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MENTAL TOUGHNESS AS A PREDICTOR FOR PRE-SEASON DEPRESSION AND  
ANXIETY SYMPTOMS, AND CHANGES OVER THE COURSE OF AN ATHLETIC  
SEASON

by

COLLEEN J. BOHANNAN

(Under the Direction of Jessica Mutchler)

ABSTRACT

Background: Mental toughness (MT) has been considered necessary for individuals to be successful in the athletic setting. A connection has been theorized between MT and mental health. Purpose: The purpose was to investigate if MT could be utilized as a predictor of the presence of depression and/or anxiety symptoms. This study also explored if MT, and depression/anxiety symptoms change over the course of a competitive season. Methods: 43 individuals ( $19.42 \pm 1.26$  years) participating in a fall team sport from the same Division I University participated in the study. Data was captured during pre-season, high stakes, and end of season, and included: demographic information, Mental Toughness Index (MTI), Generalized Anxiety Disorder 7-Item (GAD-7), and Patient Health Questionnaire-9 (PHQ-9). Data Analysis: Separate linear regressions determined if there was a relationship between pre-season MTI and GAD-7/PHQ-9 scores. Changes in MTI, PHQ-9, and GAD-7 scores were determined using *t*-tests. Results: A significant, weak inverse relationship was identified between pre-season MTI scores and pre-season GAD-7 ( $r = -0.315$ ;  $p = 0.020$ ) and PHQ-9 ( $r = -0.318$ ;  $p = 0.019$ ) scores. MTI significantly predicted GAD-7 scores ( $\beta = -.315$ ,  $p = 0.04$ ) and PHQ-9 scores ( $\beta = -0.318$ ,  $p = 0.038$ ). High-stakes PHQ-9 scores were significantly greater ( $p = 0.026$ ) than pre-season scores. Conclusions: This study supports the use of the MTI as a supplementary screening tool but does not support the replacement of the PHQ-9/GAD-9. It may be appropriate to administer the PHQ-9/GAD-7 during varying time points over the course of a competitive season.

INDEX WORDS: Mental toughness, Depression, Anxiety, Mental health

MENTAL TOUGHNESS AS A PREDICTOR FOR CHANGES IN DEPRESSION AND  
ANXIETY OVER THE COURSE OF AN ATHLETIC SEASON

by

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B.S., Oregon State University, 2017

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## CHAPTER I

### INTRODUCTION

Nationally, there were an estimated 17.0 million students enrolled in American colleges and universities in the 2015-2016 academic school year (National Center for Education Statistics, 2017). Entering college signifies a transition from being dependent in one's adolescence, to advancing to young adulthood with new responsibilities (Wolcott & Gore-Mann, 2009). The college years can be considered as a mini-life cycle, bringing about developmental tasks and adaptive opportunities (Medalie, 1981). This means the establishment of new relationships, important career decisions, substantial life decisions, balancing academic and social priorities, and adjusting to the freedom that partners with collegiate campus life (Etzel, Ferrante, & Pinkney, 2002; Watt & Moore III, 2001). Of these 17.0 million students, there is a sub-population of over 278,000 student-athletes who participated in National Collegiate Athletic Association (NCAA) sports in the same year (National Collegiate Athletic Association, 2016).

The term "student-athlete" is one of the only hyphenated identities utilized in the academic setting (Goldberg & Chandler, 1995), thus indicating that these individuals are required to fulfill the taxing role of both a student and an athlete simultaneously. Intercollegiate athletics adds physical, psychological, and time demands to the student-athlete's life (Kirk & Kirk, 1993; Watt & Moore, 2001). Athletes are required to adapt to the higher levels of play, greater time commitments, and increased travel for away games, while maintaining adequate grades and fulfilling obligations to their coach, their teammates, and the rules and regulations of the NCAA (Goldberg & Chandler, 1995; Kirk & Kirk, 1993; Watt & Moore III, 2001). Student-athletes can become understandably overwhelmed by the demands of each of the roles that they are required to fulfill (Miller & Kerr, 2002). It has been considered by many that those athletes

who are successful possess higher levels of “mental toughness” (Buhrow et al., 2017; Clough & Earle, 2002; Crust, 2007; Gucciardi, Hanton, Gordon, Mallett, & Temby, 2015).

Since the early 1960s, it has been consistently reiterated in literature that mental toughness is a key component of the successful athlete (Cattell, 1957; Kroll, 1967; Werner & Gottheil, 1964). Clough and his colleagues developed a refined concept of mental toughness (MT) in 2002, focusing on a multi-dimensional approach to MT. They felt this construct was best represented by the following four core components: (a) control, (b) commitment, (c) challenge, and (d) confidence (Clough et. al, 2002). According to a study completed by Clough and Earle in 2002, individuals who are considered more mentally tough can cope more easily with physical and mental demands, such as those placed on a student-athlete. Mentally tough individuals will maintain the belief that they themselves can control their negative life experiences, are highly committed to achieving their personal goals, will view negative experiences as a challenge necessary for growth, and are confident in their abilities to assess and overcome undesirable life experiences. Continued research and more advanced understandings of MT led researchers to the most current working definition proposed by Gucciardi et al. in 2017:

“Mental toughness can be defined as a state-like psychological resource that is purposeful, flexible, and efficient in nature for the enactment and maintenance of goal-directed pursuits (Gucciardi, 2017, pg. 18).”

This definition encompasses the following key dimensions: generalized self-efficacy, buoyancy, success mindset, optimistic style, context knowledge, emotion regulation, and attention regulation (Gucciardi et al., 2015).

