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Research Article

Anxiety and Depression in Medical Students Worldwide: Where do we go from here?

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Abstract

Introduction: Alarming rates of mental illness in medical students are well-established worldwide: medical students consistently have higher rates of anxiety and depression than the general population. With easy access to a growing library of research on the subject, knowing when and how to generalize findings can feel paralyzing. The objective of this narrative review is to present an updated understanding of the quality of current literature surrounding anxiety, depression and suicidality in medical students. Particular attention will focus on severity of mental illness as well as identified risk factors unique to medical student populations.

Methods: Reviewed studies were collected from electronic databases (PubMED, psycINFO, Web of Science), and references of included studies were screened for additional relevant articles. Included studies were published within 2008 to 2018 and used BDI and BAI scales for measurement of depression and anxiety, respectively.

Results: All reviewed studies reported severity of depression and anxiety through prevalence rates; however, deviations in instrument cut-off scores confound the ability to draw accurate comparisons across studies. Best research practices follow well-validated cut-off scores, report both mean scores and prevalence data and openly explain reasoning behind investigation of specific risk factors.

Discussion: More adequate representation of anxiety and suicidality in medical students is needed. Increased awareness of risk factors associated with depression and anxiety is needed for research as well as proper detection and prevention of depressive and anxiety symptoms in medical students. Recommendations for next steps and initiatives by medical schools and supporting faculty are also discussed.

Keywords: *Anxiety; Depression; Medical School; Medical Students*

Abbreviations

BDI: Beck Depression Inventory; BAI: Beck Anxiety Inventory

Background

Over the past decade, there has been a rising number of publications focussing on medical student health and wellness - or lack thereof. Researchers and medical educators worldwide are independently and collaboratively inviting discussion surrounding mental illness in medical professionals into mainstream conversation. In what appears to be a universal phenomenon, psychological distress in medical students is significantly elevated relative to the general population [1]. When left untreated, the consequences of such illnesses can be tragic; ranging anywhere from academic failure to suicide [2]. Despite access to a growing library of research, the extensive amount of available information can feel paralyzing.

Where, when and how does one begin to enact change? What research can be generalized to which populations? What risk factors are relevant and modifiable?

Many medical students fit within the age range (18 - 24 y.o.) at high risk for development of depression, anxiety, and psychiatric co-morbidities [3]. The additional stressors specific to medical training are an added risk for medical students. With limited time to maintain adequate support systems, medical students are faced with burdensome course-loads, long work hours, examination pressures, intense competition among peers, sleep deprivation, potential financial debt and frequent exposure to pain, suffering and death of patients [3-8].

Untreated anxiety and depression results in devastating effects for medical students, including deterioration in relationships and poor self-care (i.e. diet and exercise) [2]. Alarmingly high suicide rates among physicians and medical students is thought to be a reflection of the consequences of untreated depression and anxiety [9]. In general, only 18 - 34% of young adults suffering from mental illness are likely to seek out care [10]. Relative to the general population, medical students are even less likely to seek out appropriate treatment. This is in part due to the lingering stigma that continues to surround mental illness as well as students' fears of being perceived as unfit to practice medicine [11]. Consequently, many students avoid seeking proper treatment until symptoms escalate to the point that academic performance suffers [12].

Psychological distress during medical training not only impacts student learning, but also places students at higher risk for mental health concerns later in their careers. Psychological distress has been found to compromise academic performance and contribute to academic dishonesty, substance abuse, and attrition from medical school [2,7,13]. Moreover, physician impairment results in enormous-potentially life-threatening-concerns for patient care and safety, including diminished doctor-patient communication, declines in empathy and compassion for patients, and a six-fold rise in medical errors [3,5,8,11]. Researchers suggest a potential cascade effect, whereby poor mental health during medical training increases likelihood of mental health problems later in professional life [13,14].

