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Description of Mental Health Responses on an Electronic PPE at a NCAA Division I Institution: A Pilot Study

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DESCRIPTION OF MENTAL HEALTH RESPONSES ON AN ELECTRONIC PPE AT

A NCAA DIVISION I INSTITUTION: A PILOT STUDY

BY

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THESIS ACCEPTANCE PAGE

Megan Blomberg

This thesis is approved as a creditable and independent investigation by a candidate for the master's degree and is acceptable for meeting the thesis requirements for this degree. Acceptance of this does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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This thesis is dedicated to my family, for their love and support throughout my academic

and professional aspirations. Thank you for always pushing me to achieve my dreams,

even when I did not think they would be possible.

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ABSTRACT

DESCRIPTION OF MENTAL HEALTH RESPONSES ON AN ELECTRONIC PPE AT

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The purpose of this study was to improve the effectiveness of mental health screening forms that are used during the preparticipation physical exam, or PPE, process and to help start a discuss about the need for further mental health resources. This study aimed to look at the prevalence of mental illness being reported at a Division I Institution and whether we are receiving consistent answers across various forms. We pulled the data from all 750 student-athletes that competed during the 2017-18 academic year at South Dakota State University (SDSU) and looked specifically at their answers on the PHQ-9, GAD-7, and mental health section of the health history form. We first analyzed the prevalence of yes answers on the mental health section of the health history form and then performed a chi^2 test of proportions to look for any significant differences among gender. We then looked at the severity of scores being reported on the PHQ-9 and GAD-7, and finally we compared the answers given to nine pairs of similar questions on different forms to look for inconsistencies among answers. We found the prevalence rate of mental illness to be roughly 8.5% and we also found that half of the questions analyzed on the health history form showed significant differences among gender. The analysis of the PHQ-9 and GAD-7 scores did not show any significant differences between gender, but it did show a discrepancy in the overall prevalence rate of mental illness when compared to the health

history form. Finally, we found that four of the nine pairs of questions analyzed had a low

sensitivity value, while five of them had high sensitivity and specificity values. These

low and inconsistent values make it very hard for clinicians to fully understand the full

scope of mental illness among their student-athletes and makes it hard to show the need

for further mental health resources for this population. Future research should focus on

attaining more honest and accurate reporting of mental illness symptoms to help show the

true prevalence rate among this population in order to get them the help that they deserve.

CHAPTER I

INTRODUCTION

Student-athletes participating in NCAA Division I athletic programs are expected to be strong, perform with excellence every day, and overcome both physical and mental adversity. However, their risk of mental illness is equal to that of their peers.[1] As many as 21% of collegiate athletes report suffering from depressive symptoms severe enough to be considered clincal depression each year[2], and this can be due to the added mental stressors that student-athletes must endure every day. The purpose of the preparticipation physical exam, or PPE, is to screen incoming student-athletes for any condition that could lead to unsafe participation. The challenge in regards to PPE's is that they often are not standardized and lack questions that identify student-athletes at risk of mental health conditions. Without accurate data (both by the individual and in aggregate) to help design appropriate resources related to mental health prevention and intervention, thousands of student-athletes will continue to go unrecognized in the fight against mental illness.

PURPOSE

The primary objective of this study, as a pilot project, is to examine the prevalence of mental health conditions, including depression and anxiety, as reported by all South Dakota State University (SDSU) student-athletes and to determine whether there is inconsistency in the reporting across different validated forms (i.e. medical history form, PHQ-9 and GAD-7). The purpose of this project is to increase the effectiveness of mental health screening for student-athletes completing the PPE form and guide a discussion of support services that are available to both student-athletes and sports medicine staff who treat a student-athlete population. Increasing the effectiveness of our screening tools will help to more accurately detect those student-athletes with a mental health condition or who are showing the early signs of a mental health condition. This data can then be used to demonstrate the need for more resources available to these student-athletes who need and deserve help. Having these resources in place will increase the effectiveness of the referral process and begin to provide a higher quality of care for these student-athletes. It will show them that their mental health conditions are being taken seriously and that there are resources in place for them to take advantage of and will hopefully lead to more accurate reporting of mental health conditions by the student-athletes in the future.

RESEARCH QUESTION

Do answers to mental health questions on pre-participation examinations agree with results from tests specifically aimed at assessing depression and anxiety?

SPECIFIC AIMS

Aim 1: To determine how frequently SDSU student-athletes report mental health condition or indicators of mental health concerns when completing their PPE form.

Aim 2: To determine if student-athletes report information consistently regarding mental health related conditions across multiple areas of the PPE form (i.e. medical history form, PHQ-9, and GAD-7).

HYPOTHESIS

Our hypothesis for the first specific aim is that approximately 21% of all student-athletes will report a mental health condition or an indicator of mental health condition on their PPE; consistent with prevalence data on NCAA Division I athletes. Our hypothesis for the second specific aim is that student-athletes will provide some inconsistency when reporting mental health conditions and/or indicators of mental health conditions across the various forms within the PPE.