Evaluation of MT has been inconsistent through the years due to the variety of methodology used to evaluate and index the construct. After an extensive and thorough review of the existing MT literature in both athletic and non-athletic populations, Gucciardi and colleagues produced the eight-item Mental Toughness Index (MTI). The MTI is scored based on an individual's current state, not his/her previous history, due to the belief that MT is a state-like concept, varying and possessing enduring properties across situations and time (Gucciardi & Gordon, 2012). Since its 2015 introduction, this measure has been found to be an effective, valid, and reliable measure of MT in many populations – both athletic and non-athletic (Hannan, Moffitt, Neumann, & Thomas, 2015; Mahoney, Ntoumanis, Gucciardi, Mallett, & Stebbings, 2016; Parker, Jones, & Lovell, 2017). Most recently the MTI was employed to study MT and its connection to psychological skills and techniques in a population of 285 elite Malaysian athletes (ages  $18.89 \pm 4.49$ ), as well as MT and correlations to performance in 143 competitive soccer players in Spain (Guillén & Santana, 2018; Ponnusamy, Lines, Zhang, & Gucciardi, 2018).

Results from previous studies measuring MT have demonstrated a positive correlation between MT and performance in competition, the workplace, and lab-based settings (Cowden, 2017; Gucciardi, 2017; Gucciardi et al., 2015; Rigoni, 2013). Beyond athletic performance, MT has been tied to academic performance and rehabilitation adherence (Crust et al., 2014; Levy, Polman, Clough, Marchant, & Earle, 2006). Individuals possessing high MT were better able to cope with pain than their low MT counterparts (Levy et al., 2006). It has been suggested that MT can be developed through practice and experience, rather than an inherited ability (Anthony, Gucciardi, & Gordon, 2016; Buhrow et al., 2017; Danielsen, Rodahl, Giske, & Hnigaard, 2017; Weinberg, Freysinger, Mellano, & Brookhouse, 2016). Potentially the most important correlation of MT is its relationship to mental health.

In a 2017 evaluation of literature, Gucciardi, Hanton, and Fleming made the argument that mental toughness may represent a positive indicator of mental health. It was suggested that MT could be utilized as a ‘hook’ to attract athletes into open dialogue settings in which there can be an open discussion regarding the importance of mental health (Gucciardi, Hanton, & Fleming, 2017). This would also provide an opportunity to improve knowledge of key mental health issues. Kaiseler and colleagues found that the characteristics of MT in athletes were suggested to be predictors of coping and coping effectiveness in response to a self-selected sport stressor (Kaiseler, Polman, & Nicholls, 2009). Additional studies have identified that the subdimensions of MT are moderate to strong predictors of psychological well-being (Micoogullari, Odek, & Beyaz, 2017; Stamp et al., 2015). These studies, however, have yet to quantitatively examine these predictive relationships between MT and specific mental health issues, such as generalized anxiety disorder and depression.

In collegiate athletes, rates of depression range from an estimated 15% to 21%, with freshmen student-athletes at greater risk for developing depressive symptoms than their more seasoned teammates (Proctor & Boan-Lenzo, 2010; Yang et al., 2007). Student-athletes experience many common mental health issues including eating disorders, substance abuse disorders, and anxiety disorders (Yang et al., 2007). This is logical considering the increased stressors experienced by student-athletes including achievement expectations, injuries, rivalry matches, time demands, conflict with teammates or coaches (Kirk & Kirk, 1993; Watt & Moore III, 2001). If left unaddressed, the combination of these stressors - especially with a history of other common mental health issues – have the potential to lead to the development of anxiety and/or depression (Sudano, Collins, & Miles, 2017).

Despite education and promotion, there continues to be a prevalent stigma surrounding mental health and its treatment, especially in the collegiate athletic population. Unfortunately, the influence of this stigma leads to student-athletes being less likely than their non-athlete peers to seek help for mental health issues like depression and anxiety (Armstrong, Burcin, Bjerke, & Oomen Early, 2015). This is concerning considering a study conducted in 2006 reported that only 12% of college students with depressive symptoms have ever been treated for depression (Michael, Hueisman, Gerard, Gilligan, & Gustafson, 2006). Healthcare providers rely on opportunities, such as required pre-participation exams, to identify student-athletes who may be at risk or in need of support (Neal et al., 2013; Reynon, Goehlert, & Seifert, 2014). Common screening tools to identify mental health issues are the Generalized Anxiety Disorder 7-item scale (GAD-7) and Patient Health Questionnaire (PHQ-9) (Galles, 2016; Reynon et al., 2014). There is currently no consensus regarding the best scale to utilize in pre-participation screenings to appropriately and adequately identify mental health issues in participating student-athletes.

Establishing if MT predicts self-reported symptoms of depression and/or anxiety, would allow the sports medicine team to better identify student-athletes at risk for mental health issues during the preseason screening process without the need of multiple questionnaires. Similar to the changing states of depression and anxiety, it may be likely for MT to change over the course of a competitive season. In 2012, Drees and Mack utilized the Mental, Emotional, and Bodily Toughness Inventory to examine competitive high school wrestlers pre and post season, and saw significant differences among freshmen versus seniors, and those with winning versus losing records. Further literature on changes in MT over time and influences of specific situations on MT, such as high-stakes competition, are lacking.

The purpose of this study was to determine if the MTI scores collected during pre-season could be utilized as a predictor of the presence of depression (PHQ-9) and/or anxiety (GAD-7) symptoms. This study also examined if MT and symptoms of depression and anxiety in student-athletes changed over the course of a competitive season. It was hypothesized MTI scores at pre-season would predict depression and generalized anxiety symptoms also reported at pre-season. It was also hypothesized that MTI scores would improve from pre to post season for those with low pre-season MTI scores, and would remain the same for those with high pre-season MTI scores. Depression and anxiety symptoms were hypothesized to increase from pre-season to high-stakes in-season.