As staggering rates of mental illness in medical students become more well-established worldwide, one would expect medical educators to feel equipped at tackling this long-standing problem. While the scientific community is making great strides in uncovering and normalizing this taboo topic from the depths of the hidden curriculum, next steps remain unclear. There is a need to ascertain instances during which students are at heightened risk for the development of psychiatric disturbances and design interventions that carefully attend to potential causative factors. While the high prevalence of depression, anxiety and suicidality in medical students has been well-established on a global level, little is known about risk factors that lead to student distress [2].

Published systematic reviews and meta-analyses bring to light concerningly high prevalence rates of depression, anxiety and suicide in medical students. A recent meta-analysis of 77 studies worldwide estimated the global prevalence of depression among medical students to be 28% (95% confidence interval 24.2% - 32.1%) [15]. Dependence on mathematical, systematic reviews risk over-emphasizing numbers as opposed to critical appraisal of researchers' methodologies and conclusions [16].

Objective of the Study

The objective of this narrative review is to present an updated understanding of the quality of current literature surrounding anxiety, depression and suicidality in medical students. Particular attention will focus on methods of reporting severity of mental illness as well as identified risk factors unique to medical students worldwide. Through critical appraisal of methodologies and conclusions of all reviewed studies, our goal is to ensure that research as well as active monitoring and detection strategies are in line with current trends.

Methods

PubMED, psycINFO, and Web of Science were searched for primary research data published within the last ten years (between January 2008 and June 2018) pertaining to depression, anxiety and suicidality in medical students. Searches used combinations of (medical student) AND (depression OR depressive disorder) OR (anxiety OR anxiety disorder) OR (suicide OR suicidal ideation). Reference lists of retrieved studies were also cross-checked to identify relevant additional studies.

Inclusion and exclusion criteria

The search was limited to full-text, peer-reviewed articles written in English. All studies were quantitative in nature, presenting primary data on a study population comprised of undergraduate medical students (separate from other learners). Studies assessing student mental health according to a general construct (e.g. global mental health, general distress, burnout etc.) were excluded (See figure 1).

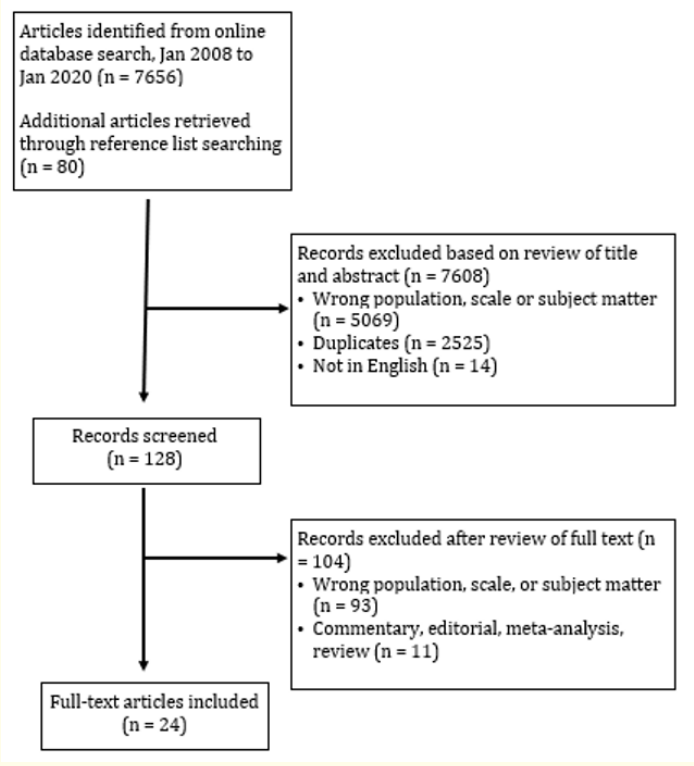

Figure 1: *Flow chart outlining paper identification and selection process.*

In accordance with suggestions put forward by Erschens., *et al*. [17], included studies were restricted to those using standardized assessment tools for measuring depression, anxiety and/or suicidality that have been validated cross-culturally. In order to improve comparability of data across studies, only studies using Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI) were included. It is important to note that because researchers rely on different cut off scores when determining the presence of depression and/or anxiety, comparisons based solely on prevalence rates can be misleading [14,18]. In efforts to control for this confounder, the present review looks only at BDI and BAI measurements that follow standardized or well-validated cross-cultural cut-off scores.