ASSUMPTIONS

- All subjects answered all questions on the PPE forms honestly and to the best of their ability.

LIMITATIONS

- Data was self-report and therefore was subject to under-reporting and recall bias.

- Data was limited to a single year. This was due to the mental health questions being a recent addition to the PPE form.

CHAPTER II

REVIEW OF LITERATURE

Epidemiology

Prior research has shown that 1 in 5 teens suffer from a mental health condition that is severe enough to affect their daily lives[3] and that approximately 14.8 million people 18 and older suffer from a major depressive disorder.[4] There are approximately 8 million high school student athletes[5] and 460,000 collegiate student-athletes competing each year[6], that means more than 96,000 student-athlete are suffering from depression every year just in collegiate athletics.[2] Female athletes are at a 1.32 greater risk of experiencing depression compared to men and freshman athletes have a 3.27 greater risk compared to seniors.[2] A study conducted by Wolanin et al. looked at the prevalence of depressive symptoms in Division I student-athletes at one institution over a three year period and found that the prevalence of student-athletes having clinically relevant depressive symptoms to be 23.7% and those with moderate to severe depressive symptoms was 6.3%. They also found differences in the prevalence of clinically relevant depressive symptoms by sport with track recording the highest (35.4%) and lacrosse with the lowest (13.5%). Track was also associated with the highest risk of reporting clinically relevant depressive symptoms with a 2.066 times greater risk when compared to all other sports. There was no significant difference found by sport in terms of moderate to severe depressive symptoms. This study also reported that there were differences in prevalence

of clinically relevant depressive symptoms by sport and gender and found that female track athletes had the highest prevalence (37.5%), while male lacrosse players had the lowest. Female track athletes also had a 2.257 times greater risk of having clinically relevant depressive symptoms than any other group.[7] Depression is considered one of the most treatable psychiatric illnesses with 80-90% of those with depression responding well to treatment, but depression has to first be recognized.[8]

Unfortunately, suicide is the 3rd leading cause of death among NCAA student-athletes, behind accidents and sudden cardiac death.[9,10] It has been shown that 90% of those who die by suicide have a psychiatric condition that would have been diagnosable and treatable at the time of death, and more than 50% of all who die from suicide suffer from major depression.[8] A study by Garlow et al. looked at suicidal ideation and depression in undergraduate student-athletes at Emory University and found a direct association between increasing symptom severity scores on the PHQ-9 and the presence of suicidal ideation. They had no students fall into the no depression category, while 40% were in the severe category. It was also shown that certain characteristics were significantly more common in student-athletes with suicidal ideation, they were: anxiety, irritability, rage, desperation, and feeling out of control.[11] Another study by Rao et al. looked at the incidence of suicide in NCAA athletes and found that suicide represented 7.3% of all-cause mortality among the athletes surveyed and that male athletes had a significantly higher rate of suicide compared to female athletes. They also found that suicide occurred in all years with 8 freshman, 10 sophomores, 5 juniors, and 9 seniors, as well as across all divisions with 17 in Division I, 9 in Division II, and 9 in Division III. When looking at differences among sports, it was found that football reported the largest

number of cases (13), followed by soccer (5), track/XC (5), baseball (4), and swimming

(3). Football athletes had 3.27 times greater risk of committing suicide when compared to

all other NCAA athletes, regardless of sex, and a 2.21 times greater risk when compared

with all other male athletes.[12] In order to understand why these statistics are so high in

athletics, it is important to look at the added stressors that student-athletes must face

every day.

Added Stressors

When an athlete decides to continue their athletic career into the collegiate

setting, they are not only signing up for the added physical stress, but also the added

mental stress that comes with it. In order to be a successful student-athlete, they must

take on the time commitment that is required to balance both athletics with academics.

They will also feel added pressure to win competitions, to please fans, coaches, and

families, and the prospect of a professional career for some individuals.[2] These student-

athletes are having to take on stressors that are not experienced by other college students,

such as the extensive time demands, pressures to achieve, injuries, burn out, and conflict

with teammates or coaches. If these added stressors are left untreated, they can lead to an

increased risk for anxiety and/or depression.[13] One factor that may lead to increased risk

of a mental illness, such as depression, is injury. It has been found that athlete's coming

in for treatment for an injury also discuss psychological issues related to that injury 80%

of the time.[14] A study by Leddy et al. also found that 51% of the athletes who sustained

an injury reported to have mild-to-severe depressive symptoms, and those with an injury

reported significantly higher levels of depression compared to non-injured athletes.[15]

Another factor that can lead to increased risk of mental illness in athletics are concussions. One study conducted by Kerr et al. looked at the effects of recurrent concussions on the diagnosis of depression among retired football players and found that the 9-year risk for depression increased with the amount of self-reported concussions, with 3% in the no concussion group and 26.8% in the 10 or more group. They also found that those reporting three or more concussions were three times more likely to be diagnosed with depression, while those with a history of one or two concussions were 1.5 times more likely to get depression compared to those who had no concussions.[16] It has also been shown that poor athletic performance can lead to negative self-perceptions and feelings of helplessness, which are consistent with depressive symptoms.[17] A study by Hammond et al. found that after an athletic competition, 34% of the athletes surveyed met the criteria for a major depressive episode. They also found that those athletes that are considered to be elite, or in the top 25% of their respective sample, reported significantly more symptoms of depression compared to the remaining 75% of the athletes in their groups.[18] Before we can start overcoming the increasing prevalence of mental health in athletics, there has to be a standardized system in place to screen for the signs and symptoms of these mental health conditions. This is where the PPE comes into play.