## CHAPTER II

### METHODS

#### **Participants**

The present study began with 43 student-athlete participants, 24 male and 19 female, ages  $19.42 \pm 1.26$  years. Due to attrition, the study totaled 9 participants who completed all three data collections, 14 who completed the pre-season and high-stakes surveys, and 11 who completed the pre-season and end-of-season surveys. The sample size was a convenience sample of athletes from the same Division I University in south Georgia. Student-athlete participants who completed all three data collection surveys included 4 males and 5 females,  $19.22 \pm 1.39$  years of age. Table 1 displays the demographic data of participants for each collection category. Participation in this study was voluntary, but individuals were required to have participated in a fall season team sport including football, men's soccer, women's soccer, and women's volleyball. Individuals were excluded from the study if they had been previously diagnosed by a medical professional with depression or anxiety, and if they experienced time lost due to a concussion as this may result in psychological changes (Yang, Peek-Asa, Covassin, & Torner, 2015). These exclusions were identified via demographic questions during the pre-season, high-stakes, and end-of-season surveys.

#### **Measures and Instrumentation**

Self-report questionnaires were employed to address the research questions and hypotheses of the study. The questionnaires were administered at three points in time: pre-season, high-stakes, and end-of-season. All demographic and self-reported questionnaires can be found in Appendix C.

**Demographic Information.** Participants were asked to respond to a demographic questionnaire that assessed age, gender, sport, athletic year, and previous diagnosis and treatment of anxiety and/or depression. A follow-up demographic questionnaire, administered during the end-of-season survey, inquired about injury as a result of athletic participation during the 2018 fall athletic season, diagnosis of a concussion during the 2018 fall athletic season, if help was sought out regarding symptoms of anxiety and/or depression.

**Mental Toughness Index (MTI).** The MTI is an eight-item measure of mental toughness that requires participants to respond to each item on a 7-point scale ranging from “false, 100% of the time” to “true, 100% of the time”. Table 2 shows the dimension of mental toughness that coordinate with each question. Investigations by Gucciardi et al. (2015) support the psychometric properties, reliability, and validity of the MIT across the population of athletes, military persons, and in the workplace. This direct assessment of MT has demonstrated internal reliability in a similar population sample ( $\alpha = 0.86$ ) (Gucciardi et al., 2015). This measure also demonstrated strong reliability and association between index items using McDonald’s omega ( $\omega$ ) coefficient across populations, including Australian ( $\omega=0.85$ ), Malaysian ( $\omega=0.84$ ), and Chinese ( $\omega=0.90$ ) elite athletes (Gucciardi et al., 2016). When comparing the characteristics of the MTI, MTQ48, and Sports Mental Toughness Questionnaire (SMTQ), the MTI appeared most appropriate for current day application for the identification and scaling of MT.

**Patient Health Questionnaire-9 (PHQ-9).** The PHQ-9 is a self-report checklist developed from the following symptoms of depression: lack of interest, depressed mood, sleeping difficulties, tiredness, appetite problems, negative feelings about self, concentration problems, psychomotor agitation/retardation, and suicidal ideation. Patients are asked to indicate the extent of symptoms within the last two weeks on a 4-point scale, ranging from “0 = not at



all” to “3 = nearly every day”. Summary scores range from 0 to 27, with a score of 10 and above indicating the potential diagnosis of clinical depression (Christensen, Oernboel, Zatzick, & Russo, 2017; Manea, Gilbody, & McMillan, 2012). More specifically, individuals with a summary score of 5-9 would be considered to demonstrate “mild” depressive symptoms, while those scoring 10-14 would be considered “moderate”. Those scoring 15-19 would indicate “moderately severe” depressive symptoms, with “severe” depressive symptoms identified with a score of 20-27. The PHQ-9 has been evaluated for internal consistency using Cronbach’s alpha ( $\alpha = 0.87$ ) and test-retest reliability using the intraclass correlation coefficient ( $r = .85$ ) (Marrie et al., 2018). Sensitivity of the PHQ-9 ranges from 93.8% to 95%, and specificity ranges from 61.2% to 85.9% (Marrie et al., 2018).

**Generalized Anxiety Disorder 7-Item (GAD-7).** The GAD-7 is a 7-item self-report checklist assessing presence and severity of generalized anxiety disorder. Participants are asked to indicate the extent of symptoms within the last two weeks (e.g. “Not able to stop worrying”) on a 4-point scale, ranging from “not at all” to “nearly every day”. Summary scores range from 0 to 21. Summary scores of 5-9 indicate “mild” anxiety symptoms, 10-14 indicating “moderate”, and 15-21 indicating “severe. According to the study conducted by Spitzer and colleagues, the cutoff of 10 for moderate anxiety symptoms is supported with 89% sensitivity, and 82% specificity (Spitzer, Kroenke, Williams, & Löwe, 2006). This assessment is reported to have strong psychometric properties in terms of reliability and validity that is invariant between male and female patients (Donker, Straten, Marks, & Cuijpers, 2011; Plummer, Manea, Trepel, & McMillan, 2016; Rutter & Brown, 2017). Additionally, the GAD-7 has been supported for its good convergent and discriminant validity with other measures of anxiety and depression (Rutter & Brown, 2017). The GAD-7 has been evaluated for internal consistency using Cronbach’s

alpha ( $\alpha = 0.92$ ) and test-retest reliability using the intraclass correlation coefficient (0.76) (Marrie et al., 2018).

## **Procedures**

Following approval from the Institutional Review Board, the athletic director and coaches were contacted prior to the start of the season to inform them of the intent of this study and the recruitment of the student-athletes. Student-athletes received the informed consent form, as well as the demographic questionnaire, MTI, PHQ-9, and GAD-7, via a link sent to their university email address. All forms were completed via a Qualtrics survey and were de-identified using a participant ID prior to data analysis. Individual survey results were not shared with individuals outside of the research team and were not reviewed until completion of the fall season to ensure confidentiality. Participants underwent a separate process through their athletic department during pre-participation physicals to identify those who may be in need of support.