Instruments

This review's selected instruments-the BDI, its revision (BDI-II), and the BAI-are self-report questionnaires standardized for the measurement of depression and anxiety, respectively [2,19,20]. The psychometric properties of these instruments have been reviewed and described in detail elsewhere [21-23]. All scales have been well-validated for use among non-psychiatric patients, including medical students [20,24,25].

Results

A total of 24 studies were reviewed: all studies evaluated depression, only 13 evaluated anxiety, and only two investigated suicidality in medical students. Twenty-two studies were cross-sectional surveys and two were longitudinal in design. As outlined in the present study's inclusion criteria, all studies employed BDI and BAI scales and were required to include instrumental cut-off scores. Of these 24 included studies, all studies reported prevalence rates of depression and/or anxiety. Seventeen of the 24 studies (70.3%) reporting on depression included mean BDI scores, and 11 of the 13 studies (84.6%) reporting on anxiety included mean BAI scores. Unlike prevalence rates, mean score values are independent of cut-off scores. Reported mean scores provide a more objective comparison of severity levels across studies using the same depression and anxiety scales (See table 1 and 2).

Country	Source	Instrument Cut-off Score	Mean Score (SD)	Prevalence (%)
UAE	Ahmed., *et al*. 2009 [28]	BDI > 20 (unclear)	23.10 (NR)	28.6
Egypt	Ibrahim and Abdelreheem, 2015 [5]	BDI ≥ 17	19.20 (8.86)	57.9
Chile	Villacura., *et al*. 2017 [12]	BDI-II > 13	17.00 (11.10)	54.9
Saudi Arabia	Al-Faris., *et al*. 2014 [14]	BDI-II > 13	15.00 (10.00)	48.2
Pakistan	Azad., *et al*. 2017 [34]	BDI ≥ 20	1st yr: 13.78 (10.79) 2nd yr: 10.58 (8.73) 3rd yr: 11.39 (8.74) 4th yr: 12.35 (9.86) 5th yr: 12.56 (9.03)	14
Bahrain	Mahroon., *et al*. 2018 [8]	BDI-II > 13	13.4 (9.6)	40.0
Iran	Aghakhani., *et al*. 2011 [29]	BDI > 9	10.4 (NR)	52.6
Turkey	Ediz., *et al*. 2017 [20]	BDI > 28	9.94 (9.32)	5.3
Brazil	Pagnin., *et al*. 2014 [40]	BDI > 9	9.63 (7.06)	41.7
Brazil	Baldassin., *et al*. 2008 [32]	BDI > 9	9.10 (7.60)	38.2
USA	Ghodasara., *et al*. 2011 [31]	BDI-II > 13	8.74 (NR)	11.6

Mexico	Melo-Carrillo., *et al*. 2012 [33]	BDI > 9	8.5 (7.5)	38.4
Macedonia	Mancevska., *et al*. 2008 [37]	BDI ≥ 17	8.30 (7.40)	10.4
Brazil	Bassols., *et al*. 2014 [27]	BDI > 9	1st yr: 8.02 (6.14) 6th yr: 6.62 (5.23)	18.6
Israel	Lupo & Strous, 2011 [9]	BDI > 9	6.80 (6.20)	25.2
Malaysia	Yusoff., *et al*. 2011 [4]	BDI > 8	Female: 6.12 (5.47) Male: 3.48 (3.98)	21.2
USA	Haglund., *et al*. 2009 [26]	BDI-II > 13	6.0 (6.4)	At baseline: 11.9
India	Kumar., *et al*. 2012 [41]	BDI > 9	NR	70.2
India	Singh., *et al*. 2011 [30]	BDI ≥ 12	NR	49.1
Brazil	Brenneisen Mayer., *et al*. 2016 [13]	BDI > 9	NR	41.3
Pakistan	Alvi., *et al*. 2010 [35]	BDI-II > 13	NR	35.1
Saudi Arabia	Jarwan, 2015 [1]	BDI > 9	NR	30.9
Brazil	Serra., *et al*. 2015 [18]	BDI > 9	NR	30