PPE

The PPE is a tool that is used to help identify any condition that could negatively affect the athlete during participation. It is also used to help evaluate the athlete's general health, provide an environment to discuss high-risk behaviors, preventative care, any

non-athletic related concerns, and to meet the institutions legal and insurance requirements.[17,19-21] The PPE is also the time in which team physicians can make decisions regarding an athlete's health, safety, and well-being both in and out of the athletics setting.[19] The requirements for the implementation of the PPE in the high school level is most frequently determined by the state high school athletic associations[22] and by the NCAA in collegiate settings.[23] The NCAA requires a PPE to be done at all three divisions upon a student-athlete's entrance into the program. An initial medical evaluation should include the following: a standardized, comprehensive health history, immunization history as defined by the CDC, and a relevant physical exam, with emphasis on the cardiovascular, neurologic, and musculoskeletal systems.[23] It is important to have a thorough initial evaluation because for about half of the athletes who partake in the PPE, this will be the only contact they will have with a health care provider.[17] There are many sections to the PPE form, but the health history section is considered the most important because it has been shown to identify 75% of conditions that could affect participation.[24]

The challenge with the PPE is that there is no standardized form that is required by the NCAA or any recommendations on who should perform the physical exam.[17,19] It has been suggested that the current PPE fails for three reasons: the sensitivity and specificity of the history and examination are not adequate enough to reliably detect and exclude rare life-threatening conditions, there is rarely a follow-up scheduled to ensure recommendations are being followed, and the PPE is inconsistently delivered.[25] The problem is that in the past the format and content of most PPEs are determined by athletic administrators, even though primary physicians are the one's carrying out the

examination. This lead to a lower quality PPE being administered because the content of most PPEs are not of specific concern to the organizations that mandate it.[26] One reason that the ideal PPE has not been created yet is because there is not enough scientific evidence for each component to establish such a measure. Using an electronic approach could help change this fact. An electronic PPE would provide data, simplify administration, and allow access to results and data at any time for review. This would allow us to pull the data in aggregate to see where a particular PPE may be lacking and where its strengths lie.[17]

An article by Caswell et al. found that PPEs are required before participation in 98% of the states. Of the states that required the use of a PPE, 53% recommended or required using a form based on an outdated PPE monograph or they were using a form that was not associated with any monograph. It was also found that 8% had not revised their forms in over five years. They also found that 74% of the states were still allowing a wide variety of non-physicians to administer the PPE. Three states allowed professionals who practiced alternative medicine to administer the PPE, while 15 states allowed chiropractors to administer the PPE.[22] Another study found that 46% of the physicians conducting the PPE were unsure of the importance of the positive and negative results, and 36% were unsure how to conduct the physical exam. Approximately 52% of physicians in the same study found the lack of standardization to be a major obstacle in performing a successful PPE.[27]

When looking specifically at the data surrounding the mental health portion of the PPE, there is limited research in this area. One study conducted by Kroshus looked at whether sports medicine departments at NCAA institutions have policies in place

regarding identifying those student-athletes with a mental health disorder. She

specifically looked at whether their screening forms included questions to assess whether

student-athletes were symptomatic or at risk for an eating disorder, depression, anxiety,

alcohol abuse, prescription drug abuse, or illegal drug use. What she found was that

around one-third of the sample (31.5%) did not screen for any of the six mental health

concerns, while 19.5% screened for all six. Most of the schools that participated reported

that the PPE they use includes questions about whether the student-athlete has a history

of and eating disorder (84.7%), depression (79.2%), or anxiety (30.7%). She also found

that Division I institutions tended to screen for more mental health disorders, with an

average of three, compared to the two disorders normally screened for in the Division II

and III levels. She also found that those schools that had a written plan for identifying

mental health conditions tended to use more exhaustive screenings compared to those that

did not have a written policy. Similarly, it was found that those institutions without a

written policy for identifying student-athletes at risk for a mental health concern were

less likely to screen for eating disorders, depression, and anxiety.[28] One way to help

increase the ability to recognize athletes who are at-risk is to use validated forms within

the PPE.[29]

