given diagnoses. (62%) of medical students scored as cases on the GHQ-12. (88%) of medical students classified as disengaged and (81%) as suffering from exhaustion on the Oldenburg Burnout Inventory	No	8

Study	Country	Sample size	Study design	Measure of psychological wellbeing	Indicators of psychological wellbeing or outcomes measured	Significant wellbeing findings	EA	MERSQI Score
(Farrell, Moir, et al., 2019)	New Zealand	220	CS	GHQ-12 (Goldberg et al., 1997) OLBI (Demerouti & Bakker, 2008)	Minor psychiatric disorder, Burnout	(13%) had been diagnosed with mental health disorder prior to medical school, whereas (21%) stated they were currently seeing a GP or Allied Healthcare Professional (AHP) for their mental health (53%) of medical students scored as cases on the GHQ-12 (68%) of medical students classified as disengaged and (77%) suffer from exhaustion on the Oldenburg Burnout Inventory	No	7.5
(Fino et al., 2021)	Italy	349	Intervention	STAI (Spielberger, 1970) PSS (Cohen et al., 1983)	Anxiety Stress	The study found moderate to high levels of stress and physical symptoms among medical students throughout the trimester, and poor sleep quality in nearly half of the participants. The results suggest that incorporating mindfulness techniques can help reduce the negative effects of anxiety on student wellbeing during high-pressure periods and when self-regulation is most important	Yes	8.5
(Ghali et al., 2022)	Tunisia	147	CS	GHQ-12 (Goldberg et al., 1997)	Psychiatric disorder	Out of 147 students surveyed, 68% had a score that indicated positive results on the GHQ-12 questionnaire	Yes	7
(Hu et al., 2019)	USA	169	CS	CES-D (Rankin et al., 1993) STAI (Spielberger, 1970)	Depression, anxiety	Out of the total number of students surveyed, 23.7% reported experiencing moderate to severe symptoms of anxiety, while 9.5% reported moderate to severe symptoms of depression	Yes	6
(Kulsoom & Afsar, 2015)	KSA	575	CS	DASS (Henry & Crawford, 2005)	Depression Anxiety Stress	Out of the students surveyed, 43% reported depression, 63% reported anxiety, and 41% reporting stress	Yes	7.5

Study	Country	Sample size	Study design	Measure of psychological wellbeing	Indicators of psychological wellbeing or outcomes measured	Significant wellbeing findings	EA	MERSQI Score
(Lane et al., 2020)	Ireland	161	Mixed method	PSS (Cohen et al., 1983) SSS (Lane et al., 2020)	Stress	Of the students surveyed, 65.2% reported scores above the accepted norms on the Perceived Stress Scale, with 34.8% reporting low-stress levels, 55.9% moderate, and 9.3% reporting high stress levels	Yes	7.5
(Liu et al., 2020)	China	217	CS	PHQ-9 (Kroenke et al., 2001) GAD-7 (Spitzer et al., 2006)	Anxiety Depression	Out of the students surveyed, the prevalence of depression was 35.5%, and the prevalence of anxiety was 22.1%. The majority of the students who were in a depressed or anxiety state were mild or moderate	Yes	7
(Lattie et al., 2019)	USA	53	Intervention	MSWBI (Liselotte N Dyrbye et al., 2010) PSS (Cohen et al., 1983) PHQ-8 (Kroenke et al., 2009) GAD-7 (Spitzer et al., 2006)	Anxiety Stress Depression	At the onset of the study, the majority of students exhibited minimal symptoms of depression and anxiety, as reflected in their GAD-7M (1.4) and PHQ-8M (1.1) scores. Nonetheless, a considerable number of students reported high levels of stress	No	7
(Lemtiri Chelieh et al., 2019)	Morocco	637	CS	GHQ-12 (Goldberg et al., 1997) OLBI (Demerouti & Bakker, 2008)	Minor psychiatric disorder, Burnout	47% of medical students scored as cases on the GHQ-12. Medical students reported a high level of burnout (93%), disengagement (68%) exhaustion on the Oldenburg Burnout Inventory (OLBI). 90% of students reported medical studies as the main source of stress	No	7

Study	Country	Sample size	Study design	Measure of psychological wellbeing	Indicators of psychological wellbeing or outcomes measured	Significant wellbeing findings	EA	MERSQI Score
(Masri et al., 2019)	Jordan	479	CS	GHQ-12 (Goldberg et al., 1997) OLBI (Demerouti & Bakker, 2008)	Minor psychiatric disorder, Psychological, distress Burnout	(2%) had been diagnosed with mental illness prior to medical school compared to (11%) of medical students who had been diagnosed with a mental health condition during medical school. (92%) of medical students had a minor psychiatric disorder, according to GHQ-12. A high level of burnout has been reported by undergraduate medical students; 91% and 78% reported, respectively, exhaustion and disengagement	Yes	8
(Meo et al., 2020)	Saudi Arabia	530	CS	Newly generated questionnaire	Stress	Medical students experienced elevated levels of stress, depression, and emotional detachment, leading to changes in their learning behaviours	Yes	7
(Machado et al., 2019)	Brazil	69	Intervention	SWLS (Diener et al., 1985) PANAS (Watson et al., 1988) SRQ-20 (Santos et al., 2010)	Life satisfaction gratitude, appreciation, optimism, resilience, virtues; mood, anxiety, somatization disorders	Results showed that medical students reported improvement in overall life satisfaction, an increase in positive emotions, and a decrease in psychiatric symptoms	Yes	8.5
(Mirilovic et al., 2022)	Serbia	580	CS	DASS-21 (Henry & Crawford, 2005)	Depression, anxiety, stress	Approximately 64.5% of students aged 21 to 30 reported experiencing severe depressive symptoms, 66.8% reported experiencing a severe degree of anxiety, and 66.7% reported experiencing a severe degree of stress	Yes	7
Perissotto et al., 2021	Brazil	347	CS	(HADS) (Zigmond & Snaith, 1983)	Depression Anxiety	The study found high levels of mental burden, especially in first-year medical students, with depression and anxiety being some of the most commonly reported mental health issues	Yes	7

Study	Country	Sample size	Study design	Measure of psychological wellbeing	Indicators of psychological wellbeing or outcomes measured	Significant wellbeing findings	EA	MERSQI Score
(Phang et al., 2016)	Malaysia	135	Intervention	PSS (Cohen et al., 1983) GHQ (Goldberg et al., 1997)	Stress psychiatric disorder	A marked improvement was observed in all outcome measures (stress, psychological distress) one week after the intervention was implemented	Yes	9.5
(Pranita et al., 2013)	India	134	CS	WHO-Five Well-being Index Questionnaire (Bech, 2004)	Subjective quality of life (positive mood, vitality and interest in things)	Medical students have reported poor wellbeing (17%) according to the WHO grading system	Yes	7
(Ramadianto et al., 2022)	Indonesia	532	CS	DASS (Henry & Crawford, 2005)	Depression, anxiety, stress	Approximately 22.2% of the group reported experiencing symptoms of depression and nearly half (48.1%) reported experiencing symptoms of anxiety. Additionally, 3% of the group reported experiencing extremely severe depression and 8.1% reported experiencing extremely severe anxiety	Yes	8
(Reed et al., 2011)	USA	2,056	CS	PSS (Cohen et al., 1983) Maslach Burnout Inventory (Paradise, 1983) SF-8 (Ware et al., 2001)	Stress, burnout, and quality of life	A large portion of the surveyed medical students, 45.6%, reported experiencing burnout. These students also reported high levels of stress, with an average score of 17.0 out of 40. The overall quality of life for these students, as measured by the SF-8, was lower than that of the general population. Additionally, 10% of the students surveyed reported considering dropping out of medical school in the past year	Yes	8.5

Study	Country	Sample size	Study design	Measure of psychological wellbeing	Indicators of psychological wellbeing or outcomes measured	Significant wellbeing findings	EA	MERSQI Score
(Saleem & Saleem, 2017)	Pakistan	120	CS	Ryff's Psychological Well-Being Scale (Li, 2014)	Psychological wellbeing, including autonomy, environmental mastery, self-acceptance, personal growth, positive relations with others, and purpose in life	Religiosity positively predicts psychological wellbeing	Yes	7
Sartorao Filho Carlos et al., 2020	Brazil	340	CS	PHQ-9 (Kroenke et al., 2001) GAD-7 (Spitzer et al., 2006)	Depression Anxiety	46.17% of students had symptoms of moderate or severe anxiety, while 64.41% had symptoms of moderate or severe depression	Yes	7
(Srivastava et al., 2007)	India	105	longitudinal	IPAT (Krug & Laughlin, 1984)	Anxiety and depression	Students reported an average level of anxiety and depression. (86.7%) of medical students scored lower than the cut-off in the anxiety scale, and there is no significant difference in anxiety over the period of time	No	7
(Slavin et al., 2014)	USA	178	Intervention	STAI (Spielberger, 1970) PSS (Cohen et al., 1983) CESD (Radloff, 1977)	Anxiety Stress Depression	Students in their first year reported a considerable reduction in symptoms related to moderate to severe depression, anxiety, and stress. Additionally, they reported an improvement in community cohesion when compared to the pre-change classes	Yes	7.5

