RESEARCH ARTICLE

REVISED Risky Behaviors Amongst Medical Students Within the United States

[version 2; peer review: 1 approved, 2 not approved]

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Abstract

Introduction

The lifestyle of medical students may drive them to engage in risky behaviors to seek solace from their academic lives. Despite studies having been conducted on the mental health of medical students, very little is known regarding practices these individuals engage in to relieve stress.

Methods

An anonymous Qualtrics survey was created using the CDC's 2021 Behavioral Risk Factor Surveillance System to assess the risky behaviors of medical students. The survey was then sent to medical students across the United States during the 2023 fall academic semester. Statistical analysis was then conducted to determine the significance of the findings.

Results

Five hundred and sixty-one medical students who attend medical schools in 21 US states completed the survey. 9.30% of first years disclosed engaging in more risky behaviors to cope with medical school compared to 26.86% of second years. 10.47% of first years increased their alcohol intake, compared to 21.71% of second years. 5.81% of first years admitted to increasing episodes of alcohol binge drinking compared to 16.57% of second years. 2.33% of first years reported an increase in recreational drug use, compared to 14.29% of second years. 20.35% of first years described worsened diets, compared to 40.57% of second-year students. 19.19% of first years

Open Peer Review

Approval Status ✓ ✗ ✗

	1	2	3
version 2 (revision) 08 Apr 2025			✗ view
version 1 15 Jan 2025	✓ view	✗ view	

1. **Dr. Miriam Simon**, National University of Science and Technology, Sohar, Oman
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Any reports and responses or comments on the article can be found at the end of the article.

disclosed initiating care with a mental health professional, compared to 44.57% of second years. 7.56% of first years started a new prescription medication to cope with stressors, compared to 24.0% of second years. 95.93% of first years have no diagnosed psychiatric disorders, which decreases to 85.71% of second years, 72.41% of third years, and 62.32% of fourth years.

Conclusion

First-year medical students engage in less risky behaviors than their peers. We propose that medical schools can attenuate these risky coping mechanisms by offering campaigns discussing the potential harms of substance use by their students.

Keywords
Mental Health, Medical Students, Medical School, Risk, Risky Behavior

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Author roles: Smith H: Conceptualization, Investigation, Methodology, Project Administration, Writing – Original Draft Preparation, Writing – Review & Editing; **Azar M**: Investigation, Methodology, Project Administration, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing; **Xu G**: Data Curation, Formal Analysis, Supervision, Writing – Review & Editing

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REVISED **Amendments from Version 1**

Included in the new version is a more in-depth and up-to-date literature review regarding the mental well-being and risky behaviors of medical students in the United States. The authors have included new citations about risky behaviors and potential links to mental duress with improved language regarding the relationship between risky behaviors and mental well-being. Addressed comments made by reviewers.

Any further responses from the reviewers can be found at the end of the article

Introduction

As the future of the healthcare field, student doctors face monumental expectations, rightfully so. Still, the pressure experienced by these students may drive them to engage in risky behaviors to seek solace from their strenuous academic lives. As the future faces of medicine, student doctors have the unique opportunity to be pillars of health and well-being in their respective communities. However, because of the potential physical and mental duress faced by students, they may be participating in behaviors that could negatively impact their health as a means to seek solace from internal and external stressors. Research has established that experiencing psychosocial stress and mental duress can negatively influence the health behaviors of an individual[1,2]. According to the CDC's 2021 Behavioral Risk Factor Surveillance System, some of these behaviors include binge drinking, the use of cigarettes or other nicotine products, the use of recreational drugs, poor diets, lack of exercise, unprotected sexual intercourse, or insufficient sleep[3]. These behaviors may also lead to increased psychological disorders including anxiety, depression, attention deficit disorder, or the need for a new or stronger prescription psychiatric medication.

There are approximately 125,500 medical students enrolled in accredited MD and DO programs in the United States[4,5]. These students endure tremendous amounts of stress, expectations, and uncertainty regarding the future of their professional careers. As the field of medicine becomes increasingly competitive, GPA, board examination scores, extracurriculars, and research have become as important as ever to be considered as a strong candidate for residency match[6]. These increased levels of strain could result in medical students resorting to unhealthy coping methods to ease mental duress. In a study conducted in Iran, it was found that Iranian medical students reported low levels of physical activity, had increased body mass indices, and engaged in daily cigarette smoking and weekly alcohol consumption[7]. These students also reported experiencing depressed mood, substance abuse, and physical violence[7]. Students also admitted to contemplating suicide, with a small percentage attempting[7].

