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THE ASSOCIATION BETWEEN DEPRESSION, ANXIETY, PERCEIVED STRESS, AND

COPING MECHANISMS AMONG PREMEDICAL STUDENTS AT UCR

By

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A capstone project submitted for Graduation with University Honors

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Abstract

Depression and anxiety are the two most prevalent mental illnesses affecting premedical students in the United States. In recent years, increased research about this topic suggests that most premedical students deal with symptoms of depression and anxiety that persist throughout their medical careers, associating with future burnout and increased risk for suicide. Many effective psychological services exist for these treatable disorders, yet they are rarely utilized by students. To better understand the risk and mechanisms for depression and anxiety among UCR premedical students, this study aims to investigate the association between depression, anxiety, perceived stressors, and coping mechanisms in this at-risk student population. Survey methods will be used via established questionnaires administered to premedical students of: the Perceived Stress Scale (PSS); Brief COPE; Patient Health Questionnaire-9 (PHQ-9); and Generalized Anxiety Disorder-7 (GAD-7), COVID-19 Student Stress Questionnaire (CSSQ). After data collection is complete, quantitative analyses (i.e., descriptive statistics, Pearson's correlations, linear regression) will be employed to determine the associations between these variables. We expect to see a positive correlation between perceived stress with depression and anxiety, and a negative relationship between healthy coping strategies with depression and anxiety. This study can be potentially useful in providing new information about the mental health of the premedical student community to UCR counseling services and departments, providing them with a starting point to further pursue this topic and design effective outreach engagement to improve premedical student well-being at UCR. Through improved well-being, UCR students may experience lowered risk for future burnout, mental health issues, and suicide.

Table of Contents

Introduction

Physician Burnout

A rise in physician burnout and suicide in the United States has led to increased focus surrounding this topic in medicine. According to recent research, almost half of the physicians in the United States experience burnout at some point of their medical careers, which can lead to persistent, negative effects on healthcare [4]. Given the current healthcare system and environment, work-related stress is on the rise. In medicine, an increased emphasis on administrative and business duties have created extra stressors and workload for current physicians. Balancing these roles along with clinical responsibilities can be really difficult for already-overworked physicians to manage. Not only that, these extra tasks take precious time away from the therapeutic patient-physician interactions, possible contributing to higher levels of stress, frustrations, and worse health outcomes on both sides., The rise in clerical responsibilities can pose a serious barrier for physicians who have been practicing medicine for a while; chances are that they have not received much or any training on navigating the clerical tasks, and they have probably adapted to this demand on their own.

Criteria for Burnout

Burnout is "a psychological syndrome that results from a prolonged response to occupational or educational stressors" and consists of three dimensions: emotional exhaustion, depersonalization, and reduced personal accomplishment [5]. In studies, burnout is most commonly measured by the Maslach Burnout Inventory (MBI), a 22-item instrument that gathers frequency of feeling associated with the 22 scales. Each scale can be scored from 0 (never) to 6 (every day), and will fall under one of the three dimensions of burnout (i.e., emotional exhaustion, etc.) [10]. For physicians, emotional exhaustion (a score 27 or greater out of 54)

refs to being emotionally empty and having nothing left emotionally to offer to their patients during the workday. With empathy being a critical, non-negotiable skill for a healthcare professional to have, it is plausible that emotionally exhausted physicians might be underperforming at work, are dissatisfied with a decrease in optimal health outcomes, and have declining mental health as a result. Depersonalization (score of 10 or greater out of 30) refers to detachment from the treatment of patients, involving negative, cynical, or cruel sentiments, and viewing patients as objects instead of human beings with varying experiences. Reduced personal accomplishment (score of 33 or less out of 48) refers to feelings of inefficacy, dissatisfaction, and depreciation of one's work ethic or results towards patient care services and accomplishments [16].