Study	Country	Sample size	Study design	Measure of psychological wellbeing	Indicators of psychological wellbeing or outcomes measured	Significant wellbeing findings	EA	MERSQI Score
(Torales et al., 2019)	Paraguay	180	CS	GHQ-12 (Goldberg et al., 1997) OLBI (Demerouti & Bakker, 2008)	Minor psychiatric disorder, Psychological distress, Burnout	(4%) diagnosed with mental health disorder before starting medical school, and 21 sought professional help. (95%) of students scores positive on the GHQ-12 (61%) of students classified as detachments and (99%) as suffering from exhaustion on the OLBI	No	7
(Volpe et al., 2019)	Italy	360	CS	GHQ-12( Goldberg et al., 1997) OLBI (Demerouti & Bakker, 2008)	Minor psychiatric disorder, Burnout	(4.17%) of medical students had a prior mental health diagnosis, compared to (8.6%) during medical school. (74%) scored positive on the GHQ-12, while (79%) were disengaged and (84%) suffered exhaustion on the Oldenburg Burnout Inventory	Yes	7.5
(Wilkes et al., 2019)	Canada	69	CS	GHQ-12 (Goldberg et al., 1997) (OLBI) (Demerouti & Bakker, 2008)	Minor psychiatric disorder, Psychological, distress Burnout	(26%) diagnosed with mental health disorder during medical school, (36%) currently seeking professional help. (75%) meet GHQ-12 criteria. (70%) meet exhaustion, (64%) disengagement criteria on the Oldenburg Burnout Inventory. (83%) cite medical studies as main stress source	No	7
(Yusoff, 2011b)	Malaysia	260	CS	GHQ-12 (Goldberg et al., 1997) MSSQ (Yusoff et al., 2010a)	Stress level and stressors of medical students	The results indicated a significant increase in medical students experiencing distress during the summative examination. Specifically, the percentage of distressed students rose from an initial value of 26.29% to 58.59%, representing a substantial increase	Yes	8
(Zhang et al., 2021)	China	142	CS	PHQ-9( Kroenke et al., 2001) GAD7 (Spitzer et al., 2006)	Depression Anxiety	The study found that many students felt anxious (30.28%) and most of them showed signs of being depressed (40.85%)	No	7

Abbreviations: GHQ-12, General Health Questionnaire; OLBI, Oldenburg Burnout Inventory; IPAT, Institute for Personality and Ability Testing anxiety and depression scale; MSWBI, Medical Student Well-Being Index; PSS, Perceived Stress Scale; Program; DASS-21, Depression Anxiety Stress Scale – 21; GAD-7, Generalized Anxiety Disorder; MSWBI, The Medical Student Well-Being Index; PHQ-8; Patient Health Questionnaire-8; PHQ-9, Patient Health Questionnaire; STAI, State-Trait Anxiety Inventory; SWLST, The satisfaction with life scale; PANAS, Positive and Negative Affects Schedule; IPAT, Institute for Personality and Ability Testing anxiety and depression scale; SSS, Subjective Stress Scale; CES-D, Centre for Epidemiologic Studies-Depression scale; MSSQ, Medical Student Stressor Questionnaire; SF-8, Medical Outcomes Study Short Form; MHC-SF, Mental Health Continuum Short Form; SRQ-20, Self-reporting questionnaire; MERSQ, Medical Education Research Study Quality Instrument; EA, Ethical approval.



Table 2.  
Systematic Review-Characteristics of Included Studies

Study	Country	Sample size	Study design	Measures of psychological wellbeing	Indicators of psychological wellbeing or outcomes measured	Significant wellbeing findings	EA	CASP
(Byrnes et al., 2020)	Australia	68	Qualitative	N/a	Stress	The study identified prolonged working hours, academic-life balance challenges, uncertainty in new clinical settings, and strained peer relationships as primary stressors for medical students during clinical placements	Yes	Moderate
(Chew-Graham et al., 2003)	UK	22	Qualitative	N/a	Stress	Medical students have acknowledged that studying medicine can lead to stress during their undergraduate studies	Yes	Moderate
(Lane et al., 2020)	Ireland	161	Mixed method	N/a	Stress	The study found that stress was a prominent issue among final-year medical students, with sources of stress including future career paths, academic pressures, and lack of work-life balance	Yes	High
(Malpass et al., 2019)	UK	57	Qualitative	N/a	Stress	The results indicated that by undergoing mindfulness training, students develop a more positive perspectives and greater self-awareness when it comes to their psychological wellbeing and their studies within the field of medicine	Yes	High
Rich et al., 2023	UK	20	Qualitative	N/a	Stress Anxiety	The research revealed a significant rise in stress and anxiety levels among medical students, impacting various aspects of their wellbeing	Yes	Moderate
(R. I. Winter et al., 2017)	UK	20	Qualitative	N/a	Stress	Results indicated that participants rationalised their feelings as a common response to assessment pressure, despite signs of psychological distress, with factors affecting their decision to seek help like recognition of the issue and prioritising wellbeing	Yes	Moderate

Abbreviations: CASP, Critical Appraisal Skills Program

### **3.1. Methodological Quality of Included Studies**

The quality of studies included in the review varied. The majority utilised quantitative methods, with one study employing mixed methods, and five studies utilising qualitative methods; for a detailed list of included studies, please refer to Tables 1 & 2. The overall quality of the quantitative studies was rated low according to the mean MERSQI score of 7.3, while the methodological quality of the qualitative studies was considered moderate, with a mean CASP quality score of 8. Ethical approval was mentioned in more than half of the studies included in the synthesis (see Tables 1 & 2).

### **3.2. Results of Individual Studies**

#### **3.2.1. Measurements/Indicators of Psychological Wellbeing**

The review highlighted a wide range of outcomes and measures utilised to evaluate medical students' psychological wellbeing (see Tables 1 & 2). The measured outcomes included: stress, depression, anxiety, burnout, minor psychiatric disorder, psychological distress, quality of life, autonomy, environmental mastery, self-acceptance, personal growth, positive relations with others, purpose in life, positive wellbeing, self-control, general health, somatisation disorders, life satisfaction, gratitude, appreciation, optimism, resilience, qualities and virtues, anguishing and flourishing. Stress (n:18), depression (n: 17), anxiety (n: 18), burnout (n: 14), and minor psychiatric disorders (n:12) were the most cited indicators of psychological wellbeing. The findings did not reveal any differences in the identified constructs between the pre-COVID and post-COVID periods hence indicating no noticeable effect of the COVID-19 pandemic in terms of the aspects of wellbeing that were looked at. The measures most frequently used to assess the psychological wellbeing of medical students were the General Health Questionnaire (GHQ-12)(Goldberg et al., 1997), Oldenburg Burnout Inventory (OLBI)(Demerouti & Bakker, 2008), Perceived Stress Scale (PSS)(Cohen et al., 1983) and Depression Anxiety Stress Scale – 21 (DASS-21)(Henry & Crawford, 2005). Other less frequently used tools were the Generalized Anxiety Disorder (GAD-7)(Spitzer et al., 2006), Medical Student Well-Being Index (MSWBI)(Dyrbye et al., 2010), Patient Health Questionnaire-8 (PHQ-8)(Kroenke et al., 2009), Patient Health Questionnaire (PHQ-9)(Kroenke et al., 2001), Hospital Anxiety and Depression Scale (HADS)(Zigmond & Snaith, 1983), STAI(Spielberger, 1970), The Satisfaction With Life Scale (SWLS)(Diener et al., 1985), Positive and Negative Affects Schedule (PANAS)(Watson et al., 1988), Institute for Personality and Ability Testing (IPAT) anxiety and depression scale (Krug & Laughlin, 1984), WHO-Five Well-being Index Questionnaire (Pranita et al., 2013), Dupuy General wellbeing schedule(Dupuy, 1984), Subjective Stress Scale (SSS)(Lane et al., 2020), Centre for Epidemiologic Studies-Depression scale (CES-D)(Rankin et al., 1993), Medical Student Stressor Questionnaire (MSSQ)(Yusoff et al., 2010a), Maslach Burnout Inventory(Paradise, 1983), Medical Outcomes Study Short Form (SF-8)(Ware et al., 2001), Mental Health Continuum Short Form (MHC-SF)(Keyes, 2009), Self-reporting questionnaire (SRQ-20)(Santos et al., 2010).

#### **3.2.2. Anxiety and Depression**

The findings of the review showed that 17 studies (see Tables 1 & 2) reported moderate to high rates of depression in medical students worldwide ranging from 23% (Hu et al., 2019) to 64% (Mirilovic et al., 2022), with DASS being the most commonly used tool to assess depression severity, where a cut-off of >21 was considered severe depression. However, some studies (Almaqbal, 2019; Damiano et al., 2021; Damião Neto et al., 2020; Lattie et al., 2019; Ramadanto et al., 2022) did not mention the depression score cut-off used. Similarly, anxiety

was found to be prevalent in 14 studies (see Tables 1 & 2), with moderate to high rates ranging 20% (Christophers et al., 2021)-66% (Mirilovic et al., 2022), assessed through various measures of anxiety scales. While DASS (Henry & Crawford, 2005) and GAD (Spitzer et al., 2006) were the most commonly used measurement tools, some studies (Almaqbal, 2019; Damiano et al., 2021; Damião Neto et al., 2020; Hu et al., 2019) failed to provide a cut-off score. Notably, few studies examined specific anxiety, such as the state-trait anxiety (Fino et al., 2021; Hu et al., 2019; Slavin et al., 2014) or the general anxiety disorder (Chootong et al., 2022; Christophers et al., 2021; Lattie et al., 2019; Zhang et al., 2021). Moreover, some studies did not differentiate between anxiety symptoms and a clinical diagnosis of an anxiety disorder (Bloodgood et al., 2009; Srivastava et al., 2007). Other studies (Bloodgood et al., 2009; Srivastava et al., 2007) utilised a measurement of anxiety and depression (Dupuy, 1984; Krug & Laughlin, 1984) that had not been previously used in undergraduate medical education, as stated by the authors.