According to a 2006 study, despite the increasing levels of physician burnout, depression, and suicide[8], very little is known regarding the mental well-being of medical students, with even less known about activities these students engage in to improve their mental states. Current day, much more research has been done regarding the mental well-being of medical students. Still, little is known regarding how these same students relieve the stressors of strenuous higher education. A meta-analysis conducted in 2017 on the prevalence of depression and suicidal ideation amongst medical students found that 27.2% of medical students experienced depression or depressive symptoms. 15.7% of these students sought psychiatric treatment for these symptoms and 11.1% of these students experienced suicidal ideation[9]. Another study examining substance abuse amongst medical students found that 91.3% of surveyed students consumed alcohol, 26.2% of students used marijuana, and 33.8% of students had five or more alcoholic drinks in one setting within the past two weeks[10]. With the increased mental health concerns experienced by medical students in the United States, therapy services and mental health counseling have also been utilized by this population, albeit limited. Between 47%–60% of medical students in a 2021 survey who screened positive for depression, anxiety, or hazardous drinking habits reported an unmet need for mental health services[11].

This study aims to identify what risky behaviors medical students in the United States engage in to cope with the stressors of medical school. We hope to examine possible correlations present between increased levels of mental duress triggered by medical school and risky behaviors. Secondarily, we would like to address the mental health disparities experienced by medical students and explore healthier methods to improve the well-being of healthcare's future. Lastly, this work contributes to an under-studied field of medical education in the United States. With this research, we hope to build upon existing literature, open discourse on the topic of the mental well-being of medical students, and further endeavors to address unhealthy coping mechanisms within this population.

Methods

An anonymous Qualtrics survey was created using the CDC's 2021 Behavioral Risk Factor Surveillance System to assess the risky behaviors of medical students. Questions were selected based on relevance to medical students' lives. Variables measured included demographic information, mental health concerns including depression, anxiety, and stress, alcohol consumption, binge drinking, tobacco/nicotine product usage, recreational drug usage and abuse, unprotected sexual intercourse, diet/nutrition, and sleep habits. Mental health habits were also examined, including the initiation of therapy/counseling services and the use of prescription drugs such as antidepressants, anxiolytics, and stimulants. The survey also included the GAD-7 and PHQ-9 to assess for Generalized Anxiety Disorder and Major Depressive Disorder within medical students. The survey was distributed to coordinators within research and administrative offices at medical schools across the United States. Medical schools were selected based on geographical location and availability of coordinator contact information. Coordinators then distributed the survey to all students (M1-M4) within their respective medical programs via email, GroupMe, or QR codes. Completion of the survey by medical

students at participating programs was completely optional. It was distributed purposefully over 50 days, from July 27th to September 15th of 2023. Upon completion of data collection, statistical analysis was conducted to determine the significance of the findings. The Chi-square test was used to analyze each of the survey questions among the different years of medical students. Post-hoc analysis with Bonferroni correction were employed among the questions with p-values < 0.05 in the Chi-square test. IBM SPSS Statistics (version 29.0) and GraphPad Prism (version 10.0) were used for data analysis.

Results

Five hundred and sixty-one (561) medical students from medical schools across 21 states within the United States completed the survey. This included 172 first-year, 175 second-year, 145 third-year students, and 69 fourth-year medical school students. The majority of survey participants were white (75%) females (62%) aged 18–24 (54%).

From our survey, comparing first, second, third, and fourth-year students to each other, we found that there is a significant difference between class levels and experiencing subjectively increased levels of stress ($p<0.001$). Specifically, 81.4% ($p=6.66 \times 10^{-8}$) of first-year medical students endorsed increased levels of stress compared to 93.1% of second years, 96.6% of third years, and 98.6% of fourth-year students. As students progress through medical school, they also experience subjectively increased levels of depression ($p<0.001$) and anxiety ($p=.002$). According to our survey, 16.3% ($p=3.44 \times 10^{-27}$) of first-year, 49.1% of second-year, 75.2% ($p=5.20 \times 10^{-12}$) third-year, and 87.0% ($p=8.03 \times 10^{-11}$) of fourth-year students admitted to experiencing increased levels of depression since matriculation. Additionally, 4th years specifically experience significantly increased levels of anxiety compared to their peers (94.2%, $p=0.005$).

There was also found to be a significant change in whether or not students subjectively admit to engaging in risky behaviors as they progress through school ($p<0.001$). When asked if students subjectively considered themselves to be engaged in risky behaviors, 9.3% of first-year students felt that they did engage in risky behaviors to cope with the increased stress, depression, and anxiety of medical school ($p=1.59 \times 10^{-6}$) compared to 26.9% of second-year, 27.6% of third-year, and 29.0% of fourth-year students.

