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## Prevalence and Risk Factors for Anxiety in Medical and Allied Health Students in the United States and Canada

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# Prevalence and Risk Factors for Anxiety in Medical and Allied Health Students in the United States and Canada

## Abstract

**Purpose** The purpose of this study was to determine the current known prevalence and risk factors for anxiety in medical and allied health profession students. The framing question for this systematic review was, "What is the prevalence of and mitigation of risk factors for anxiety among medical and allied health profession students?" **Method** CINAHL, Medline, PsychInfo, and SportDiscus were searched for peer-reviewed English-language articles published between January 2000 to October 2020 reporting primary data on anxiety in U.S. and Canadian medical and allied health students. Searches used combinations of Medical Subject Heading terms students, allied health, nursing, medical, athletic training, occupational therapy, physical therapy, physician assistant, anxiety, anxiety disorders, stress, psychological distress, or emotional regulation. Reference lists were inspected to identify additional relevant articles. Demographic information, instruments used, prevalence data, risk factors, and qualitative findings on student anxiety were abstracted. **Results** The search identified eleven studies that met the authors' criteria. Most studies were cross-sectional surveys that evaluated various categories of psychological distress and associated behaviors. The studies suggest a wide range of prevalence rates of clinically significant anxiety with inconclusive results when differences in rates of anxiety by gender, age, class year or school were assessed. Clinical experience, time management, coping strategies, social support, and academic performance were all found to be risk factors associated with student's anxiety. **Conclusion** Medical and allied health education can be a time that contributes to psychological distress in students. Prevalence, prevention, and management of anxiety, stress, and depression should be explored further, particularly within allied health professions to provide better insight into how educators can provide support to their students. Additionally, the ability to identify students at risk for anxiety and other mental health problems may be an important step in prevention moving forward.

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### ABSTRACT

**Purpose** The purpose of this study was to determine the current known prevalence and risk factors for anxiety in medical and allied health profession students. The framing question for this systematic review was, "What is the prevalence of and mitigation of risk factors for anxiety among medical and allied health profession students?" **Method** CINAHL, Medline, PsychInfo, and SportDiscus were searched for peer-reviewed English-language articles published between January 2000 to October 2020 reporting primary data on anxiety in U.S. and Canadian medical and allied health students. Searches used combinations of Medical Subject Heading terms students, allied health, nursing, medical, athletic training, occupational therapy, physical therapy, physician assistant, anxiety, anxiety disorders, stress, psychological distress, or emotional regulation. Reference lists were inspected to identify additional relevant articles. Demographic information, instruments used, prevalence data, risk factors, and qualitative findings on student anxiety were abstracted. **Results** The search identified eleven studies that met the authors' criteria. Most studies were cross-sectional surveys that evaluated various categories of psychological distress and associated behaviors. The studies suggest a wide range of prevalence rates of clinically significant anxiety with inconclusive results when differences in rates of anxiety by gender, age, class year or school were assessed. Clinical experience, time management, coping strategies, social support, and academic performance were all found to be risk factors associated with student's anxiety. **Conclusion** Medical and allied health education can be a time that contributes to psychological distress in students. Prevalence, prevention, and management of anxiety, stress, and depression should be explored further, particularly within allied health professions to provide better insight into how educators can provide support to their students. Additionally, the ability to identify students at risk for anxiety and other mental health problems may be an important step in prevention moving forward.

**Keywords:** mental health, risk factors, coping strategies, education

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## INTRODUCTION

According to the National Institute of Mental Health, anxiety is one of the most common forms of mental illness, with an estimated 31.1% of adults in the United States experiencing any anxiety disorder at some time in their lives.<sup>1</sup> Anxiety is especially prevalent and is the leading cause of mental health issues and psychological distress among the college-aged population, due to differing stressors that college students encounter such as geographic change, academic challenge, financial strain, and a new social environment.<sup>2</sup> These stressors can lead to an increased prevalence of anxiety and other mood state disorders.<sup>3</sup>