### **3.2.3. Burnout**

Evidence of burnout, as assessed in several studies (Almaqbal, 2019; Almeida et al., 2019; Castaldelli-Maia et al., 2019; Chau et al., 2019; Farrell, Kadhum, et al., 2019; Farrell, Kar, et al., 2019; Farrell, Moir, et al., 2019; Lemtiri Chelieh et al., 2019; Masri et al., 2019; Reed et al., 2007; Torales et al., 2019; Volpe et al., 2019; Wilkes et al., 2019), highlights the widespread nature of this issue, with the OLB (Demerouti & Bakker, 2008) being the most frequently used measure, and the highest reported rate being 95% (Chau et al., 2019). The studies assessed two domains of burnout, exhaustion and disengagement, with cut-off scores of mean >2.1 for disengagement and mean >2.25 for exhaustion. Different measurement tools were used in the other two studies (Almaqbal, 2019; Reed et al., 2007) to assess burnout. One study (Almaqbal, 2019) used MSWBI (Dyrbye et al., 2010) as a measure of physical and psychological distress to rate levels of burnout, while the other study (Reed et al., 2007) used MBI (Paradise, 1983) to measure the emotional exhaustion and depersonalisation aspects of burnout.

### **3.2.4. Stress/Psychological Distress**

Stress and psychological distress represent crucial aspects of psychological wellbeing as identified across qualitative (Chew-Graham et al., 2003; R. I. Winter et al., 2017; Byrnes et al., 2020; Malpass et al., 2019; Rich et al., 2023;) quantitative (Almaqbal, 2019; Damiano et al., 2021; Damião Neto et al., 2020; Fino et al., 2021; Kulsoom & Afsar, 2015; Lattie et al., 2019; Meo et al., 2020; Mirilovic et al., 2022; Phang et al., 2016; Ramadanto et al., 2022; Reed et al., 2011; Slavin et al., 2014; R. I. Winter et al., 2017; Yusoff, 2011b) and one mixed-method (Lane et al., 2020) research within the included studies. Utilising the term "stress," the majority of studies reported high levels of stress among medical students, ranging from 58.59% (Yusoff, 2011) to 69% (Lane et al., 2020). The DASS (Henry & Crawford, 2005) and PSS (Cohen et al., 1983) scales were the most commonly used measures of stress. "Psychological distress" was reported in eight studies (Almaqbal, 2019; Castaldelli-Maia et al., 2019; Chau et al., 2019; Farrell, Kar et al., 2019; Masri et al., 2019; Torales et al., 2019; Wilkes et al., 2019), with one study (Almaqbal, 2019) using the MSWBI (Dyrbye et al., 2010). Notably, only the study by Almaqbal (2019) provided information on the measure used for psychological distress, employing the MSWBI (Dyrbye et al., 2010), while the remaining studies did not specify the instrument employed for this assessment. Furthermore, no clear distinction was made between stress and psychological distress in the included studies but only reported on the experience of the stressors. Notably, both quantitative and qualitative studies consistently identified academic stressors as the most commonly reported stressors among medical students (Byrnes et al., 2020; Castaldelli-Maia et al., 2019; Chew-Graham et al., 2003; Lane et al., 2020; Malpass et al., 2019; Winter et al., 2017; Yusoff, 2011). Following academic stress, stress from interpersonal

relationships emerged as another significant stressor (Castaldelli-Maia et al., 2019; Chau et al., 2019; Lemtiri Chelieh et al., 2019; Masri et al., 2019).

### **3.2.5. Minor Psychiatric Disorders**

The GHQ-12 (Goldberg et al., 1997) has been employed in several studies (Almeida et al., 2019; Castaldelli-Maia et al., 2019; Chau et al., 2019; Farrell, Kadhum, et al., 2019; Farrell, Kar, et al., 2019; Farrell, Moir, et al., 2019; Lemtiri Chelieh et al., 2019; Masri et al., 2019; Torales et al., 2019; Volpe et al., 2019; Wilkes et al., 2019) to measure minor psychiatric disorders and has shown high levels of mental health issues among medical students. The estimated prevalence of reported psychological issues ranged from 47% (Lemtiri Chelieh et al., 2019) to 95% (Torales et al., 2019). Additionally, (Machado et al., 2019) employed the SRQ-20 (Santos et al., 2010) questionnaire to specifically evaluate psychological wellbeing tapping into somatisation disorder, revealing that 32.3% of the students had scores indicating risk for the presence of common mental health disorders.

### **3.2.6. Positive Aspects of Psychological Wellbeing**

Six studies (Almaqabali, 2019; Bloodgood et al., 2009; Dyrbye et al., 2012; Machado et al., 2019; Pranita et al., 2013; Saleem & Saleem, 2017) have measured positive aspects of psychological wellbeing using six different scales (Bech, 2004; Diener et al., 1985; Dupuy, 1984; Keyes, 2009; Ryff & Keyes, 1995; Watson et al., 1988), but all have consistently indicated poor psychological wellbeing across these aspects. Pranita et al. (2013) used the WHO Five Well-being Index Questionnaire (Bech, 2004) to evaluate the positive aspects of subjective quality of life in Indian medical students, tapping on domains such as positive mood, vitality, and interest in things. Their results were consistent with those of another study (Almaqabali, 2019) that suggested a low mental quality of life in medical training, using the MSWBI (Dyrbye et al., 2010). Additional studies used various measurement tools to assess positive indicators of psychological wellbeing, including Ryff's Psychological Well-Being Scale (Ryff & Keyes, 1995), which measured autonomy, environmental mastery, self-acceptance, personal growth, positive relations with others, and purpose in life. The Dupuy General Wellbeing Schedule (Dupuy, 1984) was used to assess positive wellbeing, self-control, and general health, while the SWLS (Diener et al., 1985) measured life satisfaction. Another study (Machado et al., 2019) utilised the PANAS (Watson et al., 1988) tool to assess gratitude, appreciation, optimism, resilience, qualities, and virtues, while the MHC-SF (Keyes, 2009) was used (Dyrbye et al., 2012) to assess both flourishing and languishing.

## **3.3. The Methodological Approach Used to Index Psychological Wellbeing**

The methodology or measures used to index psychological wellbeing in medical student studies exhibited variation. Depression was looked at using the DASS (Henry & Crawford, 2005) in 5 studies, while other studies utilised five different scales, the IPAT (Krug & Laughlin, 1984), PHQ-8 (Kroenke et al., 2009) & 9 (Kroenke et al., 2001), CES-D (Rankin et al., 1993), MSWBI (Dyrbye et al., 2010), HADS (Zigmond & Snaith, 1983) and Dupuy General Wellbeing Schedule (Dupuy, 1984). Anxiety was assessed using six different scales, including the DASS (Henry & Crawford, 2005) and GAD (Spitzer et al., 2006) as well as the IPAT (Krug & Laughlin, 1984), STAI (Spielberger, 1970), SRQ-20 (Santos et al., 2010) and the Dupuy General Wellbeing Schedule (Dupuy, 1984). Burnout was rated using the OLBI (Demerouti & Bakker, 2008), Maslach Burnout Inventory (Paradise, 1983) and MSWBI (Dyrbye et al., 2010) scales, and minor psychiatric disorders were assessed using the GHQ-12 (Goldberg et al., 1997). To assess stress and psychological distress, a range of measures was used, including the PSS (Cohen et al., 1983) and DASS (Henry & Crawford, 2005). Seven scales were utilised to

evaluate positive indices of psychological wellbeing. These scales included the WHO-Five Well-being Index Questionnaire (Pranita et al., 2013), MSWBI (Dyrbye et al., 2010), Ryff's Psychological Well-Being Scale (Ryff & Keyes, 1995), Dupuy General Wellbeing Schedule (Dupuy, 1984), SWLS (Diener et al., 1985), PANAS (Watson et al., 1988), and MHC-SF (Keyes, 2009).

The majority of the studies (see Tables 1 & 2) used a cross-sectional design, while only two studies (Machado et al., 2019; Srivastava et al., 2007) used a longitudinal design. Additionally, there were a few interventional studies (Bloodgood et al., 2009; Damião Neto et al., 2020; Fino et al., 2021; Lattie et al., 2019; Machado et al., 2019; Malpass et al., 2019; Phang et al., 2016; Slavin et al., 2014), including one randomised controlled trial (RCT) (Damião Neto et al., 2020). Data were collected using self-reported online questionnaires, and convenience sampling was used in the vast majority of studies. When evaluating wellbeing, the majority of the studies used multiple scales that measure negative aspects of psychological wellbeing, while few studies (Dyrbye et al., 2012; Pranita et al., 2013; Saleem & Saleem, 2017) utilised a measure or a combination of measures that tapped into positive aspects of wellbeing (Almaqbali, 2019; Bloodgood et al., 2009; Machado et al., 2019).