Current Findings at Premedical Level

Although extensive research has been conducted to examine burnout at the medical student, resident, and physician level, there is little known about the risk of burnout at the earlier undergraduate, premedical student level. In the limited research that exists, premedical students have been shown to exhibit higher levels of burnout, depression, and anxiety compared to non-premedical students [5]. Since premedical students are more prone to burnout due to intrinsic and extrinsic factors, it is important to prevent burnout in aspiring physicians through targeted research, wellbeing programs, and fostering a productive yet healthy work environment. Factors such as the stress, competitive nature, lack of healthy coping mechanisms, and mental health issues that are part of the premedical pathway seem to contribute to burnout's three criteria. Even though current psychological services exist that help with stress, anxiety, and depression management, students rarely end up seeking help for various reasons. Consequently, this pattern

5

persists throughout and influences all levels of medical education and training, which diminishes physician well-being in the long run and potentially harms the quality of patient care.

In the literature, there is a significant gap in current, accurate knowledge regarding the premedical experience and how it molds future physicians in the United States. Although not comprehensive in scope, most of the pre-existing studies done at this level mainly examine the association of gender, ethnicity, and medical career interest. Studies accounting for gender found that females, especially those exhibiting depressive symptoms, scored higher on the emotional exhaustion dimension for burnout and had higher chances of attrition from the premedical pathway. Important to note that once depression was accounted for in variable analysis, no significance was found between emotional exhaustion, gender, and premedical status [5-7]. However, these findings are not sufficient to explain the gender differences in attrition rates. Studies accounting for ethnicity in premedical students found similar results.

Compared to their non-URM counterparts, URM (i.e., specifically Hispanic or black identifying) premedical students showed decreased interest rates and higher attrition rates upon progression on the premedical pathway. Family income, support networks, and experiences at the start of the premedical journey seem to be strongly correlated factors in partly describing this phenomenon [1]. With more opportunities and support networks being tailored towards URM in medicine, it could lead to lower attrition rates in the near future but data is very limited on this topic. Not only that, the URM students included in this study were from Stanford only so the results are not generalizable to campuses with varying levels of ethnicity, especially one as diverse as UCR. However, this opens up a starting point for future, detailed-longitudinal research exploring connections between ethnicity, attrition rates, and other relevant variables such as support networks, resources, etc. Surprisingly, another study found that premedical students of

color reported higher mean levels of coping efficacy even though they reported facing more barriers on their journey [9].

One study concluded that meditation-based interventions have the potential to reduce stress levels, and potentially burnout, in premedical and medical students. Participants reported lowered psychological distress (including depression), state and trait anxiety, higher levels of empathy and positive spiritual experiences [15]. These results were consistent and replicable even during high stress periods such as examinations. Outside of this work, minimal research has been conducted on the coping mechanisms that premedical students employ to deal with depression, anxiety, and stress.

Additionally, research investigating demographics among the premedical population is very limited. For example, age and sexual orientation have not been extensively studied in the premedical population. As more non-traditional students matriculate into medical schools and potentially become doctors, it is important to examine how age plays a role in physician well-being. Similarly, the norms surrounding sexuality in the United States are constantly changing, making sexual orientation a notable factor in psychological health because students who identified as non-heterosexual showed higher levels of depression, anxiety, and low-self rated health [13].

Current Findings at Medical Student Level

In the literature, findings on medical students seem to be much more extensive compared to premedical students. Perceived stress seems to be the most-studied variable in medical students. After completing premedical education, medical students start to face extra stressors and challenges unique to medical training, which can make them more prone to worsening mental health. Balancing the tough challenges of medical school training along with other

7

responsibilities can be very demanding and exhausting. Best case scenario, medical students would develop their professional and medically-necessary skills alongside strategies for self-care, personal well-being, and growth. Unfortunately, due the tough work-life balance, personal health tends to be neglected by medical students. Assumably, medical students taking care of their wellbeing and mental health would turn out to be healthier and better medical professionals.