Psychological distress can become especially magnified for both medical and allied health profession students as they encounter rigorous coursework and the added responsibility of clinical education and rotations, which are an essential part of the curriculum that allows students to put theory into practice.<sup>2,4-6</sup> While anxiety in moderate levels can contribute to a student's performance in the clinical setting because it activates the flight or fight response, performance will decrease when anxiety levels are too high or too low.<sup>7,8</sup>

Anxiety within the medical and nursing student population has largely been researched in Europe and Asia, with studies within the United States steadily increasing, which confirms the international scope and importance of this issue.<sup>9</sup> However, little is known about the prevalence of anxiety in allied health profession students. While curriculum and content may differ, allied health professions including Physician Assistant, Physical Therapy, Occupational Therapy, and Athletic Training also require an intensive academic curriculum and clinical education with participation in patient care.<sup>2,3,8</sup> Much like medical and nursing students, allied health science students are trained to understand health-related issues and how the human body works, so they are prepared to provide patient care to improve health, treat illness, and prevent and cure disease.<sup>8</sup> Clinical education can place students in various learning situations that require complex decision-making and critical thinking skills. Such situations require students to vacillate between the role of student and practitioner, which can create stress and anxiety.<sup>5</sup>

Furthermore, during the COVID-19 pandemic, mental illness and feelings of fear and anxiety have significantly increased.<sup>10</sup> Public health precautions such as social distancing, isolation, quarantine and changes in employment or school status can also be overwhelming and anxiety producing. Re-entry to school may increase levels of anxiety, and medical and allied health students may be especially vulnerable to changes in mental health status due to changes in clinical education with less patient-contact hours, virtual or modified in-person learning environments, and greater risk of being exposed the virus due to the necessity of working in close contact with patients. The purpose of this systematic review is to determine the current known prevalence and risk factors for anxiety in medical and allied health profession students. The framing question for this systematic review was, "What is the prevalence of and mitigation of risk factors for anxiety among medical and allied health profession students?"

## METHODS

### Database Search

CINAHL, Medline, PsychInfo, and SportDiscus were searched for peer-reviewed articles reporting primary data on medical and allied health student anxiety. Subject heading terms used were combinations of students, allied health, nursing, medical, athletic training, occupational therapy, physical therapy, physician assistant, anxiety, anxiety disorders, stress, psychological distress, or emotional regulation (Table 1). The search was limited to articles published in English in the last 20 years (January 2000 to October 2020) and yielded a total of 2,103 citations. The search was limited to this timeframe due to the ever-changing nature of healthcare, and therefore healthcare education.

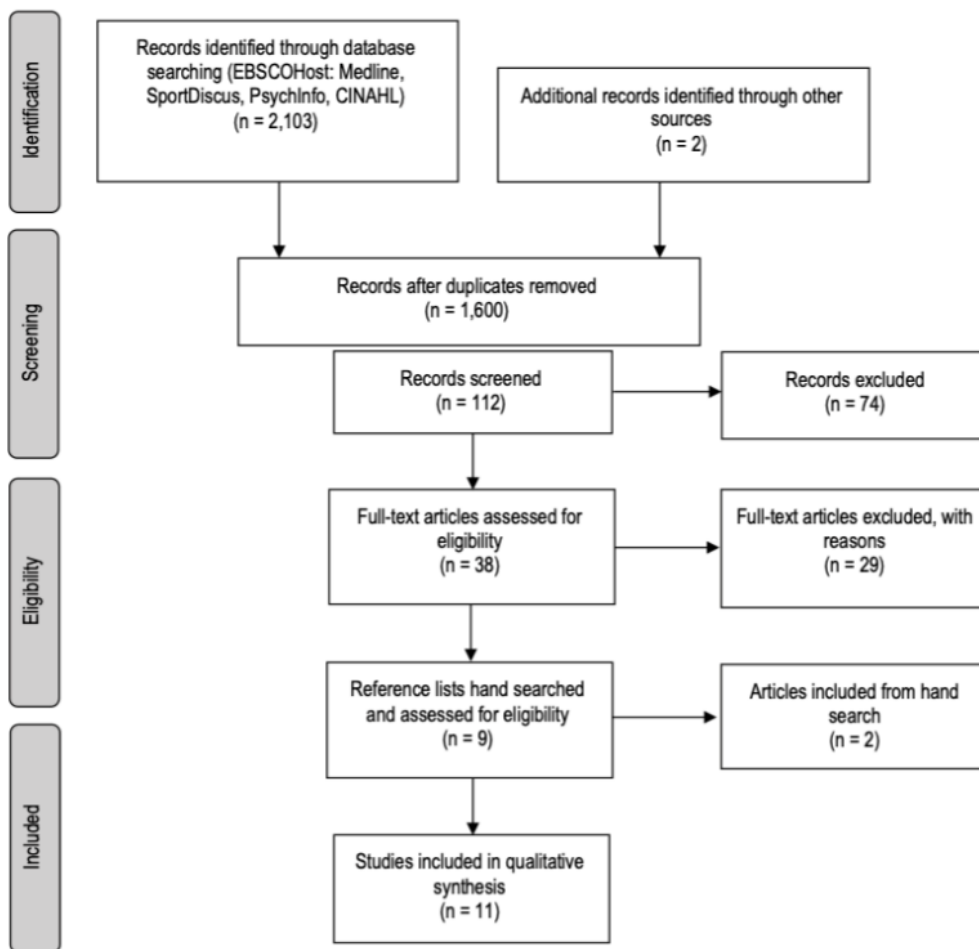
**Table 1.** Search Strategy by Database