PHQ-9

One validated form that can be used to screen for mental health conditions is

called the Patient Health Questionnaire, or PHQ. This is a self-administered, 3-page

questionnaire designed to screen for 8 diagnoses that are divided into threshold and

subthreshold disorders. These questionnaires are then given to the physician to review

and verify positive results. The PHQ-9 is the depression module found within the full PHQ. This form uses nine questions to help diagnose depressive disorders and grade the severity of the symptoms. Depression is diagnosed based on how many symptoms they report having. If they report having five or more of the nine total symptoms and one of them is depressed mood, then depression is diagnosed. Each symptom is then given a frequency score from 0 (not at all) to 3 (nearly every day) and that is what is used to determine the severity.[30] The diagnostic validity of the PHQ has already been found in two studies, both conducted by Spitzer et al.[31,32] The first study looked at 3,000 patients from eight different primary care clinics and found that the diagnostic validity of the PHQ is comparable to the clinician-administered measure that was being used at the time.[32] The second study looked at 3,000 patients from seven different obstetrics-gynecology clinics where they found high construct validity seen by the strong association of functional impairment and disability days compared to psychiatric diagnosis.[31]

Kroenke et al. conducted a study that looked at both of Spitzer's studies to evaluate the validity of the PHQ-9 by adjusting the algorithm for PHQ threshold. They found excellent internal reliability in both studies, with a Cronbach's α of 0.89 in the primary care study and 0.86 in the obstetrics-gynecology study. Test-retest reliability was also found to be very high. They also calculated likelihood ratios and found a large association between increasing PHQ-9 scores and the probability of having major depression. A ROC analysis was also conducted and showed that the area under the curve for diagnosing major depression was 0.95, which demonstrates that the PHQ-9 would be able to differentiate between those with and without major depression. Construct validity

was found through the strong association between the PHQ-9 scores and functional status, disability days, and symptom-related difficulty. Finally, external validity was seen by the replication of findings in both of Spitzer's original studies.[30-32] While screening for depression is very important, using only a depression measure could lead to other conditions being overlooked.[33]

GAD-7

The 7-item Generalized Anxiety Disorder Scale (GAD-7) is another validated measure that can be used to ensure anxiety conditions are not overlooked. The GAD-7 is used to identify individuals with generalized anxiety and to measure the severity of the symptoms. This measure asks how often, in the last two weeks, they have been bothered by each of the seven symptoms related to generalize anxiety disorder. Their response options are: not at all, several days, more than half the days, and nearly every day, and these are then scored as 0, 1, 2, and 3 with total scores ranging from 0-21. Scores greater than or equal to 5, 10, and 15 represent mild, moderate, and severe anxiety.[34] Spitzer et al. conducted a study that consisted of two phases. Phase one was used to select the items that should be included on the final GAD-7, while phase two was used to determine the GAD-7 test-retest reliability. They recruited 591 participants from 15 primary care locations in 12 different states. They found that the internal consistency was excellent with Cronbach $\alpha= 0.92$. Intraclass correlation was 0.83, which demonstrated that test-retest reliability was good. They also found convergent validity to be good through its correlations with the Back Anxiety Inventory (r=0.72) and the anxiety subscale of the Symptom Checklist-90 (r=0.74). Good construct validity was seen through the increasing

scores on the GAD-7 being strongly associated with several domains of functional

impairments seen through the SF-20 functional status scales, self-reported disability days,

and physician visits.[33] Löwe et al. conducted a study to investigate the validity and

reliability of the GAD-7 in the general population, and also found good criterion,

construct, factorial, and procedural reliability. They also found that the unidimensional

structure of the measure makes it applicable among different subject groups and this is

supported by the internal consistency being almost identical among all groups.[34]

CHAPTER III

METHODOLOGY

Participants

   This study retrospectively looked at data from all student-athletes during the

2017-18 seasons. This included a total of 710 student-athletes from 17 varsity sports at a

Division I Institution. Of these 710 student-athletes, 381 of them identified as male and

329 as female, and they had a total median age of 19.57 years. When broken down by

sport, track and field had the most student-athletes with 164 participants, followed by

football with 148, and swimming and diving with 63. Volleyball and golf tied for the

least number of participants with 18. A further breakdown of the general demographics

can be found in table 1.

Procedures

   During the summer and fall of 2017, SDSU Sports Medicine Staff decided to

revise their PPE process and switched to an electronic based format through the company

PRIVIT. This change to the electronic format helped improve the convenience of

delivery to the student-athletes by allowing them to be able to complete the PPE's at

home and on their own time prior to arriving to SDSU for their physical examination.

The use of an electronic based format also served as an opportunity for the Sports

Medicine Staff to gain aggregate data in regards to certain conditions reported by student-

athletes throughout their athletic careers at SDSU.