One study comparing stress and burnout in different stages of the medical profession (i.e., premedical, medical, physician) surprisingly found that medical students' mean scores for all burnout dimensions, anxiety, and depression fell in between those of physicians (lowest scores) and premedical students (highest scores) [14]. One would expect physicians and medical students to score higher on these variables due to the increased amount of challenging and unique stressors they face as they progress with their medical training, yet the opposite results were seen. Another study analyzing stress and coping strategies among first-year medical students found that common sources of stress such as academic progress and the lack of resources and/or financial stability to be strongly correlated with high mean stressor scores based on the General Health Questionnaire-12 (GHQ-12) scoring. Higher academic performance, patient interactions, and supportive social networks and learning environments were strongly correlated with low mean stressor scores [11]. Gender differences were also taken into account, with females exhibiting higher mean stressor scores in most of the stress sources.

A lot of medical students might face challenges in regulating their psychological wellbeing and behavioral tendencies as they transition from didactics towards clinical rotations during the second half of medical school. This shift in expectations and environment might lead to an increase in anxiety symptoms as unintentional coping mechanisms, and its relation to perception of performance. While examining this phenomenon, researchers found that third-year

medical students had the highest levels of anxiety and depressive symptoms which correlated with lower perceived performance scores. On the contrary, first-year students exhibited more obsessive-compulsive symptoms instead of anxiety symptoms. Accounting for gender revealed that female medical students were more significantly associated with lower perceived performance than their male counterparts [3]. Via multivariate analysis, researchers from a different study concluded that medical students from sexual minority groups reported higher scores on health and social stressor measures (i.e., anxiety and depressive symptoms, harassment, isolation, worse health) compared to heterosexual students [13]. Since sexual minorities and females face unique challenges due to their characteristics, they may need more wellness initiatives that are able to provide more individualized, targeted support and resources. However, more extensive research is needed in order to draw any conclusive and generalizable results.

In terms of improving mental wellbeing and helping individuals deal with stressors, research strongly indicates the benefits of Mindfulness-Based Stress Reduction (MBSR) interventions as coping strategies. The same study, already discussed previously for premedical students, found the same outcomes for medical students after the short, 8-week intervention was given as a means of reducing stress. Participants were able to develop their empathy, listening, and compassion skills more for the betterment of the patients' and their own health and wellbeing. For this sample, reported trait anxiety seemed to be the key variable through which effects were produced in other variables [15]. Another study analyzed whether certain coping styles (wishful thinking and self-blame) impacted neuroticism's effects on anxiety levels under stress (examinations). It found that high neuroticism contributed to increase pre-examination

anxiety and daily anxiety levels, indicating that coping strategies can play a role in inducing psychological distress [2].

Additionally, a systematic review of the efficacy of MBSRs on reducing depression, stress, fatigue, and burnout offered mixed findings on the variables. For stress, depression, and burnout, notable reductions were found in 57% (4 studies), 67% (6 studies), and 33% (1 study) of the studies, respectively. No studies reported a reduction in fatigue levels after implementation of the intervention [8]. However, six of the 8 studies (accounting for gender) reviewed primarily had female-dominated samples, making it harder to generalize the efficacy of MBSRs to male medical students. On the other hand, more research is needed to generalize anything to a specific subgroup of medical students considering the lack of extensive research surrounding this topic.

Relevance of COVID-19 Pandemic Lockdown

With COVID-19 disrupting the entire world, its persistence has caused many negative health outcomes for man people, especially medical professionals. Some challenges this pandemic has brought for healthcare workers include but are not limited to: financial changes, lifestyle changes (i.e., decreased freedom and opportunity for sustenance of meaningful interpersonal relationships), inability to provide necessary quality care due to resource shortages, unmanageable stress and workloads, and less time for personal care. Undoubtably, this pandemic would have some impact on mental health of healthcare workers. Compared to the general population, medical professionals exhibited higher levels of depressive symptoms, COVID-19 related stress, anxiety symptoms, and health concerns but they also reported lower levels of proactive coping [12]. Higher levels of proactive coping are associated with better emotional regulation, lower depressive and anxiety symptoms, and more resiliency by allowing the individual to skillfully modify highly stressful events to obtain the best health outcome [12].