| Database | Search Number | Search Items   |
|----------|---------------|--|
| CINAHL   | #1            | [MH "students, allied health"] or [MH "students, nursing] or [MH "students, medical"] or [MH "students, nursing, baccalaureate"] or [MH "students, nursing, graduate] or [MH "students, nursing, practical"] or [MH "students, nursing, practical] or [MH "students, athletic training"] or [MH "students, occupational therapy"] or [MH "students, physical therapy"] or [MH "students, physician assistant"] |
|          | #2            | [MH "anxiety"] or [MH "anticipatory anxiety"] or [MH "catastrophization"]  |
|          | #3            | #1 and #2  |
| MEDLINE  | #1            | [MH "students, medical"] or [MH "students, health occupations"] or [MH "students, nursing"]  |

| Database    | Search Number | Search Items  |
|-------------|---------------|---|
|             | #2            | [MH “anxiety”] or [MH “catastrophization”] or [MH “performance anxiety”] or [MH “psychological distress”] or [MH “emotional regulation”]        |
|             | #3            | #1 and #2   |
| PsychInfo   | #1            | [DE “medical students”] or [DE “nursing students”]  |
|             | #2            | [DE “performance anxiety” or DE “test anxiety” or DE “anxiety disorders” or DE “generalized anxiety disorder” or DE “stress”] or [DE “anxiety”] |
|             | #3            | #1 and #2   |
| SportDiscus | #1            | DE “medical students” or DE “physical therapy students”   |
|             | #2            | DE “anxiety” or DE “psychological stress” or DE “distress(psychology)”  |
|             | #3            | #1 and #2   |

Studies conducted outside the United States and Canada were excluded due to differences in the curricula of the U.S. and Canadian systems of medical and allied health training and other systems around the world. Only studies of empirical design with primary data on medical or allied health (physical therapy, occupational therapy, physician assistant, and athletic training) students were included. Studies that assessed an intervention targeted at anxiety or symptoms of mental illness were excluded. Studies that assessed stress and/or mood states were included due to their predictive nature and relationship with anxiety symptomology. After removing duplicates and screening titles and online abstracts, articles were retrieved for full examination if inclusion in the study was indicated. Nine articles were selected for inclusion. From those nine articles, reference lists were inspected to identify additional relevant articles, resulting in an additional two articles included for a total of eleven. The screening process is illustrated by a PRISMA flowchart in Figure 1.