Data collection occurred at three time points: once at pre-season, once surrounding a high-stakes in-season competition, and once post-season. Subsequent surveys were e-mailed only to participants whom had completed the first data collection and had selected to continue to participate. The survey link was also made available to the team in their team communication platform (GroupMe, Teamwork, etc.) for ease of access if they chose to participate in a follow-up survey.

**Pre-Season Screen.** The pre-season data collection consisted of the student-athlete informed consent form, pre-screen demographic questionnaire (age, gender, sport, athletic year, and previous diagnosis and treatment of anxiety and/or depression), MTI, PHQ-9, and GAD-7. Participant results were captured within 7 days prior to their participation in the first formal athletic team practice session.

**High-Stakes Screen.** The high stakes screening took place within 7 days prior to a conference rivalry competition, with the rivalry competition being identified by the coaching staff at the start of the season (Havard, Gray, Gould, Sharp, & Schaffer, 2013; Kilduff, Elfenbein, & Staw, 2010; Tyler & Cobbs, 2017). This screening included the MTI, PHQ-9, and GAD-7.

**End-of-Season Screen.** The end-of-season screen consisted of a follow-up demographic questionnaire (injury occurrence and professional interaction), MTI, PHQ-9, and GAD-7. Participant results were captured no less than 7 days and no more than 21 days after their final athletic competition.

### **Data Analysis**

Statistical Package for the Social Sciences (SPSS v.23.0) was used to complete all statistical analysis. Descriptive statistics were run for demographic variables (e.g. age, athletic year, etc.). Means and standard deviations were calculated for overall MTI and individual question scores to identify population norms.

Due to attrition, sample size of those who completed data collection was smaller than anticipated. Participants were therefore not categorized into groups according to levels of mental toughness, as intended. A one-way ANOVA was run to determine if there was a significant difference in MTI scores between genders. Separate linear regressions determined if there was a predictive relationship between MTI scores at pre-season and PHQ-9 and GAD-7 scores collected at pre-season.

MTI, PHQ-9 and GAD-7 scores were examined using separate paired samples t-tests to identify the presence of significant situation-specific differences in the scores of mental

toughness, generalized anxiety symptoms, and/or depression symptoms. The alpha level for statistical analyses of all statistics was set at  $p < 0.05$  *a priori*. Cohen's  $d$  effect sizes (ES) were calculated and interpreted as small ( $\geq 0.2$ ), moderate ( $\geq 0.5$ ), and large ( $\geq 0.8$ ) effects (Cohen, 1988).

### CHAPTER III

#### RESULTS

A one-way ANOVA confirmed no significant difference in MTI scores between males and females ( $p = 0.412$ ), and Levene's test confirmed variance of the compared populations were equal ( $p = 0.808$ ). Therefore, for all other statistical tests, males and females were grouped together.

There was a statistically significant weak, inverse relationship between the pre-season MTI total scores and pre-season GAD-7 ( $r = -0.315$ ;  $p = 0.020$ ) and PHQ-9 ( $r = -0.318$ ;  $p = 0.019$ ) scores. Collinearity diagnostics denied multicollinearity between the MTI and GAD-7 (VIF = 1.00; tolerance = 1.00) and between the MTI and PHQ-9 (VIF = 1.00; tolerance = 1.00). MTI explained 9.9% of the variance in GAD-7 scores ( $R^2 = 0.099$ ,  $F(1,41) = 4.514$ ,  $p = 0.04$ ). MTI explained 10.1% of the variance in PHQ-9 scores ( $R^2 = 0.101$ ,  $F(1,41) = 4.619$ ,  $p = 0.038$ ). MTI significantly predicted PHQ-9 scores ( $\beta = -0.318$ ,  $p = 0.038$ ). MTI significantly predicted GAD-7 scores ( $\beta = -.315$ ,  $p = 0.04$ ).

PHQ-9 scores collected at high-stakes ( $4.64 \pm 5.18$ ) were significantly greater ( $p = 0.026$ ) than scores reported at pre-season ( $2.79 \pm 4.209$ ). However, there was a small effect size ( $d=0.392$ ) demonstrated. No other differences were reported between MTI, PHQ-9 and GAD-7 scores across the season ( $p>0.05$ ).

Pre-season MTI, PHQ-9, and GAD-7 scores broken down by athletic year are shown in Table 3. Means and standard deviations of MTI, GAD-7 and PHQ-9 scores collected over the course of the season are represented in Table 4.

## CHAPTER IV

### DISCUSSION

The purpose of the study was to investigate the following questions: (1) Can MTI scores be used as a predictor for depression and/or anxiety symptoms at pre-season, (2) Do self-reported feelings of depression and/or anxiety change over the course of the competitive season, and (3) Is MT situation specific, or does it stay constant throughout a competitive season of athletic participation? We hypothesized that MTI scores would predict symptoms of depression and anxiety captured using the PHQ-9 and GAD-7 during pre-season, respectively. We also hypothesized that self-reported feelings of depression and/or anxiety in this population would change over the course of a competitive season. Furthermore, we believed that individuals with “low” mental toughness at pre-season would demonstrate an increase in mental toughness scores over the course of the competitive season – demonstrating that mental toughness has the potential to change and does not in fact stay constant.

The results of this study supported a weak inverse relationship between MT and both depression and anxiety symptoms. The pre-season MTI was found to significantly predict pre-season scores of the PHQ-9 and GAD-7, but only explained approximately 10% of the variance for both measures. Symptoms of depression (PHQ-9) was the only measure to significantly increase from pre-season to high-stakes in-season, with all other measures showing no significant change between pre-season to high-stakes, high-stakes to post-season, and pre-season to post-season. Included in the following discussion is an interpretation of these results.