When considering risky behaviors, we found there to be a significant difference in students increasing the amount of alcohol they consume ($p<0.001$), as well as increasing their episodes of binge drinking ($p=0.001$). 10.5% ($p=9.62 \times 10^{-5}$) of first-year students admitted to increasing their alcohol consumption since starting medical school, compared to 21.7% of second-year, 24.8% of third-year, and 31.9% of fourth-year students. Only 5.8% ($p=1.45 \times 10^{-4}$) of first-year students engaged in increased alcohol binges compared to 16.6% of second-year, 17.9% of third-year, and 21.7% of fourth-year students. Students did not significantly increase their tobacco product usage, however, students did increase their alternative nicotine product (vape, nicotine pouches) usage ($p=0.002$). Third-year medical students in particular increased their nicotine product usage more than their peers. Thirteen point eight (13.8%) ($p=1.45 \times 10^{-4}$) of third-year students admitted to increasing their nicotine product usage since matriculation, whereas less than 10% of the other class levels increased their usage. As students progress through medical school, they also increase their usage of recreational drugs and try recreational drugs for the first time ($p<0.001$). 2.3% ($p=1.08 \times 10^{-5}$) of first-year medical students increased their recreational drug use and 0.0% ($p=6.74 \times 10^{-4}$) tried recreational drugs for the first time. Comparatively, nearly 15% of second, third, and fourth-year students had increased their recreational drug use and 14.5% ($p=1.71 \times 10^{-5}$) of fourth-year students had tried recreational drugs for the first time during their tenure in higher education. First-year medical students also engage in significantly less unprotected sexual intercourse (with a non-long-term partner) than their older peers ($p<0.001$). 3.5% ($p=2.70 \times 10^{-5}$) of first-year students engage in these risky sexual encounters. It was observed that 11.6% of second-year, 18.6% ($p=5.11 \times 10^{-3}$) of third-year, and 21.7% of fourth-year students engaged in unprotected sex with non-long-term partners. Of the surveyed students, first-year medical students also seem to have the healthiest diets, with 20.3% ($p=3.63 \times 10^{-9}$) admitting their diet has worsened since matriculation compared to 40.6% of second-year, 48.3% of third-year, and 57.0% of fourth-year students admitting to unhealthier eating habits.

Despite being a healthy coping mechanism, mental health duress in longer-tenured students was evident in the significantly reported usage of mental health counseling ($p<0.001$). In their first year of medical school, 19.2% ($p=2.96 \times 10^{-14}$) of first-year students sought mental health counseling, compared to 44.6% of second-year, 59.0% ($p=1.08 \times 10^{-5}$) of third-year, and 66.7% ($p=2.67 \times 10^{-5}$) of fourth-year students. As a result of students seeking psychiatric services, a significant number of students also were diagnosed with a new psychiatric disorder since beginning medical school ($p<0.001$) with the most common new diagnosis being depression. Interestingly, levels of depression decrease through medical school with 89.9% ($p=4.46 \times 10^{-7}$) of first-year students receiving a new diagnosis of depression compared to 38.3% ($p=2.14 \times 10^{-8}$) of fourth-year students. To address mental health distress, a significant number of medical students started a new psychiatric prescription medication after matriculation ($p<0.001$). Two point three (2.3%) ($p=1.16 \times 10^{-7}$) of first-year students started an antidepressant and 2.3% ($p=1.59 \times 10^{-6}$) started an anxiolytic. The use of antidepressants and anxiolytics increases as students progress through their schooling. Thirty-seven point seven (37.7%) ($p=1.97 \times 10^{-9}$) and 30.4% ($p=1.59 \times 10^{-6}$) of fourth-year students started an antidepressant or anxiolytic, respectively (Figure 1, Figure 2 and Figure 3).