Figure 1. PRISMA Flow Chart



**Data Extraction**

Data extraction for each article can be referenced in Table 2. Each empirical study was systematically examined for demographic information including gender, age, and the type of allied health program the participants were enrolled in. The articles were also screened for the types of instrumentation and outcome measures utilized. Results of each article were screened for prevalence and risk factors for anxiety. Three of the articles utilized qualitative methods and were screened for qualitative themes addressing the phenomenon of anxiety within this population.

**RESULTS**

Eleven studies met the eligibility criteria for inclusion. Most studies were cross-sectional surveys that evaluated various categories of psychological distress and associated behaviors. Three studies incorporated a qualitative component, one utilized a qualitative case study as its main form of data collection, the additional two included open-ended questions in their instrumentation. Most studies intended to examine the prevalence or levels of the aforementioned mental health disorders, with many assessing associations with demographic characteristics, academic performance, and intrinsic and extrinsic factors. Table 2 lists the studies, purpose, design, sample size and populations, instrumentation, and main findings.

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**Table 2.** Data Extraction for Articles Included in Systematic Review

| Reference                               | Purpose   | Design                                     | Sample Size/Demographics                              | Program Type/School                                 | Instrumentation/ Outcome Measures   | Results  |
|---|---|--|---|---|---|--|
| Bryant et al. (2019) <sup>2</sup>       | Determine mood states and burnout levels among professional master's AT Students during middle and end of academic semester   | Cross-Sectional with qualitative component | 41 (male = 11, female = 30, age = 23.39 +/- 1.44 yrs) | Professional Master's AT Programs (# not specified) | POMS and MBI (determine risk of burnout through EE, DP, PA); 3 open-ended questions   | High level stressors reported from lack of personal accomplishment; No change in mood states from mid to end of semester   |
| Chandavarkar et al. (2006) <sup>3</sup> | Explore the phenomenology of obsessive-compulsive and other anxiety symptoms in medical students  | Cross-Sectional                            | 427 (66% Female, 34% male)                            | Medical Students from two schools in California     | Obsessive-compulsive sx: Modified LOI-SF; Anxiety: STAI-T; Depressive sx: BDI-II; ADHD sx: short version WURS; Perceived performance in medical school w/anchored 5-pt likert scale | Anxiety, attentional, and depressive sx highest in third-year students. Perceived performance was not significantly correlated with obsessionality; lower perceived performance was associated with higher levels of anxiety and depressive sx. Suggestion that sx are may be developmentally appropriate and adaptive. Other anxiety sx appear to be maladaptive responses to external stressors. |
| Chernomas & Shapiro (2013) <sup>4</sup> | To investigate the prevalence of stress, depression, and anxiety among undergraduate nursing students; explore associations between demographic data and quality of life indicators | Cross-Sectional with qualitative component | 437 (392 female, 50 males; 57% between ages 21-25)    | Baccalaureate Nursing Program in Canada             | Depression Anxiety Stress Scales (DASS), Demographic questionnaire, Quality of Life Indicators, One open ended question   | Higher anxiety scores associated with ineffective coping strategies and increased current faculty stress. Perceiving that life is more stressful in a nursing program was associated with higher SDA scores. Multiple demands of personal lives and school related expectations combined to create stress and reflected in several quality of life indicators.                                     |