#### **4. Discussion**

This systematic review examined the outcomes, outcome measures and methodological approaches used in studies to assess the psychological wellbeing of medical students. Due to the heterogeneity of the study designs and measurement approaches, it was not feasible to perform meta-analyses of the reviewed studies. Notably, the studies focused mainly on the negative indicators of psychological wellbeing, with stress, depression, anxiety, burnout, and minor psychiatric disorders being the most commonly reported. In contrast, the positive indicators of psychological wellbeing, life satisfaction, gratitude, appreciation, optimism, and resilience, were less frequently explored. The studies used a range of scales to measure negative aspects of psychological wellbeing, with the GHQ-12, OLB, PSS, and DASS-21 being the most frequently employed. Researchers primarily used self-reported measures and quantitative designs, with convenience sampling being the most common approach for participant selection.

This review has identified various outcomes used as indicators of psychological wellbeing in medical students. However, there needs to be more precision in how these outcomes are defined and measured. It is worth noting that out of all the studies reviewed, only one (Machado et al., 2019) provided a discrete definition of psychological wellbeing or mental health. The finding bears significant implications for a lack of consistency in the measurement of psychological wellbeing, making the comparison of findings across studies problematic. Further, psychological distress was indexed as a combination of burnout, depression, fatigue, stress and low mental quality of life –all of which are outcomes that have been previously found to be directly linked with poor psychological wellbeing (Almaqbali, 2019).

Moreover, the terms used to identify aspects of psychological wellbeing have varied and have been imprecise across studies, with some using different constructs interchangeably, such as minor psychiatric disorders and psychological distress, leading to confusion and overlap among constructs. In one study (Almaqbali, 2019), mental quality of life was referred to as a direct wellbeing outcome, but the actual measurement of this construct focused on depression and anxiety. This is problematic as different labels are being used to refer to constructs that are not strictly tapped upon by the tools used to measure them (Mansfield et al., 2020). Future studies can benefit from improving the clarity and precision in defining and measuring psychological wellbeing outcomes, as well as using consistent terminology across different studies (Newson

et al., 2020). This can further help improve the validity and reliability of the measures and provide a clearer overall picture of medical students' psychological wellbeing.

The methodological approaches used in studies assessing the psychological wellbeing of medical students were mixed. Around a third of the included studies showed a clear focus on measuring negative aspects of psychological wellbeing utilising multiple scales, while few studies utilised a measure or a combination of measures that tapped into positive aspects of wellbeing. This diversity in methodological emphasis raises a critical consideration: the potential oversight of the overall psychological wellbeing state of medical students when the focus is primarily placed on negative aspects per se (Diehl et al., 2011; Keyes, 2005; Westerhof & Keyes, 2010). The existing literature highlights the significance of adopting a positive psychology framework in the evaluation of global psychological wellbeing (Benoit & Gabola, 2021; Seligman, 2015; White & Eyber, 2017). Such an approach not only ensures a more holistic understanding of psychological wellbeing but also sheds light on factors contributing to resilience, personal growth, and overall positive functioning among medical students (Dyrbye et al., 2012; Van Dijk et al., 2017). Hence, embracing a positive psychology approach would help capture the complete spectrum of psychological wellbeing, thereby providing a more comprehensive perspective into the mental health of medical students (Westerhof & Keyes, 2010). In line with previous systematic reviews that have underlined the challenge of assessing wellbeing-related outcomes in the healthcare domain (Hall et al., 2016; Krishnan et al., 2022), this review also posited the necessity for more consistency in the measurement methods of psychological wellbeing used in studies with medical students; and also emphasised the importance of directing more attention towards positive as well as negative indicators of medical student psychological wellbeing.

Furthermore, in the included studies, self-reported measures were prominently employed to capture subjective experiences, often through surveys or questionnaires, reflecting a common practice in studies focusing on psychological wellbeing (Agnes Mary Khine Myint & Mohanan, 2019; Datar et al., 2017). While these measures offer direct insights into individuals' perspectives, it's crucial to acknowledge their natural subjectivity and susceptibility to biases such as social desirability and recall bias (Davis et al., 2010; Dodd et al., 2021). Alongside the use of self-reported measures, researchers frequently opted for quantitative research designs, including correlational studies and experimental designs, facilitating the statistical analysis of relationships and causal links. Convenience sampling emerged as the predominant method for participant selection, a practice that, while providing valuable insights, can introduce potential biases and may limit the generalisability of study findings to broader populations (Li et al., 2022).

While quantitative designs predominated, only a few studies utilised qualitative methods, with five employing such approaches and one adopting a mixed-methods approach. This scarcity highlighted the need to acknowledge the potential that qualitative and mixed-methods approaches can offer. Qualitative methods have the capacity to uncover nuanced aspects of psychological wellbeing from the students' perspective, providing in-depth characterisations that quantitative methods may not capture alone (Cohen et al., 2002; Rubin & Rubin, 2011). Conversely, mixed-methods approaches can integrate the strengths of both qualitative and quantitative methods, offering a comprehensive understanding of psychological wellbeing among medical students by combining rich qualitative insights with rigorous quantitative analyses (Creswell, 2015; Dawadi et al., 2021). Integrating these approaches can significantly enrich our understanding of psychological wellbeing in this context (Creswell & Creswell, 2017; Firestone, 1987; Scott et al., 2023; Wilkinson & Smith, 2003).

In light of the multitude of methodologies and outcomes used in research so far, capturing the full continuum or scope of the psychological wellbeing of medical students remains a challenge. The various questionnaires used have identified a range of wellbeing problems, some of which overlap, creating confusion about the nature of these problems and the outcomes measured. It is also unclear whether the identified problems may be indicators of clinical depression, anxiety, or general distress or measurements of transient mood or stress levels. To adequately support students' wellbeing, there is also a need for qualitative research to differentiate between reactive stress and clinical cases requiring specific intervention.

In sum, the findings are consistent across research studies in terms of denoting poor psychological wellbeing and mental health problems, particularly anxiety and depression, in the medical student population (Belayachi et al., 2016; Dyrbye et al., 2006; Moffat et al., 2004; Tan et al., 2023; Vizheh et al., 2020; Yusoff et al., 2010b).

The findings of this review complemented findings from previous reviews on the conceptualisation of wellbeing in the general student population that have identified issues with defining and measuring various domains of wellbeing (Dodd et al., 2021; Hossain et al., 2023; Hou et al., 2021). These reviews have highlighted challenges such as inconsistencies in defining wellbeing domains and selecting appropriate measures. Specifically, previous research has indicated a lack of consensus on what domains are relevant for understanding student wellbeing in general, leading to a fragmented body of work (Hossain et al., 2023). Moreover, discrepancies in the approaches used to measure wellbeing have been noted, with some studies focusing solely on subjective experiences while others incorporate broader psychological factors (Dodd et al., 2021).

Arguably, the pattern of findings that emerged from this review highlights an inconsistency in the measurement of psychological wellbeing, bringing to the fore a need to clearly index the full spectrum of medical students' psychological wellbeing within a well-defined framework of mental health and wellbeing. Identifying the factors that may positively influence medical students' psychological wellbeing is also important, as identifying positive indicators of psychological wellbeing can further inform wellbeing interventions or other tailored curricula-based programmes in medical education settings (Dyrbye et al., 2012).

## **5. Strengths, Limitations and Future Directions**

To the best of the authors' knowledge, this study is one of the first attempts to systematically review the outcomes measured and methods used to assess the psychological wellbeing of medical students. With a large sample size of 16,463 participants from various countries, the study provides a broad representation of the medical student population. However, it is important to acknowledge some limitations pertinent to this review. Due to the scope of the review and limited resources available, only studies published in English were included, potentially excluding relevant studies conducted in other languages. The search strategy may have also missed some relevant studies, although efforts were made to minimise omissions by searching multiple databases, grey literature, hand-searching reference lists and having the search conducted by a second author too. The heterogeneity of study designs and measurement approaches made it impossible to conduct meta-analyses, and all studies utilised cross-sectional data, which limited the authors' ability to infer causal relationships.

Future studies should aim to ensure a more homogenous methodological approach using a set of constructs that typically index aspects of psychological wellbeing, drawing upon well-validated measures of psychological wellbeing. Identifying well-defined outcomes pertinent to mental health and wellbeing may also have considerable research and clinical implications for

using appropriate outcome measures in interventions in order to measure their effectiveness in enhancing medical students' wellbeing.

## 6. Conclusions

This study has highlighted the need for establishing homogeneity in the measurement methods used in studies assessing psychological wellbeing in medical students and consistency in the outcomes measured to index psychological wellbeing. Addressing this need can advance our understanding of medical students' mental health problems by allowing comparisons across studies and can potentially inform the development of enhanced wellbeing support resources and interventions in educational settings.