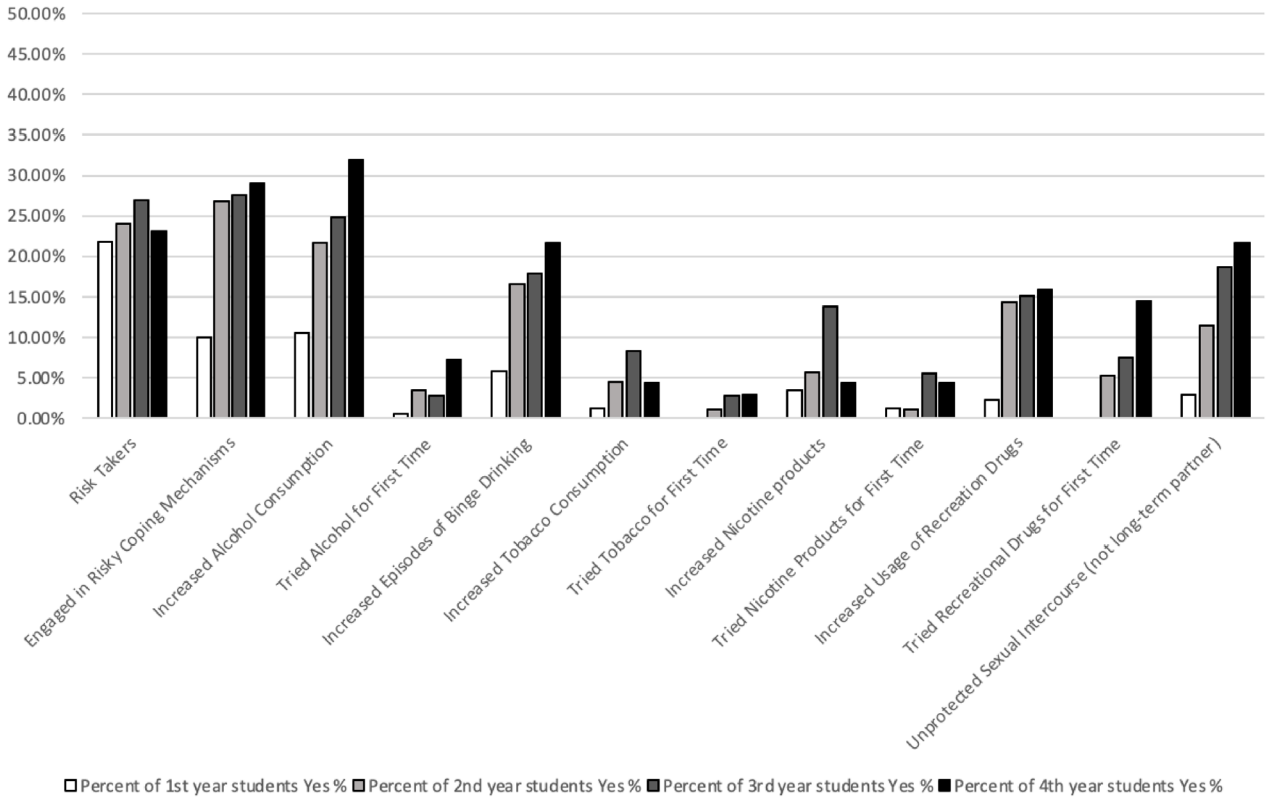

Figure 1. **Risky Behaviors by Medical School Class Cohort.**

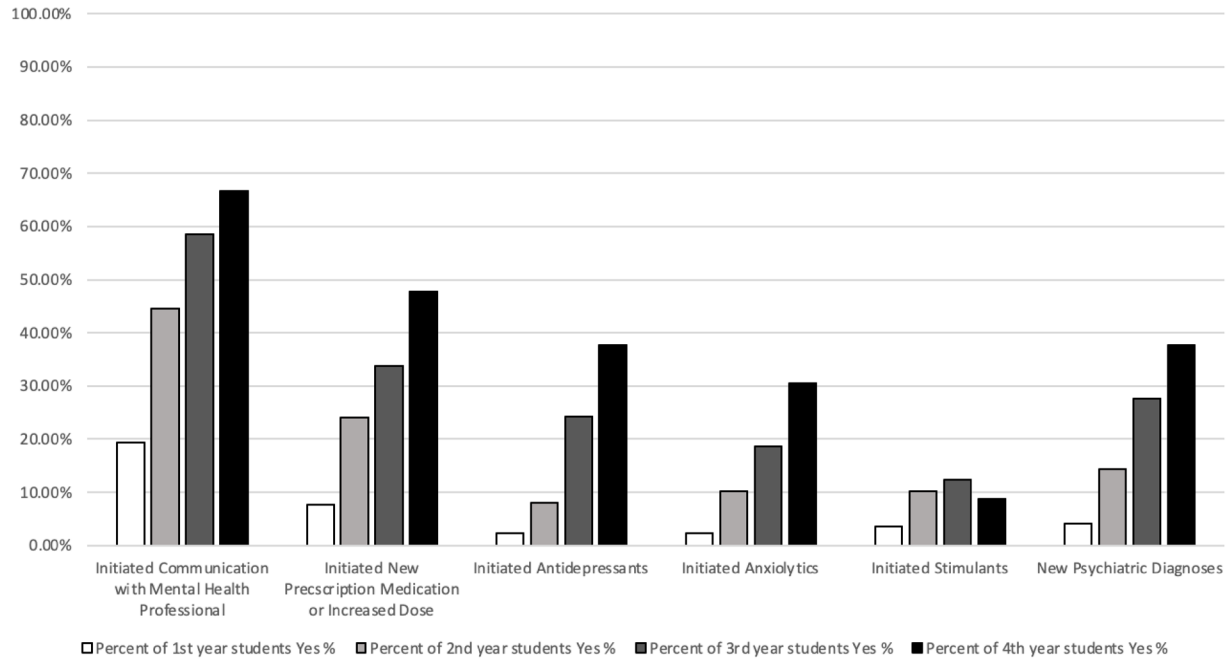

Figure 2. **Mental Wellness Report by Medical Class Cohort.**

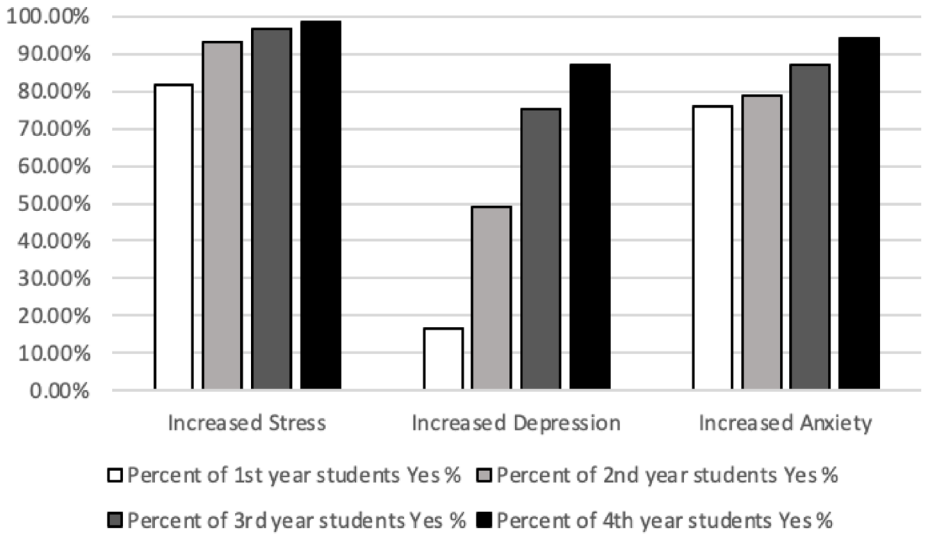

Figure 3. Stress, Depression, and Anxiety Reporting by Medical School Cohort.

Discussion

Our data suggests that as students progress through medical school, they are more likely to engage in risky behaviors, have unhealthy lifestyle habits, have a higher occurrence of psychiatric diagnosis, and be prescribed more psychiatric medications. This could be secondary to the increased levels of stress, depression, and anxiety experienced by medical students as they progress through their medical education. This increased engagement in risky behaviors, increased mental duress, and increased usage of mental health services occur almost consistently in a stepwise manner between class levels. This could result from students progressing through medical school and experiencing increased duress secondary to higher expectations, burnout, board exams, residency applications, and match.

Stigmas surrounding mental health could also impact how medical students address the burdens they face and may lead them to engage in risky behaviors. There is also evidence to support that medical students are a particularly vulnerable population, and experience rates of depression higher than those in other graduate programs or the general population[12]. With so many students experiencing mental hardship, confounded with a lack of available resources, time, or knowledge, this population is at risk of attempting to mitigate their stressors by engaging in risky behaviors that provide quick, albeit temporary, relief.

Medical school administrative staff should be aware of the mental strain experienced by their students. There is a certain unavoidable level of stress and anxiety to be expected with the rigorous course load and expectations imposed upon medical students. However, administrations should strive to provide their students with ample alternative healthy coping mechanisms to ease the duress faced by their students. With the data provided from this study, we provide evidence of the behaviors medical students engage in to seek solace