The PPE used by SDSU includes 12 different forms ranging from insurance information forms to a nutrition questionnaire. For this project, the main focus was placed on the three forms related to the mental health of the student-athletes, which includes the PHQ-9, GAD-7, and the mental health portion of the health history form. With the information from these forms, we aimed to answer two specific questions. The first was to determine the prevalence of mental health conditions among student-athletes at a Division I Institution, and to answer that, we evaluated several different areas. Table 4 depicts a complete list of the questions that were analyzed from the health history form, as well as the percentage of student-athletes that answered yes to those questions. This total was then broken down by gender and then a chi^2 test of proportions was done to find any significant differences between genders. We also looked at the severity of scores reported on the PHQ-9 (table 3) and the GAD-7 (table 4). The total scores from the PHQ-9 were broken down into the following categories: none (0-4), mild (5-9), moderate (10-14), moderately severe (15-19), and severe (>20). The total scores from the GAD-7 were broken down into the following categories: none (0-4), mild (5-9), moderate (10-14), and severe (>15). A chi^2 test of proportions was also done with this data to find if there were any significant differences between genders.

The second question looked to determine the consistency or reporting mental health conditions across multiple areas of the PPE. Within the three mental health forms on the PPE, several questions were found to be asking similar questions, and we wanted to see whether or not the student-athletes were consistently reporting their symptoms across these various forms. In order to answer this question, we ran cross tabulations between nine pairs of questions on the PHQ-9, GAD-7, and health history form to find

the specificity and sensitivity of these similar questions. Sensitivity was used to show the ability of these questions to correctly identify those who have the disease, while specificity was used to show the ability of these questions to correctly identify those who do not have the disease. Table 5 includes a list of the nine pairs of questions that were compared and the sensitivity and specificity for those questions. These questions were coded from which measure they came from and then by what question it is from on that particular form. For example, PHQ2 refers to the second question on the PHQ-9 and GAD2 refers to the second question on the GAD-7 and so on. For the health history form, those questions are coded by the form, what section it is from on that form, and finally by what question it refers to under that section. In this study, the mental health portion of the health history form is the tenth section, so HH10.18 refers to question 18 in the 10th section of the health history form.

Statistical Analysis

Prevalence of a "yes" response was calculated for each question on the health history questionnaire. The prevalence rates were compared between males and females using a chi^2 test of proportions. Similarly, prevalence and severity of depression and anxiety were calculated from the PHQ-9 and GAD-7 questionnaires. These values were also compared between males and females using a chi^2 test of proportions. Finally, sensitivity and specificity were calculated to determine whether consistent answers were being reported across similar questions on the PHQ-9, GAD-7, and health history questionnaire.

CHAPTER IV

RESULTS

On table 2, the first question to look at asks if they have ever been diagnosed with anxiety or depression, and it was shown that 8.5% of all student-athletes answered yes to this question. When looking at this split by gender, 13.5% of females answered yes, while 4.5% of males answered yes. The next major question that was looked at asks if they are now, or have ever been, under the care of a trained professional for a mental health condition, and we found that 9.0% of all athletes answered yes, with females at 14.5% and males at 4.5%. Similarly, another question asks if they are currently being treated for a mental health related condition, and only 3.0% of all athletes answered yes to this question. For females, 6.0% answered yes and 1.0% of males also answered yes. There were also a few other questions that stuck out for having a high prevalence rate among the student-athletes. The first question asked if they ever feel stressed out or under a lot of pressure, and we found a total prevalence of 36.5%, with 52.0% of females answering yes and 23.5% of males also answering yes. The next question asks about wishing they had more energy most days, and it was found that 19.0% of all student-athletes answered yes, with females reporting yes 26.5% of the time compared to the males at 13.0%. The last question that stuck out asks if they think about things over and over, and the total prevalence was 21.5%, with 25.0% of females saying yes compared to the males at 19.0%.

When looking at the difference between genders, 11 of the 22 questions analyzed on the health history form were found to have a significant difference. The first question that found a significant difference asked if they ever feel stressed out or under a lot of pressure. The percentage of females that answered yes to this question was 52.0% while only 23.5% of the males answered yes, which gave us a p-value of <0.001. The next question asked if they had ever been diagnosed with anxiety or depression, and this also had a p-value of <0.001 with 13.5% of females answering yes compared to the 4.5% of males. The question that asked if they feel safe also found a significant difference with a p-value of 0.018, with 88.0% of males answering yes compared to the 93.0% of females. The next question asked if they had used chewing tobacco, snuff, or dip within the past 30 days and 7.5% of males answered yes, while 0% of females answered yes, which gave us a p-value of <0.001. When asked if they own or have access to a gun or other weapon, a p-value of <0.001 was also found with 33.0% of males answering yes and only 11.5% of females answering yes. The following question asked if they are now, or have ever been, under the care of a trained professional for a mental health condition, and this resulted in a p-value of <0.001 as well, with 14.5% of females answering yes and only 4.5% of males answering yes. The next question was similar to the previous one and asked if they are currently being treated for a mental health related condition. This question also found a p-value of <0.001 with 6.0% of females answering yes, compared to the 1.0% of males that answered yes. The following question shifted more into anxiety and depression by asking if they wish they had more energy most days of the week, and a p-value of <0.001 was found again with 26.5% of females answering yes and only 13.0% of males answering yes. The next question asked if they feel anxious or nervous much of

the time, and this revealed a p-value of 0.045, with 12.0% of females answering yes and 7.0% of males answering yes. The question that asked if they struggle with being confident also found a significant result with a p-value of 0.001. The split among genders was 13.5% for females and 6.0% for males. The final question that found a significant difference among genders asked if they don't feel hopeful about the future. This question had a p-value of 0.006 with 4.0% of males answering yes and 1.0% of females answering yes.