Table 1: *Summary of reported cut-off scores, mean BDI/BDI-II scores and prevalence data, organized in descending order according to mean BDI/BDI-II scores.*

Depression

The highest mean BDI score (reported as mean, SD) was reported in Egypt (19.20, SD 3.86) [5], whereas the lowest BDI mean score was reported among male medical students in Malaysia (3.48, SD 3.98) [4]. See table 1 for all available reported mean BDI scores in medical students.

Depression was found to be significantly associated with the following risk factors: gender [4,5,8,12-14,18,20,26-33], age [34], religiosity [31], history of illness [4], family history of mental illness [9], ethnicity [8,29], academic performance [1,3,8,20,29], year of training [1,18,28,32,34], non-traumatic events [8,26], locality [13], financial status [9,20], parents' educational/occupational status [32] and alcohol/substance abuse [30].

Anxiety

The highest mean BAI score was reported in Egyptian medical students (19.73, SD 11.58) [5] and the lowest mean BAI score was found among a sub-population of sixth year Brazilian medical students (4.99, SD 5.36) [27]. See table 2 for all available reported mean BAI scores in medical students.

Anxiety was found to be significantly associated with the following risk factors: gender [5,8,12,18,20,26,27,34,35], religiosity [9], history of illness [4], family history of mental illness [9], academic performance [3], year of training [8,18], financial status [9,20].

Suicidality

While questions on suicidal ideation are included in BDI surveys, surveys specifically designed to measure suicidality were not implemented in any of the reviewed studies. Two studies; however, reported suicidal thoughts and ideation collected through the BDI-II.

Discussion

A critical review of the literature

Medical students worldwide encounter similar challenges, regardless of their country of origin; however, it is important to be aware of reported factors placing specific populations at heightened risk and understand the reasoning behind such links. While some studies found significant correlations between anxiety/depression and the aforementioned risk factors, some studies found inverse correlations or non-significant associations entirely. Contradictive findings reflect the complexity of mental illness as well as cross-cultural differences influencing each medical student population uniquely. Research suggests that stress associated with medical school is universal; however, differences in prevalence and severity between studies highlights the uniqueness of each student's medical school experience. Additionally, these differences may suggest a gap in terms of how well prevalence rates can accurately reflect a worldwide analysis of depression and anxiety in medical students.

This review paper highlights significant gaps in the literature concerning suicidality in medical students and the inter-relatedness of anxiety and depressive disorders. Realizing that suicide in medical students is a growing issue, it is alarming to see the lack of data on suicidal ideations and behaviours in this population. Although the BDI scale contains a suicide item that has been validated as an efficient screen for suicide risk, only two of the included articles reflected on this item in their sample populations [8,28]. As previously mentioned, surveys specifically designed to measure suicidality were not implemented in any of the reviewed studies. Future studies should more directly investigate rates of suicidality in medical students and give this problem the attention it desperately deserves.

Additionally, comorbidity rates in anxiety and depressive disorders are strikingly high, with studies suggesting comorbidity rates of 70% or higher [36]. In fact, researchers are encouraging clinicians to routinely assess for anxiety disorders in patients with depression, and vice versa [36]. It is therefore concerning to see the relatively small number of articles (13 of 24 articles) reporting on anxiety in medical students. Realizing the serious repercussions of anxiety and depressive symptoms in medical students, future research should further explore this psychological comorbidity in the context of medical school.