in their professional lives. With this knowledge, universities can work to address these disparities and educate their cohorts on the potential dangers of unhealthy coping mechanisms. As many students in our study also sought mental health counseling, schools can offer free counseling services for their medical students and provide extended hours or virtual options for students unavailable during regular working hours. As the future of medicine, schools should strive to produce invigorated and passionate physicians eager to enter the workforce to positively impact their patients' lives.

This study was conducted at the start of the 2023 academic semester. Due to the timing of the administration of the survey, students could have been subjectively less stressed and anxious as they would be closer to midterm or final exams. In addition, as our survey was purely subjective, there could be biases present as individuals could have falsely reported or confabulated their medical school experience. Voluntary response bias, as well as negative response bias could also have played a role in our results and could be a potential limiting factor of this study. The results of the GAD-7 and PHQ-9 were not included in the final manuscript as the authors wanted to focus on students' subjective experience of depression and anxiety. Due to our method of survey distribution, we also were only able to access a small fraction of the entire medical student population within the country. We also were able to reach fewer fourth-year students compared to other class levels. This could have impacted the analysis of fourth-year students compared to their peers. There is also a risk for Type I error, however, we mitigated this by conducting Bonferroni correction.

Future studies could follow a cohort of medical students from their matriculation through graduation and monitor them with quarterly surveys to obtain a more accurate representation of their mental health and behaviors. Future studies could also compare medical students to other graduate programs including law school, dental school, nursing school, and business

school to ascertain if the stress and subsequent behaviors medical students are exposed to are also experienced by their peers in other professional training.