When looking at the breakdown of PHQ-9 severity scores in table 3, a pattern starts to form with the frequency for each category. It was found that as the severity starts to increase, the number of student-athletes in each category begins to decrease. For example, the total number of student-athletes that fell into the none category was 669 (91.5%), mild was 49 (6.5%), moderate was 8 (1.0%), moderately severe was 3 (0.5%), and severe was 1 (0.25%). This same pattern was also seen in both males and females with 296 (90.5%) females and 334 (91.5%) males falling into the none category, which decreased with each category thereafter until 0 females and 1 (0.25%) male reported severe symptoms. The same pattern was seen with the breakdown of GAD-7 scores in table 4: 652 (89.0%) fell into the none category, 53 (7.0%) were classified as mild, 15 (2.0%) were considered moderate, and 10 (1.5%) were severe. The same pattern was seen when looking at both males and females with 284 (87.0%) females and 341 (91.0%) males falling into the none category, which decreased with each category thereafter until 5 (2.0%) females and 4 (1.0%) males were categorized as severe. No significant differences were found between genders for either the PHQ-9 or GAD-7.

The analysis of the sensitivity and specificity depicted in table 5 between the nine pairs of similar questions also revealed some interesting results. The first set of questions asked if they often feel sad or depressed, and this pair had the highest sensitivity score compared to the other 8 pairs with a score of 0.87 and it also had a high specificity score at 0.93. The second pair of questions asked about their sleeping habits and if they have issues falling or staying asleep, and the results showed a sensitivity of 0.86 and specificity of 0.84.The third pair looked into their energy levels by asking if they often feel tired or if they wish they had more energy most days, and we found a sensitivity of 0.76 and specificity of 0.83. The fourth pair of questions asked about self-confidence and if they struggle with being confident or if they feel bad about themselves, and this was the first pair to have a low sensitivity of 0.38, but high specificity of 0.92. The fifth pair asked about feelings of self-harm and suicidal ideations, and this pair actually had the worst sensitivity at 0, but the highest specificity at 0.99. The sixth set of questions looked into feeling of anxiety by asking if they think about things over and over or cannot control their worrying, and it showed a low sensitivity at 0.32, but still had a high specificity at 0.94. The seventh pair also looked into anxiety by asking if they feel nervous or anxious much of the time, and this set had higher scores with the sensitivity at 0.75 and specificity at 0.85. The eighth set of questions asked if they ever feel like they are under a lot of pressure or have trouble relaxing, and we found that this pair also had a low sensitivity score at 0.33, but a high specificity at 0.94. The last pair asked if they have a hard time managing their emotions or become easily irritable, and the results found that they had good scores overall with a sensitivity of 0.85 and specificity of 0.84.

CHAPTER V

DISCUSSION

Based on evidence from previous research, we hypothesized that the prevalence

rate of mental health conditions reported at a Division I Institution to be around 21%[2],

however, our study found a prevalence rate of only 8.5%. One of the biggest causes of

this may be underreporting due to the stigma that surrounds mental health in society. This

stigma can play a major role in whether the patient will self-report their symptoms or not.

Athletes may be hesitant to report their symptoms on questionnaires for the fear of

appearing weak, they may fear the coaches finding out what they said, or they may

simply be afraid to admit that they might have a mental health condition at all. Athletes

tend to feel the need to portray themselves as psychologically strong and stable because

they fear what would happen if they did not.[35] In a study conducted by Watson, it was

found that there was a significant difference in attitudes towards counseling and help-

seeking behaviors between athletes and non-athletes. Athletes tend to have a less positive

view on help-seeking behaviors compared to non-athletes and tend to have expectations

that their counselor will understand the unique demands of being a student-athlete.[36] This

was demonstrated in our data by looking at the prevalence of yes answers in table 2.

When asked if they have ever been diagnosed with anxiety or depression, we found that

8.5% of all student-athletes answered yes to this question with 13.5% of females

answering yes and 4.5% of males answering yes. However, when asked if they are

currently being treated for a mental health related condition, only 3.0% of all athletes

answered yes to this question with 6.0% of females answering yes and 1.0% of males.
This means that 59 students athletes reported being diagnosed with a mental health
condition at some point, and 23 of them reported currently being treated for a mental
health related condition. It is important that when athletes come forward with concerns
about their mental health, that the conversation focuses on them as a person, not as an
athlete. It is also important to call it a mental health issue, problem, or illness, rather than
a disorder.[37] As stated previously, the prevalence rate for depression in athletes is around
8.5%, but this number is based off of self-reported data. Imagine how large this number
would be if everyone truthfully reported their mental health symptoms.