As previously mentioned, the present review's exclusion of non-BDI and non-BAI scales was meant to improve the ability to draw conclusions across cultures. However, it became apparent that researchers using the same scales were relying on different instrument cut-off scores. Therefore, when comparing prevalence rates across populations one must carefully assess whether significant differences across populations reflects true differences or differences due to varying cut off scores. Despite BDI and BAI scales being well-validated cross-culturally, researchers within and across countries tended to stray from the originally determined cut-off score [21-23]. For example, using a cut-off score of BDI ≥ 17, researchers in Macedonia reported an 11.6% prevalence of depression in medical students [37]. In a study in Iran where researchers used a cut-off score of BDI > 9, a prevalence of 52.6% was reported [29]. It is impossible to correctly attribute the higher prevalence rate in Iran to surrounding risk factors or to the lower instrumental cut-off score. To help prevent the confounding of global comparisons, research studies should be transparent about their cut-off scores in their methodology section and attempt to streamline cut-off scores to meet validated cut-off scores.

It is understandable for researchers to more commonly use prevalence rates to present their data, as these numbers are more generalizable when comparing rates of depression or anxiety in different populations where different scales are being employed. As previously illustrated, given the inherent risk of relying on prevalence scores, this sort of generalization warrants caution. In efforts to prevent this ambiguity from clouding global research conclusions, the present review emphasized severity of depression and anxiety according to mean scores (See table 1 and 2) to give a more accurate comparison across populations. While this comparison is reasonable when looking at a specific scale, it would no longer be practical when introducing another depression or anxiety scale.

On a separate note, researchers have reported on a wide variety of risk factors ranging from endogenous risk factors inherent to the individual and exogenous risk factors of an academic or more personal nature (See figure 2). What is commonly lacking in the literature is an explanation as to why researchers decided to include a specific risk factor in their study and either knowingly or unknowingly exclude others from investigation. By maintaining a general awareness of the risk factors reported in local or distant populations, researchers can begin to include risk factors used elsewhere to build a global understanding of cross-cultural similarities and differences impacting the medical student experience. It would be unreasonable to expect researchers to investigate all possible risk factors, however, including some thoughtful background information explaining one's decisions to include or exclude variables in a study will help improve academic transparency and ultimately warrant fruitful discussion amongst the academic community. With a more thorough understanding of the risk factors that have been reported on locally, medical educators can more confidently rely on these studies to generalize to nearby or similar medical student populations.