Conclusion

As medical students progress through medical school, they experience increased stress, anxiety, and depression and engage in more risky behaviors, perhaps to cope with the increased mental strain. This occurs in a stepwise progression as, overall, first-year students have better mental fortitude and engage in significantly less risky coping behaviors than their fourth-year peers. We propose that medical schools can attenuate these risky coping mechanisms by offering discussions and campaigns discussing the potential harms of alcohol, tobacco/nicotine, and recreational drug use for their students. In addition, medical schools should offer free clinical counseling services to their students, as we observed that nearly half of all medical students in this study sought communication with a mental health professional. There is a need to address the mental well-being of future providers and take action to ensure that the future of medicine is healthy, happy, and eager to heal.

Ethics and consent

This project was reviewed and determined to be appropriate for exemption under federal regulations as an exempt category 2 study, involving only an anonymous survey, by the Marian University Wood College of Osteopathic Medicine Institutional Review Board on November 2, 2022. IRB case number S22.177. Consent obtained from participants was implied consent. As our anonymous questionnaire was completely optional for students to participate in, by students clicking on the link and submitting their responses, our ethics committee deemed this to be a consented response. All responses were completely anonymous, no de-identification of responses was necessary. We also included in the survey the purpose of the study, the content of the questionnaire, what their responses would be used for before they submitted their responses, and that there is no risk involved in completing the survey and participation is completely optional.

Data availability

Underlying data

Figshare: Risky behaviors amongst medical students within the United States. https://doi.org/10.6084/m9.figshare.27855435.v3[13]

The project contains the following underlying data:

1. Risky Behaviors within Medical Students_December 1, 2024_14.24

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http://www.doi.org/10.6084/m9.figshare.27855435.v3

Open Peer Review

Current Peer Review Status: ✔ ✘ ✘

Version 2

Reviewer Report 27 August 2025

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✘ **Devika Bhatia**
Anschutz Health Sciences Building, Aurora, USA

Overall, this study aims to describe risky behavior of medical students and compare risky behaviors between first-, second-, third-, and fourth-year medical students. The strengths of this study include the large sample size and the breadth of risky behaviors assessed, as well as the novelty of exploring risky behaviors among medical students. The major limitations of this study are the lack of clarity in the methods and results sections (particularly, variable definitions and which models were tested, thus making assessment of the authors' interpretation difficult) and the lack of adjustment in analyses for potential confounders, which again limits interpretation. Without understanding the statistical analyses further (i.e., without clearer description of the Chi-square tests performed), it is hard to say whether the interpretation of the results in the discussion are accurate or overstated.

Abstract: The abstract is clear and concise. However, the introduction section of the abstract could be improved upon – it does not include the aims for the study. Further, the conclusion section could be more clear as to who the "peers" are for the 1st year medical students (having read the paper, I gather that they mean 2nd, 3rd and 4th year medical students, though as the abstract is the first thing many readers read, it could be interpreted as non-medical student peers or the national average).
Introduction: The introduction does a decent job of connecting the pressures that medical students experience, the burden of mental health concerns they also may experience, and that they may turn to risky behaviors to mitigate these stressors. They also discuss how these behaviors may lead to further problems for medical students. They also make the argument that risky behaviors in this population are understudied in the US. There are a few concerns below:

- I'm not sure how risky behaviors can "lead" to attention deficit disorder – tis is a disorder of childhood, and likely would precede risky behavior
- I'm not sure I got from the abstract that the authors were exploring "increased levels of mental duress" – rather, just exploring risky behaviors.
- I also am not sure what "mental health disparities" means – does this mean access to services?
- Minor: "Current day" sounds a bit awkward, consider changing to "Currently," or "Since then,

…"
- Minor: "This study aims to identify what risky behaviors medical students…" – please change "what" to "which"

Methods
- How did the authors assess whether the questions selected were "relevant to medial students' lives?"
- Which type of schools were included in medical schools across the US? Were DO programs included as well as MD programs?
- It would be helpful to define the variables that the authors list (if not in methods, in a supplementary table)
- After reading the results section, it became apparent that more clarity and detail was needed in the methods section regarding the Chi-square tests that were performed. What were the individual models tested? Were chi-square tests comparing individual years to one another performed for each outcome? If not, authors can only describe that there was a difference detected among the groups, not specific differences between say, 1st year medical students and 2nd year medical students, or between 4th years and 1st, 2nd, and 3rd years combined.
- Were any tests performed that adjusted for demographics?