The struggles of healthcare professionals during this pandemic have been widely broadcasted on various mass and social media platforms. With that in mind, it is important to note how this might associate with aspiring physicians' desire and interest to continue with medical training, and with their burnout levels and overall wellbeing. Based on the previously-mentioned research on premedical attrition rates, it is plausible that the pandemic might push away or create extra barriers for female and URM premedical students on their pathway to medical school and beyond.

At this time, this study will be the first to investigate the relationships between perceived stress, coping mechanisms, depression, and anxiety to correct outdated information and preconceived notions regarding the premedical population at UCR, especially since academia and medicine are continually evolving.

Future Impact and Implications

Understanding the impact that these stressors and barriers to well-being have on aspiring physicians will allow further insight into managing burnout and suicide among this understudied student population. The key findings of this project have the potential to enhance the health of this country's college students and future physician leaders through dissemination of social and scientific knowledge and understanding. Similarly, the limitations of this project will provide a better understanding of the direction that future researchers might need to consider in order to tackle the issue of premedical well-being, and its relation to physician burnout. Institutions and organizations can use the results and the new perspectives obtained from this study to pursue outreach events, and design effective interventions so student well-being can be improved. An increase in awareness and engagement surrounding this topic can have long-lasting benefits on the future of premedical community, healthcare, and academia. Since burnout can develop from

a multitude of factors, it is imperative that proper identification and understanding of these factors can begin through this preliminary study.

Methods

Participants

The sample will consist of adult premedical students across all academic classes (i.e., 1st year, 2nd year, etc.). Premedical students from non-STEM and STEM majors will be included in the study to allow for an accurate representation of the target population. Age (i.e., less than 18 years) and premedical status (i.e., no) will be the only criteria used to exclude participants from this study. The study aims to reach out to ~250 participants.

Procedure

Five well-established surveys (i.e., the PHQ-9, GAD-7, PSS, Brief COPE Inventory, and CSSQ) will be administered along with a novel, demographic-based survey which will be designed through Qualtrics. All premedical students registered as interested in applying to medical school in UCR's Health Professions Advising Center (HPAC) will be sent an e-mail, which will include the project's purpose, description and a hyperlink for voluntary participation. Expected time of completion for all of the survey instruments is 15-20 minutes. A progress bar has been enabled at the top of the Qualtrics pages for the participants to track their progress. Participants will not receive compensation or direct benefits for their participation because this study is minimal risk, but there are some indirect benefits to this study which are mentioned in the informed consent form. Possible discomforts include mild, everyday-like psychological stress induced by the survey. Consequently, the end of the survey includes a section of resources accommodating for psychological distress. All collected responses will be confidential, anonymous, and will be stored

in a password-protected account to prevent data breaches. At the end of the survey, there will be a message indicating and thanking the participant for their involvement in this study.

Following IRB approval, social media connections and campus departments (i.e., university honors, the Well, etc.) will be utilized to help promote survey dissemination efforts to reach the largest sample possible. Data will be collected for 1-2 academic quarters. Following data collection, quantitative analyses (i.e., descriptive statistics, Pearson's correlations, linear regression) will be employed to determine the associations between these variables.

Instruments

The Patient Health Questionnaire-9 (PHQ-9) is a nine-item, well-established questionnaire that will be used to objectively evaluate depressive severity among the premedical students. In the United States, it is a validated and reliable screening tool for major depressive disorder in clinical settings.