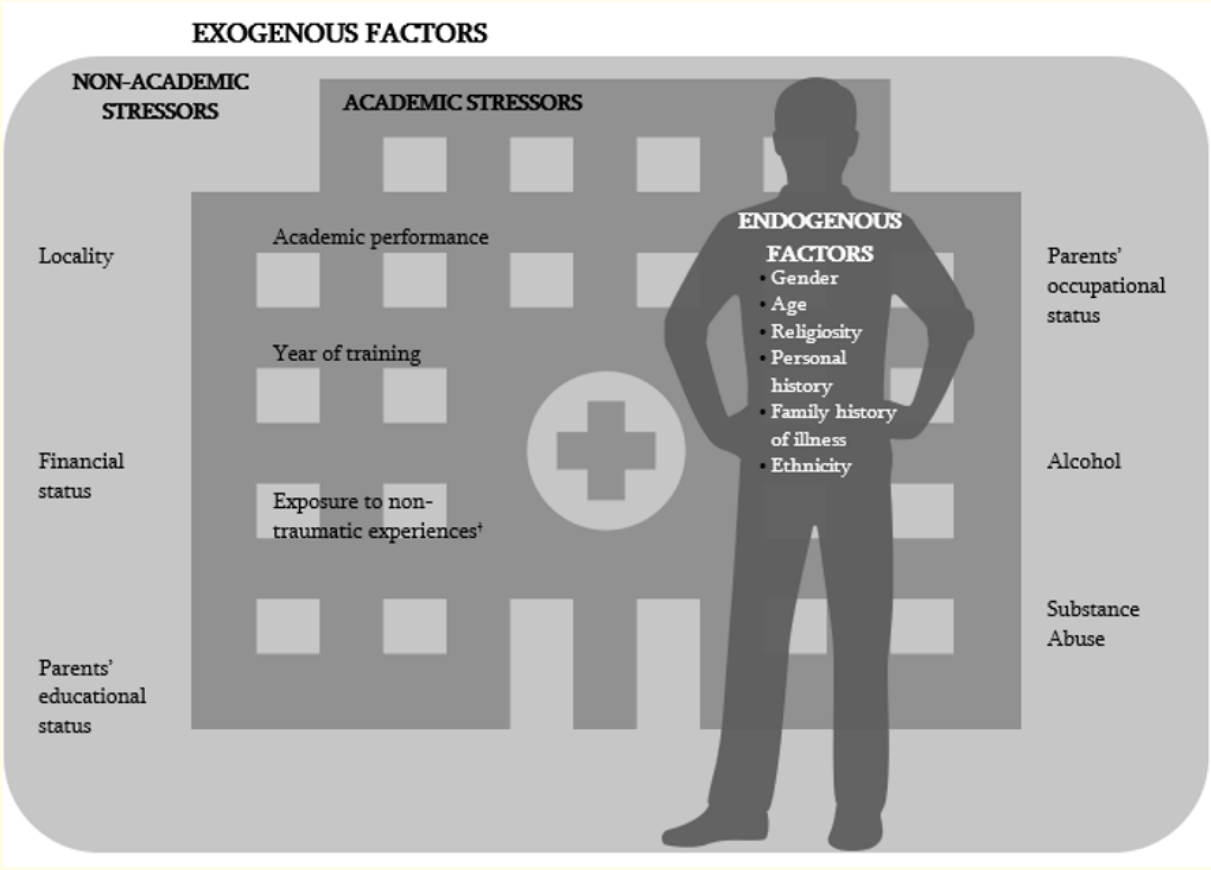

Figure 2: *Classification of risk factors reported in the reviewed studies.*

†Non-traumatic experiences operationally defined to include mistreatment of students by physician superiors (e.g. harassment, verbal abuse, belittling comments) or poor role-modeling by superiors during physician-patient interactions (e.g. negligence, substandard care, inappropriate humour).

Future Suggestions

It is clear from the research that not all risk factors influence populations in the same way - or at all. Future interventions addressing medical student depression and anxiety must cater to the specific needs of the student population and the individual student. Medical trainees, educators and clinicians should transition towards a proactive and preventative approach to mental illness among medical students. Medical schools are arguably in the best position for effecting positive change among medical students as this environment offers opportunities to collaborate among medical students, educators, and health-care workers to improve the well-being of future physicians [11].

Experiences of high work pressure are inevitable in medical school; however, steps should be taken to address modifiable risk factors adding unnecessary stress for students. Realizing the implications of poor professional and peer relationships on student well-being, steps should be taken to shift the medical environment from a place of harassment, intimidation and competition to one of collegiality and acceptance of vulnerability [11]. Additionally, open communication between peers, supervisors and counsellors should be encouraged to improve help-seeking behaviours among students. Discussion of mood and anxiety symptoms with a primary care physician increases requests for treatment or referrals [38]. Such interventions are especially important for closing the treatment gap among male medical students, as males tend to be especially at risk for under-reporting of symptoms and poor help-seeking tendencies [38].