Results
- When referring to specific p-values and chi-square tests, the authors need to refer to the tables or figures in which those results appear. It is unclear which tests led to which p-values otherwise.
- It is unclear which tests the results are referring to in the results section (see note in the methods section about needing more detail about which models were tested).
- "According to our survey, 16.3% ($p=3.44 \times 10^{-27}$) of first-year, 49.1% of second-year, 75.2% ($p=5.20 \times 10^{-12}$) third-year, and 87.0% ($p=8.03 \times 10^{-11}$) of fourth-year students admitted to experiencing increased levels of depression since matriculation" I'm not sure which tests the p-values in this section are referring to. If chi-square analysis was performed to detect differences between the groups, there should be only 1 Chi-square value and 1 p-value to detect differences between groups (rather than individual p-values for each predictor). More explanation here would be helpful.
- If p is <0.001, there is no need to express the exact p-value in the results section (e.g., "$p=3.44 \times 10^{-27}$) – authors can simply state in these cases, "p<0.001".
- "Students did not significantly increase their tobacco product usage, however, students did increase their alternative nicotine product (vape, nicotine pouches) usage (p=0.002)." – is this referring to all students, or students in a particular class compared to others?
- Minor: "Thirteen point eight (13.8%) ($p=1.45 \times 10^{-4}$) of third-year students admitted to increasing their nicotine product usage since matriculation, whereas less than 10% of the other class levels increased their usage." The beginning of this sentence is missing the word "percent" and is redundant – I'd advise choosing to write out the percent or keep it in numbers. Same with the sentence, "Two point three (2.3%) ($p=1.16 \times 10^{-7}$) of first-year students started an antidepressant and 2.3% ($p=1.59 \times 10^{-6}$) started an anxiolytic." And "Thirty-seven point seven (37.7%) ($p=1.97 \times 10^{-9}$) and 30.4% ($p=1.59 \times 10^{-6}$) of fourth-year students started an antidepressant or anxiolytic, respectively (Figure 1, Figure 2 and Figure 3)."
- Minor: "First-year medical students also engage in significantly less unprotected sexual intercourse (with a non-long-term partner) than their older peers (p<0.001). 3.5% ($p=2.70 \times 10^{-5}$) of first-year students engage in these risky sexual encounters." It may not be a fair

assumption that students in higher years are always older than 1st year medical students. It may be more accurate to say "than peers in higher years".
- "Despite being a healthy coping mechanism, mental health duress in longer-tenured students was evident in the significantly reported usage of mental health counseling ($p<0.001$)." This sentence was a bit confusing and would benefit from rewording.
- "As a result of students seeking psychiatric services, a significant number of students also were diagnosed with a new psychiatric disorder since beginning medical school ($p<0.001$) with the most common new diagnosis being depression." How do the authors know that the new diagnoses were a result of students seeking psychiatric services? It is possible that the new diagnoses came as a result of PCP appointments, or because this is self-report, self-diagnoses via internet searches, friend opinions, etc.

Discussion
- "Stigmas surrounding mental health could also impact how medical students address the burdens they face and may lead them to engage in risky behaviors." What evidence is there that the authors could cite to support this claim?
- "With so many students experiencing mental hardship, confounded with a lack of available resources, time, or knowledge, this population is at risk of attempting to mitigate their stressors by engaging in risky behaviors that provide quick, albeit temporary, relief." While this study assessed seeking mental health services, it did not assess "knowledge" or "time" being factors impairing utilization – thus, this seems to be a bit of an overstatement unless backed by other evidence.
- "With the data provided from this study, we provide evidence of the behaviors medical students engage in to seek solace in their professional lives." I'm not sure this is an accurate conclusion. There was no question or assessment as to whether those who were experiencing depression/stress, etc. used the risky behaviors assessed to "seek solace in their professional lives". More accurate might be that medical students MAY use such risky behaviors to mitigate stress experienced in medical school.
- "With this knowledge, universities can work to address these disparities and educate their cohorts on the potential dangers of unhealthy coping mechanisms." I'm not sure which disparities the authors are referring to here.
- An additional limitation was the lack of adjustment for confounders in analysis (though the authors did collect potential confounders, including demographic factors).
- The decision of not including GAD-7 and PHQ-9 scores needs more detail and to be discussed in the methods section rather than the limitations section. Because they are filled out by the participants themselves, it would still be subjective.

Is the work clearly and accurately presented and does it cite the current literature?
Partly

Is the study design appropriate and is the work technically sound?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
No

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Have any limitations of the research been acknowledged?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
No

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Epidemiological research, risk behaviors, substance use

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Version 1

Reviewer Report 24 February 2025

https://doi.org/10.21956/mep.22067.r40945

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The research investigates mental health concerns and coping mechanisms of medical students and in particular focuses on “risky behaviors.” The study has potential to contribute to the scholarly work that investigates mental health and well-being of students enrolled in professional programs but fails to appropriately or meaningfully engage with contemporary literature on the topic and has methodological issues that must be resolved.