## References

- Afshar, H., Roohafza, H. R., Keshteli, A. H., Mazaheri, M., Feizi, A., & Adibi, P. (2015). The association of personality traits and coping styles according to stress level. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences*, 20(4), 353. <https://doi.org/10.4103/1735-1995.158255>
- Agnes Mary Khine Myint, O., & Mohanan, S. A. (2019). Stress And Life Satisfaction Among Medical Students In Myanmar: The Mediating Role Of Coping Styles. *Scholar*, 11(2), 313.
- Almaqabli, M. (2019). Well-being among Medical Students in Clinical Years at a Private College in Oman: Cross Sectional Study. *EC Psychology and Psychiatry*, 8, 1129-1135.
- Almeida, T., Kadhum, M., Farrell, S. M., Ventriglio, A., & Molodynski, A. (2019). A descriptive study of mental health and wellbeing among medical students in Portugal. *International Review of Psychiatry*, 31(7-8), 574-578. <https://doi.org/10.1080/09540261.2019.1675283>
- Angkurawaranon, C., Jiraporncharoen, W., Sachdev, A., Wisetborisut, A., Jangiam, W., & Uaphanthasath, R. (2016). Predictors of quality of life of medical students and a comparison with quality of life of adult health care workers in Thailand. *Springerplus*, 5(1), 584. <https://doi.org/10.1186/s40064-016-2267-5>
- Bech, P. (2004). Measuring the dimension of psychological general well-being by the WHO-5. *Quality of life newsletter*, 15-16.
- Belayachi, J., Rkain, I., Rkain, H., Madani, N., Amlaiky, F., Zekraoui, A., Dendane, T., Abidi, K., Zeggwagh, A. A., & Abouqal, R. (2016). Burnout syndrome in Moroccan training resident: impact on quality of life. *Iranian journal of public health*, 45(2), 260.
- Benoit, V., & Gabola, P. (2021). Effects of positive psychology interventions on the well-being of young children: A systematic literature review. *International journal of environmental research and public health*, 18(22), 12065. <https://doi.org/10.3390/ijerph182212065>
- Bergmann, C., Muth, T., & Loerbroks, A. (2019). Medical students' perceptions of stress due to academic studies and its interrelationships with other domains of life: a qualitative study. *Medical education online*, 24(1), 1603526-1603526. <https://doi.org/10.1080/10872981.2019.1603526>
- Bhugra, D., Sauerteig, S.-O., Bland, D., Lloyd-Kendall, A., Wijesuriya, J., Singh, G., Kochhar, A., Molodynski, A., & Ventriglio, A. (2019). A descriptive study of mental health and wellbeing of doctors and medical students in the UK. *International review of psychiatry (Abingdon, England)*, 31(7-8), 563-568. <https://doi.org/10.1080/09540261.2019.1648621>



- Bloodgood, R. A., Short, J. G., Jackson, J. M., & Martindale, J. R. (2009). A change to pass/fail grading in the first two years at one medical school results in improved psychological well-being. *Academic medicine*, 84(5), 655-662. <https://doi.org/10.1097/ACM.0b013e31819f6d78>
- Byrnes, C., Ganapathy, V. A., Lam, M., Mogensen, L., & Hu, W. (2020). Medical student perceptions of curricular influences on their wellbeing: a qualitative study. *BMC medical education*, 20(1), 1-11. <https://doi.org/10.1186/s12909-020-02203-4>
- Castaldelli-Maia, J. M., Lewis, T., Marques dos Santos, N., Picon, F., Kadhum, M., Farrell, S. M., Molodynski, A., & Ventriglio, A. (2019). Stressors, psychological distress, and mental health problems amongst Brazilian medical students. *International Review of Psychiatry*, 31(7-8), 603-607. <https://doi.org/10.1080/09540261.2019.1669335>
- Chau, S. W., Lewis, T., Ng, R., Chen, J. Y., Farrell, S. M., Molodynski, A., & Bhugra, D. (2019). Wellbeing and mental health amongst medical students from Hong Kong. *International Review of Psychiatry*, 31(7-8), 626-629. <https://doi.org/10.1080/09540261.2019.1679976>
- Chew-Graham, C. A., Rogers, A., & Yassin, N. (2003). 'I wouldn't want it on my CV or their records': medical students' experiences of help-seeking for mental health problems. *Medical education*, 37(10), 873-880. <https://doi.org/10.1046/j.1365-2923.2003.01627.x>
- Chootong, R., Sono, S., Choomalee, K., Wiwattanaworaset, P., Phusawat, N., Wanghirankul, N., Laojaroensuk, P., Thongkhundum, P., Saetang, R., Euanontat, S., & Anantathaweekul, S. (2022). The association between physical activity and prevalence of anxiety and depression in medical students during COVID-19 pandemic: A cross-sectional study. *Annals of medicine and surgery*, 75, 103408-103408. <https://doi.org/10.1016/j.amsu.2022.103408>
- Christophers, B., Nieblas-Bedolla, E., Gordon-Elliott, J. S., Kang, Y., Holcomb, K., & Frey, M. K. (2021). Mental Health of US Medical Students During the COVID-19 Pandemic. *Journal of general internal medicine : JGIM*, 36(10), 3295-3297. <https://doi.org/10.1007/s11606-021-07059-y>
- Cohen, D., Rees, S., Palmer, P., Allen, J., Howells, S., Greene, G., & Rhydderch, M. (2013). Factors that impact on medical student wellbeing: perspectives of risks.
- Cohen, L., Manion, L., & Morrison, K. (2002). *Research methods in education*. routledge. <https://doi.org/10.4324/9780203224342>
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of health and social behavior*, 385-396. <https://doi.org/10.2307/2136404>
- Creswell, J. W. (2015). *A concise introduction to mixed methods research / John W. Creswell, University of Nebraska-Lincoln*. Los Angeles : SAGE.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- Damiano, R. F., de Oliveira, I. N., Ezequiel, O. d. S., Lucchetti, A. L., & Lucchetti, G. (2021). The root of the problem: Identifying major sources of stress in brazilian medical students and developing the medical student stress factor scale. *Revista brasileira de psiquiatria*, 43(1), 35-42. <https://doi.org/10.1590/1516-4446-2019-0824>
- Damião Neto, A., Lucchetti, A. L. G., da Silva Ezequiel, O., & Lucchetti, G. (2020). Effects of a Required Large-Group Mindfulness Meditation Course on First-Year Medical Students'

- Mental Health and Quality of Life: a Randomized Controlled Trial. *Journal of general internal medicine : JGIM*, 35(3), 672-678. <https://doi.org/10.1007/s11606-019-05284-0>
- Datar, M., Shetty, J., & Naphade, N. (2017). Stress and coping styles in postgraduate medical students: A medical college-based study. *Indian journal of social psychiatry : official publication of Indian Association for Social Psychiatry*, 33(4), 370-374. [https://doi.org/10.4103/ijsp.ijsp\\_59\\_16](https://doi.org/10.4103/ijsp.ijsp_59_16)
- Davis, C. G., Thake, J., & Vilhena, N. (2010). Social desirability biases in self-reported alcohol consumption and harms. *Addictive behaviors*, 35(4), 302-311. <https://doi.org/10.1016/j.addbeh.2009.11.001>
- Dawadi, S., Shrestha, S., & Giri, R. A. (2021). Mixed-methods research: A discussion on its types, challenges, and criticisms. *Journal of Practical Studies in Education*, 2(2), 25-36. <https://doi.org/10.46809/jpse.v2i2.20>
- Demerouti, E., & Bakker, A. B. (2008). The Oldenburg Burnout Inventory: A good alternative to measure burnout and engagement. *Handbook of stress and burnout in health care*, 65-78.
- Diehl, M., Hay, E. L., & Berg, K. M. (2011). The ratio between positive and negative affect and flourishing mental health across adulthood. *Aging & mental health*, 15(7), 882-893. <https://doi.org/10.1080/13607863.2011.569488>
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction With Life Scale. *Journal of personality assessment*, 49(1), 71-75. [https://doi.org/10.1207/s15327752jpa4901\\_13](https://doi.org/10.1207/s15327752jpa4901_13)
- Dodd, A. L., Priestley, M., Tyrrell, K., Cygan, S., Newell, C., & Byrom, N. C. (2021). University student well-being in the United Kingdom: a scoping review of its conceptualisation and measurement. *Journal of Mental Health*, 30(3), 375-387. <https://doi.org/10.1080/09638237.2021.1875419>
- Dunn, L. B., Iglewicz, A., & Moutier, C. (2008). A conceptual model of medical student well-being: promoting resilience and preventing burnout. *Academic Psychiatry*, 32(1), 44-53. <https://doi.org/10.1176/appi.ap.32.1.44>
- Dupuy, H. J. (1984). The psychological general well-being (PGWB) index. *Assessment of quality of life in clinical trials of cardiovascular therapies*, 170-183.
- Dyrbye, L., & Shanafelt, T. (2016). A narrative review on burnout experienced by medical students and residents. *Med Educ*, 50(1), 132-149. <https://doi.org/10.1111/medu.12927>
- Dyrbye, L. N., Harper, W., Moutier, C., Durning, S. J., Power, D. V., Massie, F. S., Eacker, A., Thomas, M. R., Satele, D., & Sloan, J. A. (2012). A multi-institutional study exploring the impact of positive mental health on medical students' professionalism in an era of high burnout. *Academic medicine*, 87(8), 1024-1031. <https://doi.org/10.1097/ACM.0b013e31825cfa35>
- Dyrbye, L. N., Szydlo, D. W., Downing, S. M., Sloan, J. A., & Shanafelt, T. D. (2010). Development and preliminary psychometric properties of a well-being index for medical students. *BMC medical education*, 10(1), 8. <https://doi.org/10.1186/1472-6920-10-8>
- Dyrbye, L. N., Thomas, M. R., & Shanafelt, T. D. (2006). Systematic review of depression, anxiety, and other indicators of psychological distress among US and Canadian medical students. *Academic medicine*, 81(4), 354-373. <https://doi.org/10.1097/00001888-200604000-00009>