Previously, a critical evaluation of the literature performed by Gucciardi and colleagues suggested that mental toughness may be a positive indicator of mental health, but the connection had not been quantitatively supported by research (Gucciardi et al., 2017). Our study supports

that higher self-reported MT at pre-season related to lower self-reports of depression ( $r = -.318, p = 0.019$ ) and anxiety ( $r = -.315, p = 0.02$ ) symptoms at pre-season. Although the MTI was found to be a statistically significant predictor of PHQ-9 and GAD-7 scores, analysis demonstrated it only explained approximately 10% of the variance for these measures. Unfortunately, these values are not high enough to support the utilization of the MTI alone during pre-season screening to predict the presence or lack of presence of depression and/or anxiety symptoms.

Due to the small sample size collected (<20 for each consecutive time point), we were unable to split the participants into “low” and “high” mental toughness. This thus changed two of our hypotheses to reflect general correlations between mental toughness and depression or anxiety, not relating to the grouping of “high” versus “low” mental toughness. Results from this study indicated correlations between MTI scores and GAD-7 scores during the pre-season data collection ( $p=0.040$ ), demonstrating a connection between mental toughness and generalized anxiety disorder in our sample of collegiate athletes. Correlations were also identified between MTI scores and PHQ-9 scores during pre-season data collection ( $p=0.038$ ), indicating an additional connection between mental toughness and depression in this sample. Despite these correlations being present, they are considered weak and do not warrant the replacement of the GAD-7 and PHQ-9 measures with the MTI. However, the MTI has potential to be utilized as a supplementary pre-screen tool, used in coordination with the GAD-7 and PHQ-9.

Data collected in our study on MT can be compared to previous studies with similar samples of age and elite competition. A 2018 study conducted using 285 Malaysian elite athletes (ages  $18.89 \pm 4.49$ ) grouped participants based on psychological skills and techniques (PST) during practice and competition. Individuals who demonstrated high adaptive PST scored significantly higher ( $p < 0.001$ ) on the MTI ( $6.48 \pm 0.38$ ), than athletes sorted into the moderate

adaptive PST ( $5.88 \pm 0.72$ ,  $d = 1.02$ ) (Ponnusamy et al., 2018). Those classified into the low adaptive PST group also scored significantly lower ( $p < 0.001$ ) on the MTI than the moderate group ( $5.21 \pm 0.18$ ,  $d = 1.45$ ). A separate study conducted in Spain in 2017 examined MT of competitive soccer players in under 16s and under 19s age groups (Guillén & Santana, 2018). Within the under 19s group, there were 143 participants who demonstrated a mean MTI score of  $5.98 \pm 0.63$ , which was significantly higher than that of the younger age group ( $p = 0.023$ ).

During pre-season data collection, our participants averaged a mean MTI score of  $6.11 \pm 0.71$ , falling within the range between individuals who demonstrated high adaptive PST and those who demonstrated moderate adaptive PST in the study conducted by Ponnusamy and colleagues (2018). On average, our sample's MTI scores would therefore be classified as moderate to high, in relation to these corresponding studies. Our initial hypothesis indicated that those with high MT would not demonstrate a change to their MT scores from pre to post season. Due to the MTI average demonstrated in our sample, we may have experienced a ceiling effect within our participants, preventing further measurable increases in MT with the MTI at different time points of the competitive season.

Although the average MTI scores across the season for the overall sample population do not appear to significantly differ, the relative "lowest" mental toughness scores at pre-season can be visually identified within athletes entering their second year of athletic participation (Table 3). Within those second-year athletes, the lowest scoring question correlated with the theme of emotion regulation (Tables 2 and 3). Emotion regulation was also the lowest scoring question across populations during pre-season and end-of-season data collections (Table 4). Although these trends are not identified as statistically significant, it is worth identifying for potential clinical significance. The second year of college is another time of important changes as students



transition out of on-campus housing, adjust to new roommates, and have potential to be separated from their first-year friends and peers (Stamp et al., 2015). These challenges, combined with the potentially lacking emotion regulation, could put second year student-athletes at a disadvantage when it comes to balancing school, sport, and life, requiring additional support beyond their first-year experience. The identification of relatively lower emotion regulation during pre-season compared to the other unidimensional themes of MT may be an indicator of challenges as athletes' transition from summer back to fall term - anticipating the return of a collegiate training load, social and academic priorities, and important upcoming career and life decisions (Etzel et al., 2002; Kirk & Kirk, 1993).

This study also had the intent to identify if self-reported feelings of depression and/or anxiety changed over the course of a competitive season. Self-reported feelings of depression in our sample did change over the course of the competitive season. During pre-season data collection, four of the 43 participants were identified with self-reported symptoms of depression - ranging from moderate to moderately severe - and five were identified with self-reported symptoms of generalized anxiety disorder – ranging from mild to moderate. Although the percentages of mental health issues reported in this study are smaller than those reported in previous literature, our findings reinforce the idea that depression and anxiety continue to be prevalent in our population of collegiate athletes (American College Health Association, 2016; Li, Moreland, Peek-Asa, & Yang, 2017; Sudano et al., 2017; Wolanin, Gross, & Hong, 2015).

The overall number of athletes reporting symptoms of depression or anxiety did not vary greatly throughout data collection. However, there were differences in the severity of self-reported symptoms, as seen in Table 5. The greatest number and higher severity of symptoms were reported at high-stakes. Feelings of depression, assessed with the PHQ-9, were significantly

greater at high-stakes in-conference play ( $4.64 \pm 5.18$ ) compared to reports at pre-season ( $2.79 \pm 4.209$ ),  $p = 0.026$ . Although the data demonstrated a small effect size ( $d = 0.392$ ), there is still applicable significance to this result. These findings suggest that it would be appropriate to administer the GAD-7 and PHQ-9 at varying time periods in the competitive season to appropriately identify athletes in need of assistance, specifically surrounding times of high-stakes play.