When looking at the 22 questions that were analyzed from the health history form,
11 of them were found to have a significant difference between genders. Of those 11
questions, seven of them revealed that females had a higher prevalence rate of answering
yes compared to males. These seven questions asked about the following: feeling stressed
out, being diagnosed with anxiety or depression, being under the care of a trained
professional, currently being treated for a mental health condition, wishing they had more
energy most days, feeling nervous and anxious much of the time, and struggling with
being confident. What these seven questions have in common is they all deal with
reporting mental health symptoms, and this difference could be attributed to the fact that
women tend to be more open to reporting these types of symptoms compared to males.
One study by Kroenke et al. found that the number of additional physical symptoms that
were associated with a depressive or anxiety disorder to be 2.54 and 2.02 greater in
females compared to males.[38]

Upon further analysis of the PHQ-9 and GAD-7 scores in tables 3 and 4, some
interesting discrepancies were found when comparing these values to questions found on

the health history form in table 2. As stated above, we found the total number of student athletes who answered yes to having been diagnosed with anxiety or depression on the health history form to be 8.5%, with 13.5% females answering yes and only 4.5% of males. However, when looking at the total number of student-athletes that reported having any form of anxiety and/or depression on the PHQ-9 and GAD-7, it was found that roughly 19% of all student-athletes fell into this category, with 8% coming from depression and 10% from anxiety. Males and females were also found to have a much higher prevalence rate on the PHQ-9 and GAD-7 when compared to the health history form with 17% of males and 22% of females falling into these categories. These differences provide evidence that we are not achieving consistent answers across these forms even though they are asking similar questions. It also shows that those who have been diagnosed with depression and/or anxiety are not representative of all the student-athletes who may have depression and/or anxiety.

When analyzing the sensitivity and specificity of the nine pairs of questions in table 5, the first, second, third, seventh, and ninth pairs showed relatively high sensitivity and specificity scores, which implies that we are getting consistent answers across these two questions and that they are answering what they are intended to answer. The fourth pair found a low sensitivity of 0.38 and high specificity of 0.92, which suggests that these two questions are doing a poor job at correctly identifying those who struggle with self-confidence, but they are doing a good job at correctly identifying those who do not. The fifth pair had the worst sensitivity at 0, but the highest specificity at 0.99. This low sensitivity is possibly due to not having any true positive tests, despite having a total of 13 student-athletes answering yes to one of the two questions. The breakdown of the yes

answers from these questions revealed that there were six false positives and seven false negatives detected, which caused the sensitivity it be very low. The sixth pair also found a low sensitivity score of 0.32, but a high specificity of 0.94. This shows that these two questions are doing a poor job at correctly identifying those who cannot control their worrying, but they do a good job at correctly identifying those that can. The eighth pair also had a low sensitivity score of 0.33 and high specificity of 0.94. This suggests that these two questions are doing a poor job at correctly identifying those that feel like they are under a lot of pressure or have trouble relaxing, but they do a good job at correctly identifying those that do not have this problem.

Conclusion

Being able to demonstrate the need for further mental health resources is vital in helping to end the fight against mental illness. This study is one of the first to investigate the manner in which student-athletes are identified as having a mental health condition upon entry into the university athletics system. The hope of this research was to be able to demonstrate that need at a Division I Institution, unfortunately, that was not the case. Our research revealed a large amount of underreporting of mental health symptoms, as well as inconsistencies among their answers across various forms within the PPE itself. These low and inconsistent values make it very hard for the clinicians to be able to fully understand the scope of mental illness among their student-athletes, and also hard to show the need for further resources. If we are able to show the need and get more mental health resources for our student-athletes, that could allow them to feel more open in

reporting their mental health symptoms because they will feel like they will have more opportunities for getting help and will not view it as such a taboo subject. Future research should focus on investigating different methods for improving the accuracy of these questions in order to decrease the information bias that is present in these studies. This could help ensure that the data being analyzed will produce the most accurate prevalence rates possible in regards to mental illness within this population, and can further demonstrate the need for more mental health resources at these institutions. This can help ensure that these student-athletes are able to get the help that they deserve and can help end the stigma that surrounds mental health.