- Fares, J., Al Tabosh, H., Saadeddin, Z., El Mouhayyar, C., & Aridi, H. (2016). Stress, Burnout and Coping Strategies in Preclinical Medical Students. *N Am J Med Sci*, 8(2), 75-81. <https://doi.org/10.4103/1947-2714.177299>
- Farrell, S. M., Kadhum, M., Lewis, T., Singh, G., Penzenstadler, L., & Molodynski, A. (2019). Wellbeing and burnout amongst medical students in England. *Int Rev Psychiatry*, 31(7-8), 579-583. <https://doi.org/10.1080/09540261.2019.1675960>
- Farrell, S. M., Kar, A., Valsraj, K., Mukherjee, S., Kunheri, B., Molodynski, A., & George, S. (2019). Wellbeing and burnout in medical students in India; a large scale survey. *International Review of Psychiatry*, 31(7-8), 555-562. <https://doi.org/10.1080/09540261.2019.1688047>
- Farrell, S. M., Moir, F., Molodynski, A., & Bhugra, D. (2019). Psychological wellbeing, burnout and substance use amongst medical students in New Zealand. *International Review of Psychiatry*, 31(7-8), 630-636.
- Farrell, S. M., Molodynski, A., Cohen, D., Grant, A. J., Rees, S., Wullshleger, A., Lewis, T., & Kadhum, M. (2019). Wellbeing and burnout among medical students in Wales. *Int Rev Psychiatry*, 31(7-8), 613-618. <https://doi.org/10.1080/09540261.2019.1678251>
- Fino, E., Martoni, M., & Russo, P. M. (2021). Specific mindfulness traits protect against negative effects of trait anxiety on medical student wellbeing during high-pressure periods. *Advances in health sciences education : theory and practice*, 26(3), 1095-1111. <https://doi.org/10.1007/s10459-021-10039-w>
- Firestone, W. A. (1987). Meaning in method: The rhetoric of quantitative and qualitative research. *Educational researcher*, 16(7), 16-21. <https://doi.org/10.3102/0013189X016007016>
- Ghali, H., Ghammem, R., Baccouche, I., Hamrouni, M., Jedidi, N., Smaali, H., Earbi, S., Hajji, B., Kastalli, A., Khalifa, H., Maagli, K. B., Romdhani, R., Halleb, H., & Jdidi, F. (2022). Association between lifestyle choices and mental health among medical students during the COVID-19 pandemic: A cross-sectional study. *PloS one*, 17(10), e0274525-e0274525. <https://doi.org/10.1371/journal.pone.0274525>
- GMC. (2013). *Supporting Medical Students with Mental Health Condition*. [https://www.gmc-uk.org/-/media/documents/Supporting\\_students\\_with\\_mental\\_health\\_conditions\\_0816.pdf\\_53047904.pdf](https://www.gmc-uk.org/-/media/documents/Supporting_students_with_mental_health_conditions_0816.pdf_53047904.pdf)
- Goebert, D., Thompson, D., Takeshita, J., Beach, C., Bryson, P., Ephgrave, K., Kent, A., Kunkel, M., Schechter, J., & Tate, J. (2009). Depressive symptoms in medical students and residents: a multischool study. *Academic medicine*, 84(2), 236-241. <https://doi.org/10.1097/ACM.0b013e31819391bb>
- Gold, J. A. (2020). Covid-19: adverse mental health outcomes for healthcare workers. *BMJ (Online)*, 369, m1815-m1815. <https://doi.org/10.1136/bmj.m1815>
- Goldberg, D. P., Gater, R., Sartorius, N., Ustun, T. B., Piccinelli, M., Gureje, O., & Rutter, C. (1997). The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychological medicine*, 27(1), 191-197. <https://doi.org/10.1017/S0033291796004242>
- Haider, S. I., Ahmed, F., Pasha, H., Pasha, H., Farheen, N., & Zahid, M. T. (2022). Life satisfaction, resilience and coping mechanisms among medical students during COVID-19. *PloS one*, 17(10), e0275319-e0275319. <https://doi.org/10.1371/journal.pone.0275319>

- Hall, L., Johnson, J., Watt, I. S., Tsipa, A., & O'Connor, D. B. (2016). Healthcare Staff Wellbeing, Burnout, and Patient Safety: A Systematic Review. <https://doi.org/10.1371/journal.pone.0159015>
- Healthcare BV. (3 May 2020). *Critical Appraisal Skills Programme (CASP)*. <https://casp-uk.net/casp-tools-checklists/>(accessed
- Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, 44(2), 227-239. <https://doi.org/10.1348/014466505X29657>
- Hope, V., & Henderson, M. (2014). Medical student depression, anxiety and distress outside North America: a systematic review. *Med Educ*, 48(10), 963-979. <https://doi.org/10.1111/medu.12512>
- Hossain, S., O'Neill, S., & Strnadová, I. (2023). What constitutes student well-being: a scoping review of students' perspectives. *Child indicators research*, 16(2), 447-483. <https://doi.org/10.1007/s12187-022-09990-w>
- Hou, H., Chin, T.-C., Slemp, G. R., & Oades, L. G. (2021). Wellbeing literacy: conceptualization, measurement, and preliminary empirical findings from students, parents and school staff. *International journal of environmental research and public health*, 18(4), 1485. <https://doi.org/10.3390/ijerph18041485>
- Hu, K. S., Chibnall, J. T., & Slavin, S. J. (2019). Maladaptive Perfectionism, Impostorism, and Cognitive Distortions: Threats to the Mental Health of Pre-clinical Medical Students. *Academic Psychiatry*, 43(4), 381-385. <https://doi.org/10.1007/s40596-019-01031-z>
- Jia, Q., Qu, Y., Sun, H., Huo, H., Yin, H., & You, D. (2022). Mental Health Among Medical Students During COVID-19: A Systematic Review and Meta-Analysis. *Frontiers in psychology*, 13, 846789-846789. <https://doi.org/10.3389/fpsyg.2022.846789>
- Keyes, C. L. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of health and social behavior*, 207-222. <https://doi.org/10.2307/3090197>
- Keyes, C. L. (2009). Brief description of the mental health continuum short form (MHC-SF). In: Atlanta. <https://doi.org/10.1037/t30592-000>
- Keyes, C. L. M. (2005). Mental Illness and/or Mental Health? Investigating Axioms of the Complete State Model of Health. *Journal of consulting and clinical psychology*, 73(3), 539-548. <https://doi.org/10.1037/0022-006X.73.3.539>
- Kötter, T., Fuchs, S., Heise, M., Riemenschneider, H., Sanftenberg, L., Vajda, C., & Voigt, K. (2019). What keeps medical students healthy and well? A systematic review of observational studies on protective factors for health and well-being during medical education. *BMC medical education*, 19(1), 94-94. <https://doi.org/10.1186/s12909-019-1532-z>
- Krishnan, A., Odejimi, O., Bertram, I., Chukowry, P. S., & Tadros, G. (2022). A systematic review of interventions aiming to improve newly-qualified doctors' wellbeing in the United Kingdom. *BMC psychology*, 10(1), 1-12. <https://doi.org/10.1186/s40359-022-00868-8>
- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of general internal medicine : JGIM*, 16(9), 606-613. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>