|                                      |  |                 |   |   |   |  |
|--------------------------------------|--|-----------------|---|---|---|--|
| Crutcher et al. (2018) <sup>5</sup>  | To determine which sources of social support were perceived to be most salient and ascertain whether social support satisfaction can predict stress and depression among ATS             | Cross-Sectional | 204<br>(140 women, 64 men; 21.14 +/- 1.8 yrs) | Professional baccalaureate Athletic Training Programs (9 across the US)                                       | Perceived Stress Scale (PSS), Center for Epidemiologic Studies Depression Scale (CESD), and Social Support Questionnaire (SSQ)  | Social support satisfaction significantly predicted overall perceived stress and depression. Satisfaction of support from family and other ATs were significant predictors of perceived stress.  |
| Frank & Cassady (2005) <sup>6</sup>  | To investigate the relationship among measures of stress, anxiety, and academic performance in DPT students during the didactic portion of curriculum                                    | Cross-Sectional | 163<br>(117 females, 46 male)                 | Doctor of Physical Therapy; 3 programs in north central US, 1 <sup>st</sup> and 2 <sup>nd</sup> year students | State-Trait Anxiety Inventory yielding separate state anxiety (SAS) and trait anxiety (TAS) scores; Perceived Stress Scale (PSS14); Academic Performance (via UGPA & DPTGPA)  | SAS, TAS, and PSS14 scores were significantly higher for females. Mean SAS and TAS scores for all subjects exceeded norms for working adults of similar age. Moderate to high correlations were found among measures of stress and anxiety, but low correlations found between those measures and academic performance.  |
| Ghodasara et al. (2011) <sup>7</sup> | To determine prevalence rates of four major categories of mental illness among medical students and to examine associations between such illnesses and a range of demographic variables. | Cross-Sectional | 301<br>(154 male, 147 female)                 | Medical Students; single school in southeastern US, 1 <sup>st</sup> -3 <sup>rd</sup> year students            | Eating Disorder Examination Questionnaire (EDE-Q), Beck Depression Inventory-II (BDI-II), State-Trait Anxiety Inventory for Adults (STAIA), Michigan Alcoholism Screening Test (MAST), Drug Abuse Screening Test (DAST) | Depression and anxiety were most prevalent in the specific medical student population than their nonmedical peer group. Exercising 1-3x/week was associated with lower rates of both depression and anxiety, having a family hx of mental illness was assoc with higher ED scores and anxiety. There was an association between gender and all disorders (Female more likely to demonstrate sx of ED, depression, and anxiety; Male more likely to demonstrate drug and alcohol use) |



|   |   |                 |   |  |   |   |
|---|---|-----------------|---|--|---|---|
| Kim (2003) <sup>8</sup>                 | To identify clinical experiences of nursing students that were anxiety provoking and examine the relationship between the level of trait anxiety and the clinical experience that produced anxiety in nursing students. | Cross-Sectional | 61<br>(53 female, 8 male;<br>mean age = 29.5) | Baccalaureate nursing students in last semester; single school in the US.                                    | Trait anxiety scale of the STAI; Clinical Experience Assessment Form                          | 36% of students experienced moderate levels of anxiety. Clinical experiences related to arriving late, being observed by instructors, responding to initial experiences, fear of making mistakes, and talking to physicians were the most anxiety producing. A significant positive relationship was found between trait anxiety and clinical experience. |
| Macauley & Plummer (2017) <sup>10</sup> | To assess the prevalence of anxiety in DPT students and examine the predictors of anxiety   | Cross-Sectional | 87<br>(72% female,<br>25.86 +/- 3.73 yrs)     | Doctor of Physical Therapy; single university in northeastern US, in 1 <sup>st</sup> or 2 <sup>nd</sup> year | State Trait Anxiety Inventory (STAI), Westside Test Anxiety Scale (WTAS); Grade Point Average | Findings showed high anxiety levels analogous to military recruits. Female gender and low GPA were predictors of anxiety.   |
| Melincavage (2011) <sup>11</sup>        | To examine student nurses' perception of anxiety in the clinical setting  | Qualitative     | 7<br>(100% female,<br>mean age = 22.1)        | Baccalaureate nursing program; two in the US, students have at least one semester of clinical experience     | Phenomenological interview; unstructured, addressing anxiety                                  | Instances of anxiety to be expected with performing skills on patients and competition among peers were reported. Behaviors of faculty, staff nurses, and physicians have contributed to anxiety of student nurses in the clinical setting.   |
| Rizzolo & Massey (2020) <sup>12</sup>   | To explore the fluctuations in stress levels in health science students during their first year of graduate school  | Cross-Sectional | 79  | DPT, OT, SLP, PA graduate students in the northeastern US.   | BSI-18  | There are notable fluctuations in anxiety levels in health science students, therefore it is necessary to assist students in developing effective stress management techniques to help moderate the negative consequence of stress.   |
| Stilger et al.(2001) <sup>13</sup>      | To examine the impact of life-stress sources that ATS encountered over the course of an academic year   | Cross-Sectional | 20<br>(11 male, 9 females;<br>22 +/- 4.6 yrs) | Professional level baccalaureate athletic training; single mid-Atlantic US university                        | Quick Stress Questionnaire (QSQ), demographic questionnaire                                   | Academic and financial concerns represented the greatest sources of stress for student athletic trainers, with stress levels fluctuating significantly throughout the academic year. Female ATS consistently reported higher levels of stress than their male counterparts.   |