Fulfilling the role of a “student-athlete” as an undergraduate places additional stresses on the individual. In addition to the typical challenges of social adjustment, career exploration, and intellectual growth of the average college student, student-athletes also experience pressure from daily practice, adaptations to a higher level of play, collegiate rivalry games, visits to their athletic trainer for injury treatment, travel for away games, etc. (A. D. Goldberg & Chandler, 1995; Kirk & Kirk, 1993; Watt & Moore III, 2001). The demonstrated change in disposition between pre-season evaluation and high-stakes data collection supports the idea that these added stressors – especially during a week of rivalry conference play – have a significant impact on student-athlete self-reported feelings of depression. This supports previous research identifying that a rivalry has the potential to provoke stronger emotional reactions (Kilduff et al., 2010).

During the end-of-season data collection, this study allowed participants the opportunity to identify whom they sought out to provide support when feelings of depression and/or anxiety arose. The reported outcome was as follows: head or assistant coach (2), team physician (1), sport psychologist (1), team athletic trainer (2), and counselor/psychologist (1). Participants were given the opportunity to identify “other” as an answer, or not respond at all. The “Inter-Association Recommendations for Developing a Plan to Recognize and Refer Student-Athletes with Psychological Concerns at the Collegiate Level” identifies the need to have a team of

physician(s), athletic trainers, campus counselors, and community based mental health care professionals in place should an athlete need a referral. The position statement goes further to recommend that the athletic trainer be the point person for referrals because health and wellness falls under the scope of the athletic trainer (Neal et al., 2013). The reported responses reinforce the need for this team of professionals as a support system as student-athletes progress through their time as undergraduates.

Although this study presented with useful findings and considerations, there were several limitations. Outside psychological factors such as personal, situational, or environmental influences of participants were not considered or controlled. All participants were part of a convenience sample recruited from the same Division I institution, and all were recruited to have participated in the same fall competitive season. However, the timing of each team's high-stakes conference rivalry was different, occurring at various times within the fall season. Impact of injury on MT was also not taken into account during this study, although previous literature has identified a hypothetical connection (Levy et al., 2006). Measures utilized in the study rely on self-reports from the student-athlete, and it was expected that participants be honest with their answers as they were ensured privacy and anonymity upon data analysis. Additionally, this study depended on the return rate of the same participants throughout data collection, resulting in attrition and decreasing our usable sample size for data analysis.

Future research is needed in the field of MT to better understand how it correlates to mental health within the student-athlete population. Other mental health issues and their correlation to MT should be explored, as there is a continued need for best-practice recommendations regarding a singular pre-screen tool that is most applicable for identifying athletes in need (Neal et al., 2013). Longitudinal studies would help to better determine if MT

stays constant through time – as it did through the course of this study – or whether it is situational, as other studies have suggested (Buhrow et al., 2017; Crust et al., 2014). These types of studies could be beneficial to also help identify the impact of injury on MT, allowing for an assessment of MT before and after injury occurs. They would also help to identify differences in the developmental processes that may foster or hinder MT development – a need identified in a meta-analysis conducted by Anthony et. al, in 2016. A larger sample size would positively contribute to the effect size of this study, which is necessary before the results can be generalized to a greater population.

## **Conclusion**

Utilizing the evaluation of mental toughness would help to bridge the gap between mental health and mental toughness in student athletes. Due to the correlations found between the PHQ-9, GAD-7 and MTI, this study would support the use of the MTI as a supplementary screening tool in coordination with the PHQ-9 and GAD-7. Due to its weak predictive abilities, the MTI would not be justifiably utilized as a replacement for the PHQ-9 and GAD-9, nor as a pre-screen prior to the administration of these two mental health questionnaires. However, this would allow for the accompanying use of a less pointed questionnaire – like the MTI – to be utilized in the student athletes’ pre-participation screening. This study suggests that due to the changes in depression and anxiety symptoms at different time points in the season, it may be appropriate to administer the PHQ-9/GAD-7 during varying time points. Additionally, this study helps to build literature focusing on mental toughness and the MTI and identify population norms for collegiate student athletes. Future research should investigate the MTI in correlation to other mental health issues, as well as continue to monitor MT over time and in varying mentally

challenging situations. Longitudinal studies can provide additional information on athlete maturation, influence of injury, and situation specific mental toughness.

**Table 1.** Student-Athlete Participant Demographic Information

	Gender	Age (years)
Pre-Season Capture	24 M, 19 F	19.42 ± 1.26
3 Captures	4 M, 5 F	19.22 ± 1.39
Pre- & High Stakes	4 M, 10 F	18.93 ± 1.27
Pre- & End-of-Season	5 M, 6 F	19.00 ± 1.34

Notes: M = male, F = Female; “3 Capture” represents the sample who have completed the Pre-Season, High-Stakes, and End-of-Season data collections; Pre-Season Capture represents the starting participants during the first data collection, after exclusion criteria.

**Table 2.** Mental Toughness Index and Coordinating Themes

Question 1	Self-Belief
Question 2	Attention Regulation
Question 3	Emotion Regulation
Question 4	Success Mind-Set
Question 5	Context Knowledge
Question 6	Buoyancy
Question 7	
Question 8	Optimism

Notes: Each question of Gucciardi's Mental Toughness Index coordinated with a unidimensional theme, collaborating to produce mental toughness in the individual (Gucciardi et al., 2015). Questions 6 and 7 coordinated with the same dimension of mental toughness.