The Generalized Anxiety Disorder-7 (GAD-7) is a seven-item questionnaire that will be used to objectively determine the presence and severity of anxiety symptoms among the participants. In the United States, it is a validated and reliable screening tool for GAD and other anxiety disorders in clinical settings.

The Perceived Stress Scale-10 (PSS-10) is a ten-item questionnaire that is validated and widely-used to assess an individual's perception of stress in varying situations. The questions are not specific to a certain subgroup or population, making it appropriate to use as a measure of perceived stress in premedical students. Considering this study's target population, the scales are relatively easy to read and comprehend. The scales mainly ask about how the participants felt or thought about a specific stressor or stressful situation during the last month.

The Brief-COPE (Coping Orientation to Problems Experience) inventory is a validated, 28-item questionnaire that will be used to evaluate different coping strategies employed in order to deal with stressful situations. It is an abbreviation of the original COPE inventory, and is one of the most widely-used questionnaires in the United States for assessing the frequency of numerous coping strategies employed following stress. This abbreviated inventory will overcome the limitation (i.e., length) of the original COPE inventory, Considering the amount and type of survey measures used in this study, survey length would have been a detrimental limitation for this project if the Brief-COPE was not utilized and would have led to participants facing difficulties in completing the survey.

The COVID-19 Student Stress Questionnaire (CSSQ) is a seven-item questionnaire that will be used to assess the stressors premedical students at UCR have encountered during the COVID-19 pandemic lockdown. The CSSQ consists of three subscales evaluating stressors corresponding to: interpersonal relationships (i.e., family/relatives, professors, colleagues), social isolation (i.e., perception of social distancing regulations, and its implications on sexual intimacy and relationships), and fear of COVID-19 related contagion (i.e., perception of contagion risk and safety during lockdown). There are other scales out there as well but by themselves, they do not have the ability to directly recognize the specific stressors induced by lockdown regulations and stressor-related disruptions of routine behavior. Consequently, they would only be able to provide input on psychological aftermath of the pandemic.

The survey created through Qualtrics will be used to determine the target population's demographics (i.e., race/ethnicity, gender, premedical status, etc.).

Demographic Survey Design

The demographics survey consists of ten questions, including multiple choice and open-text entry questions. Studies done on survey design efficacy were used along with the CDC Question bank to construct these questions in an appropriate, sensitive, and effective manner. Gender identity, race/ethnicity, sexual orientation, age were some of the typical questions included in the survey. Additional questions covered topics such as premedical status, academic standing, first-generation status, utilization of mental health resources, and academic colleges. Age will be used as a criterion for screening out a subgroup of participants (i.e., less than 18 years old) since only legal adults will be allowed to finish the survey. Not only that, age might provide some insight into the relationship between life experiences and mental wellbeing. Those who enter a number less than 18 in the text-entry box will automatically be skipped to the end of the survey and their data will be filtered out. Additionally, participants who answer no to the question "Are you a pre-medical student at the University of California, Riverside?" will be screened out and data will be filtered since the study aims to solely assess premedical student wellbeing. This survey will provide a better comprehension of the collected data and results since it will create a better picture of the population's characteristics and experiences.

Necessary Preparations

- IRB approval: Since surveys/questionnaires will be administered to measure socio-behavioral characteristics of the target population, approval will be needed from the IRB-SB department to conduct this study. Upon approval, the surveys will be administered to the target population, who will be able to participate in this study if they carefully read the informed consent form and provide consent. After reading, if participants do not provide consent, are under 18 years old, or are not premedical students, they will

15

automatically be screened out to the end of the survey and their data will not be included

in data analysis processes used to create the study's results.