[Legend for Table 2: Note -- AT = Athletic Training, sx = symptoms, ATS = Athletic Training Student, DPT = Doctor of Physical Therapy]

### Instruments Used

A variety of instruments to assess mood state, anxiety, depression, and overall mental health were used by the included studies. The three most commonly utilized instruments among the eleven studies were a version of the State Trait Anxiety Inventory (STAI), followed by the Beck Depression Inventory (BDI), and the Perceived Stress Scale (PSS).<sup>2,3,5,11-13</sup>

The STAI was derived from the Minnesota Multiphasic Personality Inventory (MMPI) and is widely used to measure anxiety. The STAI has two subscales: The A-State scale, which indicates current level of anxiousness, and the A-Trait scale, which indicates how the respondent generally feels. The internal consistency alpha coefficients are high for both subscales at 0.93 for A-State and 0.87 for A-Trait in the general population.<sup>14</sup> Both portions of the STAI are scored on a scale from 20 to 80, with higher scores indicating higher levels stress and anxiety.<sup>12</sup>

The BDI is a questionnaire used to screen for depression and has been validated for use in nonpsychiatric patients including college and medical students (mean correlation coefficient = 0.60).<sup>14</sup> While various ranges of scores have been proposed as suggesting a diagnosis of clinical depression, a score of 10-18 is generally considered an indicator of mild to moderate depression, 19-29 indicates moderate to severe depression, and 30-63 indicates severe depression.<sup>14</sup>

The PSS is a 14-item questionnaire used for measuring stress related to life events, its generality making it suitable for a variety of populations. The PSS has a maximum score of 56, with higher scores indicating higher levels of perceived stress. The PSS has been reported to be both valid and reliable in the general population with an alpha coefficient ranging from 0.75 to 0.85.<sup>2</sup>

Other instruments utilized by researchers included the Profile of Mood States (POMS) survey, the Maslach Burnout Inventory (MBI), Depression Anxiety Stress Scales (DASS), the Center for Epidemiologic Studies Depression Scale (CESD), the Westside Test Anxiety Scale (WTAS), the Brief Symptom Inventory (BSI), and the Quick Stress Questionnaire (QSQ).<sup>2-4,6,8,9</sup>

### Prevalence of Anxiety

Six of the studies reported specifically on anxiety prevalence in a variety of medical and allied health students.<sup>3,5,9,11-13</sup> Prevalence rates of clinically significant anxiety ranged from 11.5% to 45.6%.<sup>3,5,9,11-13</sup>

There were conflicting results when assessing differences in rates of anxiety by gender, age, class year or school. Two of the studies reported higher anxiety rates in females, while several others found no significant differences across gender.<sup>3,5,9,11-13</sup> Studies that compared rates of anxiety to a normative sample found significantly higher rates ( $p < 0.05$ ) within the medical and allied health student samples.<sup>3,9,12,13</sup>

### Risk Factors for Anxiety

Most of the studies assessed predictors and risk factors for anxiety, stress, and depression among the medical and allied health profession student population. Clinical experience, time management, coping strategies, social support, and academic performance were all found to be significant contributors to student's stress and anxiety.<sup>2,3,5-9,11-13</sup>

Higher anxiety levels were consistently associated with ineffective coping strategies and an inability to balance school load and personal life.<sup>9</sup> Similarly, students who reported lower levels of social support were found to have higher levels of stress, anxiety, and depressive symptoms.<sup>2,9</sup> In athletic training students, it was found that as satisfaction of social support increased, perception of stress and depressive symptoms decreased.<sup>2</sup> Sources of social support most commonly utilized by these students were family, friends, and other athletic training students. Consistent with these findings, Chernomas and Shapiro found that partnered or married students had lower anxiety scores than their single counterparts.<sup>9</sup>