Preventative programming should be implemented at the commencement of medical training and continue throughout the course of medical training, with resources specifically catering to specific times in the curriculum where students are found to experience significant levels of distress [39]. Realizing that peak stress times may vary depending on the design of the educational system, faculty should learn about and design evidence-based self-care programmes that appropriately reflect the needs of their students. Improving access to counselling resources (especially during peak stress times) and individualizing such services to suit the specific needs of the student population promotes attendance from those requiring psychological support [20].

In efforts to detect medical students experiencing psychological distress as early as possible, medical educators should pay close attention to students demonstrating poor academic performance. Students should be counselled to improve their coping abilities. In addition, training workshops should be created for both students and medical staff to disseminate accurate information about the prevalence of anxiety and depressive symptoms during medical training and to help students and educators better detect signs of distress. Students can learn to better self-identify symptoms. Meanwhile, staff can develop the skills necessary to identify students in distress, and refer such students to appropriate counselling [11]. Moreover, destigmatizing initiatives should be implemented in order to help create an environment whereby students feel more comfortable admitting to their experiences of distress and improve their help-seeking behaviours.

Limitations of the Study

Although the decision to rely solely on Beck assessment inventories improved the homogeneity of reporting methods and strengthened comparison abilities across and within nationalities and cultures, it limited available data. Due to lack of cross-cultural standardization, other scales were excluded. This strict exclusion could have resulted in our review potentially missing data collected using less universally studied scales (e.g. PHQ-9). This global review lacked data from Sub-Saharan Africa or East-Asia and Pacific regions of the world. Moreover, due to dissimilarities between researchers' chosen cut-off scores for BDI and BAI, prevalence data must be compared with caution - further illustrating the usefulness of reporting both prevalence and mean score data.

In addition, generalizability of findings of this review paper may be limited by other methodologic shortcomings of the reviewed studies. Firstly, 22 of the 24 collected studies were cross-sectional in design, only reflecting a brief snapshot of a very complex problem. Surveys may have been distributed during an especially stressful time (e.g. pre- versus post-examination period). Additionally, a cross-sectional design lacks the ability to draw any cause-effect associations between risk factors and onset of symptoms. Since most included studies were not multicenter in nature, it is worth questioning whether results collected at a single university in one city could generalize to reflect a broader region of students. To develop more generalizable causal associations about risk factors leading to depression and anxiety in medical students, future studies should be multicenter and prospective in nature.

Additionally, since participation in the included studies was voluntary, participants may inaccurately reflect the characteristics of the entire student body population, with non-responders experiencing more severe symptoms than volunteers [8]. Additionally, as with all self-reporting scales, reliance on self-reporting BDI/BAI scales poses risk of a reporting bias, whereby students over- or under-estimated their true symptoms [3]. Finally, cultural norms and surrounding stigma may have interfered with full disclosure of symptoms due to fear from negative backlash by the medical education system [11].

Conclusion

Appreciating the repercussions of psychological distress on functioning during medical training and later on in clinical practice, this research is of critical importance for developing ways to mitigate mental illness in medical students. Analysis of levels of anxiety and depression among medical students across countries has revealed gaps and areas in the literature that can be improved. Researchers should maintain a general awareness of globally noted risk factors influencing the medical experience and assess their influence on local populations. Improving rates and levels of mental illness in medical students requires a comprehensive and collaborative approach; students, educators and clinicians must work together, acting proactively and preventatively rather than reactively. For the safety of medical students and for the betterment of society, international action is required from researchers and medical educators to effectively attend to the psychological distress disproportionately plaguing medical students [11].

Conflicts of Interest

Martin A. Katzman has been an advisory board member of Abbvie, Eisai, Empower Pharma, Janssen, Otsuka, Pfizer, Purdue, Santé Cannabis, Shire, Takeda and Tilray. He has undertaken research for Lundbeck and has received honoraria from Allergan, Janssen, Lundbeck, Otsuka, Pfizer, Purdue, Shire, Takeda, Tilray, and Lunesta. He has received research grants from Pfizer. Jacqueline Mincer and Melanie Mincer report no conflicts of interest in this work.

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