- Informed consent was constructed in Qualtrics and will be placed at the beginning of the

    survey. The informed consent was constructed based on the informed consent guide from

    UCR's Office of Research Integrity. This form will provide participants information on

    the study's purpose, procedure, and relevant information regarding participation rights

    and alternatives. Additional information regarding compensation, risks, possible benefits,

    right to terminate/withdraw, and privacy protection will be included so the participants

    are well informed before proceeding. All responses will be anonymous, which is

    emphasized in the consent form itself so participants are not at risk for privacy breaches

    due to collection of identifiable information. Contact information of the research team is

    also included if participants have any questions and/or concerns regarding the study, or if

    they would like to have access to the study's findings upon its completion.

Potential Limitations

Several limitations are expected with this project. First, even though the PHQ-9 and

GAD-7 are well-established questionnaires, they may not be the most appropriate measures of

depressive and anxiety among the undergraduate student population because they were designed

as screening tools for clinical settings. Hence, these measures might not be the best indicators of

general mental health and wellbeing among UCR's premedical students.

Self-selection and self-report bias are also potential limitations due to the nature of the

study. Since surveys will be used as the primary means of data collection, individuals might

understate or overstate the presence of these variables in their undergraduate experience, which

hinders the establishment of an accurate correlation among these variables. Many premedical

students tend to be out of touch with their psychological wellbeing, so self-assessing oneself as accurately as possible might prove to be a challenge.

The occurrence of the COVID-19 pandemic lockdown also posed to be a limitation on the progression of this study. If the pandemic had not occurred, the study could have been completed, and findings could have been discussed and discussed. Similarly, despite COVID's effects on mental health and overall wellbeing, this study is not COVID-focused and did not account for the prevalence of lockdown when receiving responses from participants. By the time this study receives IRB approval, my target demographic might be drastically different considering the incoming freshmen students and the impact of a hybrid instruction format for Fall 2021.

Not only that, but making the response collection an anonymous response could be a possible limitation of this study since it prevents the possibility of this study's transformation into a longitudinal project as part of future research. One possible design could be to collect identifying data so that the same variables would be subject to data collection again in the future when the research team follows up with the participants. With some students either continuing with medical education or changing their career pathway, this approach could open up an interesting perspective on how interventions and other wellness programs might influence future wellness and prevalence of burnout or mental illness in the same students. The literature on premedical burnout and mental health is lacking significant longitudinal studies. However, taking the anonymous approach is not a true or important limitation of this study since it aligns with the project's goals and significance.

Lastly, the study is being conducted at a small scale due to time constraints. Since this study's target population will only include UCR's premedical students, the results might not be

generalizable to other campuses and premedical populations due to variance in factors such as campus culture, academic stressors, socioeconomic status, etc. UCR's student population is known to be the most ethnically-diverse out of all the UC campuses, potentially making it harder to generalize the results to the general premedical student population. UCR's ethnic and cultural diversity brings out a unique pool of participants for establishing demographics in any research study.

Conclusion

Although this study will be the first to examine the associations between these variables among premedical students at UCR, the literature is lacking extensive research on this topic especially at the premedical student level. The study does not aim to narrow down a multitude of gaps regarding burnout understanding and its consequences. More quantitative and longitudinal studies need to be conducted in order to understand this insufficiently explored topic and to make progress in the fight against burnout and physician suicide. Despite this study's promising design, it will not make up for the lack of conclusive research in this field. Gaining a better understanding on this topic is crucial for the healthier future of aspiring physicians in terms of mental wellbeing and better health care. The future results of this study could be well utilized by UCR and other institutions to actively tackle the wellbeing of this at-risk, understudied population. With premedical and medical students being much more prone to stress, burnout, depression, and anxiety compared to the general population, it is important to fully comprehend why this phenomenon is so prevalent and what factors might be contributing to its prevalence. Although MBSRs lack conclusive findings to support its guaranteed efficacy, they seem like a promising start to battle burnout. When taking variables such as demographics (i.e., gender, ethnicity, etc.) into account, current research seems to indicate a lot of conflicting results on the

associations of certain factors associated with premedical and medical wellbeing, making this a

complicated yet necessary field to obtain a comprehensive understanding of.

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