Regarding academic performance, Chandavarkar et al identified that medical students who scored higher on the BDI-II were more likely to perceive themselves as performing at a lower level than their peers.<sup>11</sup> Macauley and Plummer found that GPA was a significant predictor of anxiety levels, as it strongly negatively predicted participant scores on the STAI.<sup>3</sup> This was consistent with previous findings in other student populations where high levels of anxiety were correlated with low student GPA.<sup>3</sup> However, Frank and Cassady only found a significant correlation between stress and undergraduate GPA in first year Doctor of Physical Therapy Students.<sup>12</sup>

Clinical practice was found to be a large contributor to stress and anxiety.<sup>5,7,9</sup> Many students reported anxiety the evening prior to beginning a clinical experience.<sup>9</sup> Additionally, nursing students who reported anxiety surrounding clinical experience related their anxiety to interactions with faculty.<sup>5,7</sup> Additional factors found to predict anxiety were a family history of mental illness, exercise frequency, financial concerns, and timing of the academic semester.<sup>2,6,8,13</sup>

### **Qualitative Themes**

Three of the eleven studies reviewed used qualitative methods.<sup>4,7,9</sup> Bryant et al assessed burnout and psychosocial distress in athletic training students and found three themes from their qualitative analysis.<sup>4</sup> Most responses for students experiencing burnout were associated with meeting expectations for course load and/or clinical hours. Additionally, a research component within the education curriculum was cited as a factor leading to burnout. Students who did not experience burnout or psychosocial distress utilized personal time and social support to relieve stress from schoolwork and clinical experiences.<sup>4</sup>

Chernomas and Shapiro reported similar qualitative findings in their analysis of stress, depression, and anxiety in nursing students.<sup>9</sup> The three most common themes leading to stress were being “overwhelmed,” “balancing,” and clinical practice. The sense of being overwhelmed with the balancing of multiple responsibilities such as program obligations including coursework and clinical rotations with personal life obligations was cited as being a major source of stress among the nursing students involved in the study. Clinical practice was cited to contribute to stress before, during, and after the clinical day, resulting in high levels of anxiety and manifesting in physical reactions such as nausea, vomiting, and heart palpitations. Students also reported the clinical preceptor having a significant contribution to stress and anxiety at the clinical experience, both positive and negative.<sup>9</sup>

Melincavage conducted a phenomenological study to better understand student nurses' anxiety in the clinical setting. Consistent with the previous studies, clinical preceptors and faculty had a large impact on anxiety within the clinical setting. Themes such as inconsideration and impatience, inexperience, being demeaned, exposed, and abandoned by faculty emerged as factors contributing to anxiety levels throughout a clinical experience.<sup>7</sup>

## **DISCUSSION**

Based upon the results of the included studies, it is clear that many medical and allied health profession students suffer from high levels of stress, anxiety, and depressive symptomology.<sup>2-4,6,8,12</sup> Specifically, anxiety has been reported as prevalent in up to fifty percent of medical and allied health student cohorts.<sup>13</sup> Factors found to impact anxiety levels included possession and utilization of coping strategies, social support, timing of the semester, and clinical experiences.

### **Coping Strategies**

Coping strategies are cited as important in helping to mitigate stress and anxiety in students as they balance their many responsibilities.<sup>9</sup> Higher anxiety scores have been found to be associated with ineffective coping strategies.<sup>3,9</sup> One such strategy cited to be effectively utilized was exercise. Consistent with current literature that suggests regular exercise is related to lower rates of anxiety, evidence supports that students who reported lower rates of stress and anxiety used exercise as a main coping strategy.<sup>4,9,13</sup>

Social support as a means to cope with anxiety and stress was a main finding of the review. Bryant et al found that students who reported lower levels of stress and anxiety utilized social support and personal time to cope.<sup>4</sup> These findings are consistent with Crutcher et al who determined that social support is a strong predictor of perceived stress and depression symptomology in athletic training students.<sup>2</sup> As reported social support increased, perceived stress and depression symptoms decreased. Students drew social support from family, friends, peers within their program, and clinicians and faculty within their program.