**Table 3.** Pre-Season Mental Toughness Scoring for Each Academic Year

Measure		Total Sample (19F, 24M)	Athletic Year				
			1 (7F, 8M)	2 (4F, 8M)	3 (2F, 5M)	4 (4F, 3M)	5 (2F)
MTI	Question 1	6.35 ± 0.78	6.20 ± 1.01	6.25 ± 0.62	6.57 ± 0.79	6.43 ± 0.53	7.00 ± 0.00
	Question 2	5.91 ± 1.09	5.67 ± 1.18	5.75 ± 1.14	6.14 ± 1.07	6.29 ± 0.95	6.50 ± 0.71
	Question 3	5.84 ± 0.97	6.13 ± 0.74	5.42 ± 1.08	6.00 ± 1.00	5.71 ± 1.11	6.00 ± 1.41
	Question 4	6.63 ± 0.66	6.73 ± 0.46	6.50 ± 0.90	6.43 ± 0.79	6.71 ± 0.49	7.00 ± 0.00
	Question 5	6.00 ± 1.15	6.00 ± 1.60	5.67 ± 0.98	6.29 ± 0.76	6.14 ± 0.69	6.50 ± 0.71
	Question 6	6.07 ± 0.83	6.27 ± 0.96	5.75 ± 0.75	6.14 ± 0.69	6.00 ± 0.82	6.50 ± 0.71
	Question 7	6.14 ± 0.83	6.20 ± 0.86	6.08 ± 0.90	6.00 ± 1.00	6.14 ± 0.69	6.50 ± 0.71
	Question 8	6.00 ± 1.23	6.00 ± 1.31	5.92 ± 1.38	5.86 ± 1.07	6.00 ± 1.29	7.00 ± 0.00
	Average	6.11 ± 0.71	6.15 ± 0.80	5.92 ± 0.75	6.18 ± 0.72	6.18 ± 0.52	6.63 ± 0.35
	Total	48.93 ± 5.65	49.20 ± 6.36	47.33 ± 6.02	49.43 ± 5.77	49.43 ± 4.12	53.00 ± 2.83
GAD-7	Total	3.28 ± 3.96	3.93 ± 4.80	3.00 ± 2.76	1.86 ± 2.85	4.71 ± 4.92	0.00 ± 0.00
PHQ-9	Total	2.16 ± 3.30	2.40 ± 4.24	2.25 ± 2.56	1.00 ± 0.82	3.29 ± 4.11	0.00 ± 0.00

Notes: M = male, F = female. For this table sample size is identified for each athletic year. Further demographic variables of these samples are displayed in Table 1. Unidimensional themes coordinating with each question of the MTI are represented in Table 2.



**Table 4.** Mental Toughness Scores Over the Course of a Competitive Season

Measure		Pre-Season (16n)	High-Stakes (14n)	End-of-Season (11n)
MTI	Question 1	6.25 ± 0.78	5.93 ± 0.83	6.36 ± 0.92
	Question 2	5.88 ± 1.09	5.64 ± 1.08	5.82 ± 0.98
	Question 3	5.44 ± 1.03	5.64 ± 0.93	5.55 ± 1.04
	Question 4	6.81 ± 0.40	6.50 ± 0.76	6.27 ± 1.01
	Question 5	6.00 ± 1.03	6.00 ± 0.68	6.09 ± 0.94
	Question 6	5.94 ± 1.00	5.57 ± 0.76	5.82 ± 0.98
	Question 7	5.94 ± 1.00	6.07 ± 0.83	5.82 ± 0.87
	Question 8	5.75 ± 1.44	5.71 ± 1.20	6.09 ± 0.83
	Average	6.00 ± 0.75	5.88 ± 0.67	5.98 ± 0.73
	Total	48.00 ± 6.01	47.07 ± 5.39	47.82 ± 5.83
GAD-7	Total	4.13 ± 4.63	5.21 ± 4.71	2.27 ± 2.83
PHQ-9	Total	3.00 ± 4.01	4.64 ± 5.18	2.09 ± 2.63

Notes: 9 individuals completed all three respective data collections. For this table sample size is identified at each time point, but each sample does not contain the same participants outside of these 9 individuals. Demographic variables of these samples are displayed in Table 1.

Unidimensional themes coordinating with each question of the MTI are represented in Table 2.

**Table 5.** Athletes Identified with Depression and/or Anxiety Symptoms

	Depression	Generalized Anxiety Disorder
Pre-Season	Mild (3)	Mild (4)
	Moderate (0)	Moderate (1)
	Moderately Severe (1)	Severe (0)
	Severe (0)	
High-Stakes	Mild (3)	Mild (3)
	Moderate (1)	Moderate (2)
	Moderately Severe (1)	Severe (0)
	Severe (0)	
End-of-Season	Mild (2)	Mild (2)
	Moderate (0)	Moderate (0)
	Moderately Severe (0)	Severe (0)
	Severe (0)	

Notes: Identification of depression scaling based on PHQ-9, with “mild” demonstrating a PHQ-9 score of 5-9, “moderate” = 10-14, “moderately severe” = 15-19, and “severe” = 20-27.

Identification of generalized anxiety disorder scaling based on GAD-7, with “mild” demonstrating a GAD-7 score of 5-9, “moderate” = 10-14, and “severe” = 15-21 (Spitzer, et. al, 2006).

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## APPENDIX A: EXTENDED INTRODUCTION

*Research Questions:*

RQ<sub>1</sub>: Does the pre-season evaluation of mental toughness predict the presence of depression and anxiety symptoms in the NCAA Division 1 University student-athlete population?

RQ<sub>2</sub>: Does self-reported feelings of depression and/or anxiety change over the course a competitive season?