- Kroenke, K., Strine, T. W., Spitzer, R. L., Williams, J. B. W., Berry, J. T., & Mokdad, A. H. (2009). The PHQ-8 as a measure of current depression in the general population. *Journal of Affective Disorders*, 114(1), 163-173. <https://doi.org/10.1016/j.jad.2008.06.026>
- Krug, S., & Laughlin, J. (1984). Handbook for the IPAT anxiety scale: Institute for personality & ability testing. Champaign: Illinois.
- Kulsoom, B., & Afsar, N. A. (2015). Stress, anxiety, and depression among medical students in a multiethnic setting. *Neuropsychiatric Disease and Treatment*, 11(default), 1713-1722. <https://doi.org/10.2147/NDT.S83577>
- Lane, A., McGrath, J., Cleary, E., Guerandel, A., & Malone, K. M. (2020). Worried, weary and worn out: mixed-method study of stress and well-being in final-year medical students. *BMJ open*, 10(12), e040245. <https://doi.org/10.1136/bmjopen-2020-040245>
- Lattie, E. G., Kashima, K., & Duffecy, J. L. (2019). An open trial of internet-based cognitive behavioral therapy for first year medical students. *Internet interventions : the application of information technology in mental and behavioural health*, 18, 100279-100279. <https://doi.org/10.1016/j.invent.2019.100279>
- Lemtiri Chelieh, M., Kadhum, M., Lewis, T., Molodynski, A., Abouqal, R., Belayachi, J., & Bhugra, D. (2019). Mental health and wellbeing among Moroccan medical students: a descriptive study. *Int Rev Psychiatry*, 31(7-8), 608-612. <https://doi.org/10.1080/09540261.2019.1675276>
- Li, R.-H. (2014). Reliability and validity of a shorter Chinese version for Ryff's psychological well-being scale. *Health Education Journal*, 73(4), 446-452. <https://doi.org/10.1177/0017896913485743>
- Li, W., Zhao, Z., Chen, D., Peng, Y., & Lu, Z. (2022). Prevalence and associated factors of depression and anxiety symptoms among college students: a systematic review and meta-analysis. *Journal of child psychology and psychiatry*, 63(11), 1222-1230. <https://doi.org/10.1111/jcpp.13606>
- Liu, J., Zhu, Q., Fan, W., Makamure, J., Zheng, C., & Wang, J. (2020). Online Mental Health Survey in a Medical College in China During the COVID-19 Outbreak. *Frontiers in psychiatry*, 11, 459-459. <https://doi.org/10.3389/fpsyt.2020.00459>
- Machado, L., Reis de Oliveira, I., Peregrino, A., & Cantilino, A. (2019). Common mental disorders and subjective well-being: Emotional training among medical students based on positive psychology. *PloS one*, 14(2), e0211926-e0211926. <https://doi.org/10.1371/journal.pone.0211926>
- Macleod, A. K., & Moore, R. (2000). Positive thinking revisited: positive cognitions, well-being and mental health. *Clinical psychology and psychotherapy*, 7(1), 1-10. [https://doi.org/10.1002/\(SICI\)1099-0879\(200002\)7:1%3C1::AID-CPP228%3E3.0.CO;2-S](https://doi.org/10.1002/(SICI)1099-0879(200002)7:1%3C1::AID-CPP228%3E3.0.CO;2-S)
- Malpass, A., Binnie, K., & Robson, L. (2019). Medical students' experience of mindfulness training in the UK: well-being, coping reserve, and professional development. *Education Research International*, 2019. <https://doi.org/10.1155/2019/4021729>
- Mansfield, R., Patalay, P., & Humphrey, N. (2020). A systematic literature review of existing conceptualisation and measurement of mental health literacy in adolescent research: current challenges and inconsistencies. *Bmc Public Health*, 20, 1-14. <https://doi.org/10.1186/s12889-020-08734-1>



- Masri, R., Kadhum, M., Farrell, S. M., Khamees, A. a., Al-Taiar, H., & Molodynski, A. (2019). Wellbeing and mental health amongst medical students in Jordan: a descriptive study. *International Review of Psychiatry*, 31(7-8), 619-625. <https://doi.org/10.1080/09540261.2019.1670402>
- Mirilovic, N., Jankovic, J., & Latas, M. (2022). The impact of the COVID-19 epidemic on students' mental health: A cross-sectional study. *PloS one*, 17(9), e0275167-e0275167. <https://doi.org/10.1371/journal.pone.0275167>
- Mittal, R., Su, L., & Jain, R. (2021). COVID-19 mental health consequences on medical students worldwide. *Journal of community hospital internal medicine perspectives*, 11(3), 296-298. <https://doi.org/10.1080/20009666.2021.1918475>
- Moffat, K. J., McConnachie, A., Ross, S., & Morrison, J. M. (2004). First year medical student stress and coping in a problem-based learning medical curriculum. *Med Educ*, 38(5), 482-491. <https://doi.org/10.1046/j.1365-2929.2004.01814.x>
- Mohamed, Z., Singh, G. K. J., Dediwadon, N. S., Saleh, N. A. M., Jupri, N. N., & Ganesan, Y. (2022). Adult Personality and Its Relationship with Stress Level, Coping Mechanism and Academic Performance among Undergraduate Nursing Students. *The Malaysian journal of medical sciences*, 29(5), 117-125. <https://doi.org/10.21315/mjms2022.29.5.12>
- Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., & Stewart, L. A. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic reviews*, 4(1), 1-9. <https://doi.org/10.1186/2046-4053-4-1>
- Newson, J. J., Hunter, D., & Thiagarajan, T. C. (2020). The heterogeneity of mental health assessment. *Frontiers in Psychiatry*, 11, 76. <https://doi.org/10.3389/fpsyt.2020.00076>
- Noyes, J., Booth, A., Flemming, K., Garside, R., Harden, A., Lewin, S., Pantoja, T., Hannes, K., Cargo, M., & Thomas, J. (2018). Cochrane Qualitative and Implementation Methods Group guidance series—paper 3: methods for assessing methodological limitations, data extraction and synthesis, and confidence in synthesized qualitative findings. *Journal of clinical epidemiology*, 97, 49-58. <https://doi.org/10.1016/j.jclinepi.2017.06.020>
- Pacheco, J. P., Giacomini, H. T., Tam, W. W., Ribeiro, T. B., Arab, C., Bezerra, I. M., & Pinasco, G. C. (2017). Mental health problems among medical students in Brazil: a systematic review and meta-analysis. *Revista brasileira de psiquiatria*, 39(4), 369-378. <https://doi.org/10.1590/1516-4446-2017-2223>
- Paradise, L. V. (1983). Maslach and Jackson, "Maslach Burnout Inventory, Research Edition. Manual" (Book Review). In (Vol. 61, pp. 376). Alexandria, Va: Alexandria, Va: American Association for Counseling and Development.
- Perissotto, T., Silva, T. C. R. P. d., Miskulin, F. P. C., Pereira, M. B., Neves, B. A., Almeida, B. C., Casagrande, A. V., Ribeiz, S. R. I., & Nunes, P. V. (2021). Mental health in medical students during COVID-19 quarantine: a comprehensive analysis across year-classes. *Clinics (São Paulo, Brazil)*, 76, e3007-e3007. <https://doi.org/10.6061/clinics/2021/e3007>
- Phang, C. K., Chiang, K. C., Ng, L. O., Keng, S.-L., & Oei, T. P. S. (2016). Effects of Brief Group Mindfulness-based Cognitive Therapy for Stress Reduction among Medical Students in a Malaysian University. *Mindfulness*, 7(1), 189-197. <https://doi.org/10.1007/s12671-015-0399-2>

- Pranita, A., Apte, G., & Joshi, A. (2013). Assessment of WHO-5 well being index in 1st MBBS medical students. *International Journal of Scientific Research*, 2(2), 266-267. <https://doi.org/10.15373/22778179/FEB2013/88>
- Quince, T. A., Wood, D. F., Parker, R. A., & Benson, J. (2012). Prevalence and persistence of depression among undergraduate medical students: a longitudinal study at one UK medical school. *BMJ open*, 2(4), e001519. <https://doi.org/https://doi.org/10.1136/bmjopen-2012-001519>
- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied psychological measurement*, 1(3), 385-401. <https://doi.org/10.1177/014662167700100306>
- Ramadianto, A. S., Kusumadewi, I., Agiananda, F., & Raharjanti, N. W. (2022). Symptoms of depression and anxiety in Indonesian medical students: association with coping strategy and resilience. *BMC psychiatry*, 22(1), 1-11. <https://doi.org/10.1186/s12888-022-03745-1>
- Rankin, S. H., Galbraith, M. E., & Johnson, S. (1993). Reliability and validity data for a Chinese translation of the Center for Epidemiological Studies-Depression. *Psychological Reports*, 73(3\_suppl), 1291-1298. <https://doi.org/10.2466/pr0.1993.73.3f.1291>
- Reed, D. A., Cook, D. A., Beckman, T. J., Levine, R. B., Kern, D. E., & Wright, S. M. (2007). Association between funding and quality of published medical education research. *Jama*, 298(9), 1002-1009. <https://doi.org/10.1001/jama.298.9.1002>
- Reed, D. A., Shanafelt, T. D., Satele, D. W., Power, D. V., Eacker, A., Harper, W., Moutier, C., Durning, S., Massie, F. S., Thomas, M. R., Sloan, J. A., & Dyrbye, L. N. (2011). Relationship of pass/fail grading and curriculum structure with well-being among preclinical medical students: A multi-institutional study. *Academic medicine*, 86(11), 1367-1373. <https://doi.org/10.1097/ACM.0b013e3182305d81>
- Rich, A., Viney, R., Silkens, M., Griffin, A., & Medisauskaite, A. (2023). UK medical students' mental health during the COVID-19 pandemic: a qualitative interview study. *BMJ open*, 13(4), e070528. <https://doi.org/10.1136/bmjopen-2022-070528>
- Rubin, H. J., & Rubin, I. S. (2011). *Qualitative interviewing: The art of hearing data*. sage.
- Ryff, & Keyes. (1995). The structure of psychological well-being revisited. *Journal of personality and social psychology*, 69(4), 719. <https://doi.org/10.1037//0022-3514.69.4.719>
- Saleem, S., & Saleem, T. (2017). Role of Religiosity in Psychological Well-Being Among Medical and Non-medical Students. *Journal of religion and health*, 56(4), 1180-1190. <https://doi.org/10.1007/s10943-016-0341-5>
- Santos, K. O. B., de Araújo, T. M., de Sousa Pinho, P., & Silva, A. C. C. (2010). Avaliação de um instrumento de mensuração de morbidade psíquica: estudo de validação do Self-Reporting Questionnaire (SRQ-20). *Revista Baiana de Saúde Pública*, 34(3), 544-544. <https://doi.org/10.22278/2318-2660.2010.v34.n3.a54>
- Sartorão Filho, C. I., de Las Villas Rodrigues, W. C., de Castro, R. B., Marçal, A. A., Pavelqueires, S., Takano, L., de Oliveira, W. L., & Sartorão Neto, C. I. (2020). Impact Of covid-19 pandemic on mental health of medical students: a cross-sectional study using GAD-7 and PHQ-9 questionnaires. *MedRxiv*, 2020.2006. 2024.20138925. <https://doi.org/10.1101/2020.06.24.20138925>
- Scott, H. R., Stevelink, S. A., Gafoor, R., Lamb, D., Carr, E., Bakolis, I., Bhundia, R., Docherty, M. J., Dorrington, S., & Gnanapragasam, S. (2023). Prevalence of post-traumatic stress