Table 1. General Demographics

	Males	Females	Total
N	381	329	710
Median Age (years)	19.82	19.26	19.57
Sport			
Track and Field/Cross Country	78	86	164
Football	148	0	148
Swimming and Diving	34	29	63
Basketball	21	27	48
Baseball	46	0	46
Equestrian	0	44	44
Softball	0	34	34
Wrestling	32	0	32
Cheerleading	4	25	29
Soccer	0	28	28
Dance	0	19	19
Tennis	8	11	19
Volleyball	0	18	18
Golf	10	8	18

Table 2. Prevalence of Yes Answers on Health History Form

Question on Health History Form	Total % Yes	Female % Yes	Male % Yes	P-Value*
10.1 Do you ever feel stressed out or under a lot of pressure?	36.5%	52.0%	23.5%	<0.001
10.2 Have you felt so sad or hopeless that you stop doing your normal activity for more than a few days?	4.0%	5.0%	3.0%	0.257
10.3 Have you ever been diagnosed with anxiety or depression?	8.5%	13.5%	4.5%	<0.001
10.4 Do you feel safe?	90%	93.0%	88.0%	0.018
10.5 Do you currently smoke?	0.25%	0.5%	0.25%	0.922
10.6 During the past 30 days, have you used chewing tobacco, snuff, or dip?	4.0%	0%	7.5%	<0.001
10.7 During the past 30 days, have you used marijuana, cocaine, heroin, ecstasy, or any other street drug?	0.5%	0.25%	0.5%	0.386
10.8 During the past 30 days, have you had a least 1 drink of alcohol?	31.5%	27.5%	34.5%	0.146
10.9 Have you ever taken steroid pills or shots without a doctor's prescription?	0.25%	0.5%	0.25%	0.922
10.10 Have you ever been in an abusive relationship or the victim of domestic violence?	1.5%	2.0%	1.0%	0.410
10.11 Do you own or have access to a gun or other weapon?	22.5%	11.5%	33.0%	<0.001
10.12 Are you now, or have you ever been, under the care of a trained professional for a mental health condition?	9.0%	14.5%	4.5%	<0.001
10.13 Are you currently being treated for a mental health related condition?	3.0%	6.0%	1.0%	<0.001
10.14 I often have trouble sleeping.	9.5%	12.0%	8.0%	0.106
10.15 I wish I had more energy most days of the week.	19.0%	26.5%	13.0%	<0.001
10.16 I think about things over and over.	21.5%	25.0%	19.0%	0.061
10.17 I feel anxious and nervous much of the time.	9.0%	12.0%	7.0%	0.045
10.18 I often feel sad or depressed.	4.0%	5.0%	3.0%	0.184
10.19 I struggle with being confident.	9.73%	13.5%	6.0%	0.001
10.20 I don't feel hopeful about the future.	2.5%	1.0%	4.0%	0.006
10.21 I have a hard time managing my emotions (frustration, anger, impatience, etc.)	4.5%	6.0%	3.0%	0.098
10.22 I have feelings of hurting myself or others.	1.0%	1.0%	1.0%	0.843

*P-value represents difference between males and females (chi^2 test of proportions)

Table 3. Prevalence and Severity of Depression based on PHQ-9 Scores

Severity	PHQ-9					
	Total Frequency	Total Percent	Female Frequency	Female Percent	Male Frequency	Male Percent
None (0-4)	669	91.5%	296	90.5%	334	91.5%
Mild (5-9)	49	6.5%	23	7.0%	26	7.0%
Moderate (10-14)	8	1.0%	6	1.5%	2	0.5%
Moderately Severe (15-19)	3	0.5%	1	0.25%	2	0.5%
Severe (>20)	1	0.25%	0	0%	1	0.25%

No significant differences were observed between males and females

Table 4. Prevalence and Severity of Anxiety based on GAD-7 Scores

	GAD-7					
Severity	Total Frequency	Total Percent	Female Frequency	Female Percent	Male Frequency	Male Percent
None (0-4)	652	89.0%	284	87.0%	341	91.0%
Mild (5-9)	53	7.0%	30	9.0%	21	6.0%
Moderate (10-14)	15	2.0%	7	2.0%	8	2.0%
Severe (>15)	10	1.0%	5	2.0%	4	1.0%

No significant differences were observed between males and females

Table 5. Sensitivity and Specificity of Answers across Two Forms

Question 1	Question 2	Sensitivity	Specificity
HH10.18: I often feel sad or depressed	PHQ2: Feeling down, depressed, or hopeless	0.87	0.93
HH10.14: I often have trouble sleeping	PHQ3: Trouble falling or staying asleep, or sleeping too much	0.86	0.84
HH10.15: I wish I had more energy most days of the week	PHQ4: Feeling tired or having little energy	0.76	0.83
HH10.19: I struggle with being confident	PHQ6: Feeling bad about yourself- or that you are a failure or have let yourself or your family down	0.38	0.92
HH10.22: I have feelings of hurting myself or others	PHQ9: Thoughts that you would be better off dead, or of hurting yourself	0	0.99
HH10.16: I think about things over and over	GAD2: Not being able to stop or control worrying	0.32	0.94
HH10.17 : I feel anxious and nervous much of the time	GAD1: Feeling nervous, anxious, or on edge	0.75	0.85
HH10.1: Do you ever feel stressed out or under a lot of pressure?	GAD4: Trouble relaxing	0.33	0.94
HH10.21: I have a hard time managing my emotions (frustration, anger, impatience, etc.)	GAD6: Becoming easily annoyed or irritable	0.85	0.84

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