I cannot support this manuscript for indexing as is. I suggest engaging more thoroughly with the literature, resolve the methodological questions and issues with results. This will help to better frame the study and situate the results within the large body of literature that already addresses many of these topics.

INTRODUCTION

The introduction mischaracterizes risky behaviors as causative of psychological disorders, which I

imagine the authors do not wish to assert. Rather, these behaviors and disorders have a complex and interrelated relationship that may, at times augment one another.

The slim literature review is outdated and cites commentaries as evidence. For instance, the following quote is misleading, “Despite the increasing levels of physician burnout, depression, and suicide, very little is known regarding the mental well-being of medical students…” This sentence cites a paper from 2006 and is factually inaccurate, there is a dearth of information on the mental well-being of medical students in the past 20 years the authors have not engaged with. A more recent meta-analysis is provided in the citations.

“This study aims to identify what risky behaviors medical students in the United States engage in to cope with the stressors of medical school. Secondarily, we would like to address the mental health disparities experienced by medical students and explore healthier methods to improve the well-being of healthcare’s future. Lastly, this study is, to our understanding, the first of its kind performed in the United States. With this, we hope to open discourse on the topic of the mental well-being of medical students.”

- Discourse on mental well-being of medical students is quite open; unfortunately, the authors have not meaningfully engaged with it and this is a limitation.

METHODS

From a methodological standpoint, I have many questions that are left unanswered and present threats to the credibility and thus results of this research. For instance,

- How were these surveys distributed and by whom. Which schools were selected and why? Who distributed them and how was access gained? How could this influence the response rate or results?
- Informed consent was indicated to be “implied” and that the instrument was "anonymous" Available data suggests that what was collected was not anonymous but has been de-identified. This can influence responses and should be discussed.
- How many items were on the final instrument? How were they presented? How could this impact results?

RESULTS

“Five hundred and sixty-one (561) medical students from 21 medical schools across the United States completed the survey. This included 172 first-year, 175 second-year, 145 third-year students, and 69 fourth-year medical school students. The majority of survey participants were white (75%) females (62%) aged 18–24 (54%).”

- What is the response rate for this and how do these demographics compare with medical students in the populations sampled as well as in the populations as a whole?

Data available online does not match the results described. It is unclear to the reader what analyses were performed and how this relates to the research aims. The validated GAD-7 & PHQ-9 were both used yet none of the measures were reported or compared with other groups or published studies. For instance, "As students progress through medical school, they also experience increased levels of depression ($p<0.001$) and anxiety ($p=.002$)," does not indicate which cut off they are using to indicate what "increased levels" mean. The validated instruments have guidelines for what constitutes clinically significant or depression/anxiety that likely interferes with daily activities and this is not included here.

DISCUSSION

"Our data suggests that as students progress through medical school, they are more likely to engage in risky behaviors, have unhealthy lifestyle habits, have a higher occurrence of psychiatric diagnosis, and be prescribed more psychiatric medications. This is likely secondary to the increased levels of stress, depression, and anxiety experienced by medical students as they progress through their medical education."

- The authors should have the data to test for a correlation here that might better support this opening claim.

"Stigmas surrounding mental health could also impact how medical students address the burdens they face and may lead them to engage in risky behaviors..."

- This does not discuss stigma around mental health nor the literature. There are recent reviews of this in addition to a larger body of work. Examples are provided.

“Future studies could follow a cohort of medical students from their matriculation through graduation and monitor them with quarterly surveys to obtain a more accurate representation of their mental health and behaviors. Future studies could also compare medical students to other graduate programs including law school, dental school, nursing school, and business school to ascertain if the stress and subsequent behaviors medical students are exposed to are also experienced by their peers in other professional training.”

- This has been reported in veterinary medicine. Citation provided.

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Is the work clearly and accurately presented and does it cite the current literature?

No

Is the study design appropriate and is the work technically sound?

No

Are sufficient details of methods and analysis provided to allow replication by others?
No

If applicable, is the statistical analysis and its interpretation appropriate?
I cannot comment. A qualified statistician is required.

Have any limitations of the research been acknowledged?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: veterinary medical student mental health and well-being; veterinary professional identity

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Reviewer Report 04 February 2025

https://doi.org/10.21956/mep.22067.r40948

Dr. Miriam Simon
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The article highlights a crucial area that needs to be addressed regarding mental health status among medical students. With the prospect of becoming healers in the near future, it is vital that students in the healthcare professions utilize healthy stress coping mechanisms. The objectives of the study and corresponding results therefore brings to focus the urgency of requisite well-being initiatives for medical students. The study also has a strong community-oriented focus with guidelines for practical applicability while planning mental health and behavioral interventions for

medical students. As included as a limitation, it may be more suitable to extend the study to include a more representative study sample.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Have any limitations of the research been acknowledged?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Applied Psychology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.