- disorder and common mental disorders in health-care workers in England during the COVID-19 pandemic: a two-phase cross-sectional study. *The Lancet Psychiatry*, 10(1), 40-49. [https://doi.org/10.1016/S2215-0366\(22\)00375-3](https://doi.org/10.1016/S2215-0366(22)00375-3)
- Seligman, M. (2015). *Evidence-based approaches in positive education: Implementing a strategic framework for well-being in schools*. Springer.
- Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive Psychology: An Introduction. *The American psychologist*, 55(1), 5-14. <https://doi.org/10.1037/0003-066X.55.1.5>
- Siddiqui, A. F. (2018). Self-Efficacy as a Predictor of Stress in Medical Students of King Khalid University, Saudi Arabia. *Makara Journal of Health Research*, 22(1). <https://doi.org/10.7454/msk.v22i1.7742>
- Sivailango, T., SumithraDevi, S., Ezhilarasi, P., Arumuganathan, S., Usaid, S., & Sethumadhavan, V. (2020). A Cross-sectional study on personality, coping strategies, and quality of life of undergraduate medical students. *Annals of Indian Psychiatry*, 4(2), 170-174. [https://doi.org/10.4103/aip.aip\\_25\\_20](https://doi.org/10.4103/aip.aip_25_20)
- Slavin, S. (2018). Medical student mental health: Challenges and opportunities. *Medical Science Educator*, 28(1), 13-15. <https://doi.org/10.1007/s40670-018-0622-6>
- Slavin, S. J., Schindler, D. L., & Chibnall, J. T. (2014). Medical student mental health 3.0: Improving student wellness through curricular changes [Professional Education & Training 3410]. *Academic medicine*, 89(4), 573-577. <https://doi.org/http://dx.doi.org/10.1097/ACM.0000000000000166> (Journal of Medical Education).
- Sovold, L. E., Naslund, J. A., Kousoulis, A. A., Saxena, S., Qoronfleh, M. W., Grobler, C., & Munter, L. (2021). Prioritizing the Mental Health and Well-Being of Healthcare Workers: An Urgent Global Public Health Priority. *Frontiers in public health*, 9, 679397-679397. <https://doi.org/10.3389/fpubh.2021.679397>
- Spielberger, C. D. (1970). Manual for the State-Trait Anxiety, Inventory. *Consulting Psychologist*.
- Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of internal medicine*, 166(10), 1092-1097. <https://doi.org/10.1001/archinte.166.10.1092>
- Srivastava, K., Raju, M., Saldanha, D., Chaudhury, S., Basannar, D., Pawar, A., Ryali, V., & Kundeyawala, S. (2007). Psychological well-being of medical students. *Medical Journal Armed Forces India*, 63(2), 137-140. [https://doi.org/10.1016/S0377-1237\(07\)80057-8](https://doi.org/10.1016/S0377-1237(07)80057-8)
- Tan, T., Liu, W., Zhao, Q., Hou, Y., Yang, Y., Wu, X., Wang, Y., Chen, Y., & Hu, G. (2023). Anxiety, depression, psychological stress and coping style in medical postgraduates in southeastern China when restricted to commuting between the campus and hospital during the COVID-19 pandemic. *Frontiers in psychiatry*, 13, 1035075. <https://doi.org/10.3389/fpsyt.2022.1035075>
- Thiemann, P., Brimicombe, J., Benson, J., & Quince, T. (2020). When investigating depression and anxiety in undergraduate medical students timing of assessment is an important factor- a multicentre cross-sectional study. *BMC medical education*, 20, 1-8. <https://doi.org/10.1186/s12909-020-02029-0>
- Torales, J., Kadhum, M., Zárate, G., Barrios, I., González, I., Farrell, S. M., Ventriglio, A., & Arce, A. (2019). Wellbeing and mental health among medical students in Paraguay.



- International Review of Psychiatry*, 31(7-8), 598-602.  
<https://doi.org/10.1080/09540261.2019.1667172>
- Van Dijk, I., Lucassen, P. L., van Weel, C., & Speckens, A. E. (2017). A cross-sectional examination of psychological distress, positive mental health and their predictors in medical students in their clinical clerkships. *BMC medical education*, 17(1), 1-10.  
<https://doi.org/10.1186/s12909-017-1035-8>
- Vizheh, M., Qorbani, M., Arzaghi, S. M., Muhidin, S., Javanmard, Z., & Esmaeili, M. (2020). The mental health of healthcare workers in the COVID-19 pandemic: A systematic review. *Journal of Diabetes & Metabolic Disorders*, 19, 1967-1978.  
<https://doi.org/10.1007/s40200-020-00643-9>
- Volpe, U., Ventriglio, A., Bellomo, A., Kadhum, M., Lewis, T., Molodynski, A., Sampogna, G., & Fiorillo, A. (2019). Mental health and wellbeing among Italian medical students: a descriptive study. *International Review of Psychiatry*, 31(7-8), 569-573.  
<https://doi.org/10.1080/09540261.2019.1654718>
- Ware, J. E., Kosinski, M., Dewey, J. E., & Gandek, B. (2001). How to score and interpret single-item health status measures: a manual for users of the SF-8 health survey. *Lincoln, RI: QualityMetric Incorporated*, 15(10), 5.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and Validation of Brief Measures of Positive and Negative Affect: The PANAS Scales. *Journal of personality and social psychology*, 54(6), 1063-1070. <https://doi.org/10.1037/0022-3514.54.6.1063>
- West, M., & Coia, D. D. (2019). Caring for doctors Caring for patients. In: General Medical Council.
- Westerhof, G. J., & Keyes, C. L. (2010). Mental Illness and Mental Health: The Two Continua Model Across the Lifespan. *J Adult Dev*, 17(2), 110-119. <https://doi.org/10.1007/s10804-009-9082-y>
- White, S. C., & Eyber, C. (2017). Positive mental health and wellbeing. *The Palgrave handbook of sociocultural perspectives on global mental health*, 129-150.  
[https://doi.org/10.1057/978-1-137-39510-8\\_7](https://doi.org/10.1057/978-1-137-39510-8_7)
- Wilkes, C., Lewis, T., Brager, N., Bulloch, A., MacMaster, F., Paget, M., Holm, J., Farrell, S. M., & Ventriglio, A. (2019). Wellbeing and mental health amongst medical students in Canada. *International Review of Psychiatry*, 31(7-8), 584-587.  
<https://doi.org/10.1080/09540261.2019.1675927>
- Wilkinson, S., & Smith, J. (2003). Qualitative psychology: a practical guide to research methods. *Focus groups*.
- Winter, R. I., Patel, R., & Norman, R. I. (2017). A qualitative exploration of the help-seeking behaviors of students who experience psychological distress around assessment at medical school. *Academic Psychiatry*, 41(4), 477-485. <https://doi.org/10.1007/s40596-017-0701-9>
- Yusoff, M. S. B. (2011). Impact of summative assessment on first year medical students' mental health. *International medical journal*, 18(3), 172-175.
- Yusoff, M. S. B., Rahim, A. F. A., & Yaacob, M. J. (2010a). The development and validity of the Medical Student Stressor Questionnaire (MSSQ). *ASEAN Journal of Psychiatry*, 11(1), 231-235. <https://doi.org/10.1037/t15334-000>

- Yusoff, M. S. B., Rahim, A. F. A., & Yaacob, M. J. (2010b). Prevalence and sources of stress among Universiti Sains Malaysia medical students. *The Malaysian journal of medical sciences: MJMS*, 17(1), 30.
- Zhang, L., Wu, J., Deng, C., Zhang, M., Li, C., & Wang, Q. (2021). Mental health and personality implications among medical students during the outbreak of the COVID-19 pandemic. *Social behavior and personality*, 49(8), 1-11. <https://doi.org/10.2224/sbp.10544>
- Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta psychiatrica scandinavica*, 67(6), 361-370. <https://doi.org/10.1111/j.1600-0447.1983.tb09716.x>