### **Clinical Experiences**

Much of the anxiety throughout a medical and allied health student's education has been reported to be due to clinical education and practice. This can include stress surrounding preparation for clinical experience and a fear of making mistakes.<sup>9</sup> Clinical preceptors and program faculty have been reported as both sources of anxiety, and conversely social support.<sup>2,3,5,6,9</sup> This is important considering the large role clinical practice and experiences play in medical and allied health science education.

Nursing students reported clinical preceptors “were not very helpful” or “you can tell are annoyed by students” and felt as though they were being constantly judged and critiqued for making small mistakes.<sup>9</sup> Uncertainty in clinical skills, and being observed and evaluated by preceptors is also reported to be anxiety-inducing by students.<sup>5</sup> Although these are necessary parts of clinical education, faculty and preceptors must consider ways in which they include students within their community, convey constructive feedback, and must be able to provide students a safe environment to learn from their mistakes.

This student-preceptor disconnect could perhaps be profession-related or speak to a larger issue of preceptors and faculty preparedness to handle such issues. Each student's health and welfare should be a high priority for all faculty and staff, and they should feel comfortable asking questions and starting a conversation surrounding a student's mental health status. Sensitivity to student's vulnerability during particularly stressful points of the semester, being empathetic, and listening are all strategies faculty and staff can employ with students.<sup>6</sup>

### **Additional Factors**

Students were found to experience more symptoms toward the end of the semester and particularly during midterm and final examination periods.<sup>4,7</sup> Additionally, class year was suggested to be an important aspect of who is reporting anxiety. This is consistent across multiple professions, including medical, athletic training, physical therapy, physician assistant, and occupational therapy students with first year students reporting higher levels of stress and anxiety than those in their final year of their respective program.<sup>4,8,11,12</sup>

### **Limitations**

This systematic review was not without limitations. The timeframe and location of the studies included was a limiting factor as most studies observing this population have been conducted outside of the United States and Canada. However, the restraints allowed the researcher a more focused view on anxiety among medical and allied health students in current United States and Canadian society. Among the studies included, several gathered data using questionnaires, which could indicate limitation by recall bias and reporting errors. Additionally, timing of surveys could affect the outcome of anxiety levels based upon the point of time in the academic year, as findings indicated anxiety levels can increase during particularly demanding points of the semester such as midterms and finals. Many of the studies collected data from only one institution, with culture and unique aspects of each program potentially influencing perspectives of participants, thus impacting the ability to generalize findings to a greater population.

### **Future Directions**

A larger question now, particularly in the current social climate of a global pandemic, devoid of in-person socialization and physical touch, is how do we support these students in managing their mental health status? It is alarming the high rates at which future healthcare providers are experiencing distressing mental health symptoms. Stress, which is known to contribute to mental illness, is not an uncommon side-effect of modern medical and healthcare education. Additionally, not all students have an awareness of their own stress levels, nor do they exhibit such skills in order to deal with these issues on their own. Stress management programs, mindfulness, and meditation are all strategies that have been previously suggested as interventions for students.<sup>8</sup>

While the literature reports clear indicators of what may predict anxiety, stress, and depressive symptoms among medical and allied health students in the United States and Canada, prevalence, prevention, and management of such symptomology must be explored further, particularly within allied health professions. As much of the literature within the allied health professions specifically focuses on clinicians, examining these issues in students might provide a better insight into how educators can provide support and coping mechanisms that students take with them into clinical practice as healthcare providers. Additionally, the ability to identify students at risk for anxiety and other mental health problems may be an important step in prevention moving forward.

### **CONCLUSION**

Medical and allied health education can be a time that contributes to psychological distress in students. Prevalence, prevention, and management of anxiety, stress, and depression should be explored further, particularly within allied health professions to provide better insight into how educators can provide support to their students. Additionally, the ability to identify students at risk for anxiety and other mental health problems may be an important step in prevention moving forward.

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