RQ<sub>3</sub>: Is mental toughness situation specific, or does it stay constant throughout a competitive season of athletic participation?

*Research Hypotheses:*

H<sub>0</sub>: There is no significant difference in depression and anxiety symptoms in individuals with low mental toughness versus those with high mental toughness.

H<sub>1</sub>: Individuals with low mental toughness during pre-season evaluation will demonstrate moderate to severe depression and anxiety symptoms during pre-season evaluation.

H<sub>0</sub>: Self-reported feelings of depression and/or anxiety will remain the same over the course of a competitive season.

H<sub>2</sub>: Self-reported feelings of depression and/or anxiety will change over the course of a competitive season.

H<sub>0</sub>: Individuals with low mental toughness at pre-season will demonstrate stagnant or decreasing in mental toughness scores over the course of the competitive season.

H<sub>3</sub>: Individuals with low mental toughness at pre-season will demonstrate an increase in mental toughness scores over the course of the competitive season.

*Inclusion Criteria:*

- Male and female student-athletes between 18-25 years of age participating in a fall season NCAA Division 1 University sport.
- Participation in a Fall Team Sport.
- Voluntary participation.

*Exclusion Criteria:*

- Student-athletes who experience time loss due to a concussion.
- Participation in a Fall Individual Sport.
- Student athlete is a minor (under 18 years of age).
- Individual has an existing diagnosis of depression and/or anxiety by a medical professional.

*Limitations:*

- Outside psychological factors such as personal, situational or environmental influences.
- Measures utilized in the study rely on self-report of the student-athlete.
- There are varying “high-stakes” time-frames for each fall-season sport.
- Relying on return rate through three data capturing points (i.e. pre-season, high-stakes, end-of-season).

*Delimitations:*

- The student-athletes are part of a convenience sample from the same university.
- All student-athletes have their competitive season in the fall.
- All student-athletes whom have been previously diagnosed with depression and/or anxiety will not be included in the study.

*Assumptions:*

- Student-athletes will be truthful and honest in answering all questions and scales.

- Conference rivalry captures high-stakes scenario among all participating student-athletes.

*Operational Definitions:*

- College Athlete: For the purpose of this study, a college athlete is a full-time resident student on a varsity team at the NCAA Division I level.
- High-stakes: Identified by the coaching staff at pre-season as an important rivalry game.
- Rivalry: A fluctuating adversarial relationship existing between two teams, players, or groups of fans, gaining significance through on-field competition, on-field or off-field incidences, proximity, demographic makeup, and/or historical occurrence(s) (Harvard et al., 2013)
- Injury: A reportable injury must have occurred as a result of participation in organized intercollegiate practice or contest, required medical attention by a team certified athletic trainer (AT) or physician, and resulted in restriction of the student-athlete's participation or performance for one or more days beyond the day of injury (Mueller-Wohlfahrt et al., 2013).
- Depression: A mood disorder that causes severe symptoms, persisting for at least two weeks, that affect how you feel, think, and handle daily activities, such as sleeping, eating, or working. Symptoms include some or all of the following: persistent sad, anxious, or "empty" mood; feelings of hopelessness, or pessimism; irritability; feelings of guilt, worthlessness, or helplessness; loss of interest or pleasure in hobbies and activities; decreased energy or fatigue; moving or talking more slowly; feeling restless or having trouble sitting still; difficulty concentrating, remembering, or making decisions; difficulty sleeping, early-morning awakening, or oversleeping; appetite and/or weight changes; thoughts of death or suicide, or suicide attempts; aches or pains, headaches, cramps, or

digestive problems without a clear physical cause and/or that do not ease even with treatment (National Institute of Mental Health, 2016).

- Anxiety: People with generalized anxiety disorder display excessive anxiety or worry for months and face several anxiety-related symptoms, including: restlessness or feeling wound-up or on edge; being easily fatigued; difficulty concentrating or having their minds go blank; irritability; muscle tension; difficulty controlling the worry; sleep problems (difficulty falling or staying asleep or restless, unsatisfying sleep) (National Institute of Mental Health, 2016).
- Mental Toughness: A state-like psychological resource that is purposeful, flexible, and efficient in nature for the enactment and maintenance of goal-directed pursuits (Gucciardi et al., 2015).

## APPENDIX B: REVIEW OF LITERATURE

The following review of literature will summarize the current knowledge of mental toughness (MT), its use, and its measurement. Included in this review is background information on the transition to college; mental health; and MT. These main topics will break down into overview of mental health issues in college students, prevalence of mental health issues in student athletes and its consequences, and current screenings and the role of the athletic trainer; early definition and theory of MT, updated theory and definition of MT, influence of MT, and measuring MT.

### **Transition to College**

In the 2015 academic year, there were an estimated 17.0 million students enrolled in American colleges and universities (National Center for Education Statistics, 2017). This transition coordinates with the last phase of an individual's adolescence, and results in both social and biological changes as they move into young adulthood and a plethora of new responsibilities (Micoogullari et al., 2017; Wolcott & Gore-Mann, 2009). College requires the establishment of new relationships, important career and life decisions, balancing social and academic priorities, developing and redefining study skills, and adjusting to the freedom and independence that accompanies campus life (Etzel et al., 2002; Kirk & Kirk, 1993; Watt & Moore III, 2001). Due to challenges such as these, the time an individual spends in college is considered to be one of the most unsteady periods of their development. Dependent on the sub-population of college students, there is potential to be added challenges that require even greater psychological development along with the already present social, emotional, and academic demands.

Playing an intercollegiate sport adds a complex layer to undergraduate student life. The term “student-athlete” is the only hyphenated identity utilized within the academic setting, demonstrating that one must fulfill two separate roles while participating in collegiate athletics (A. D. Goldberg & Chandler, 1995). Not only do these individuals experience the typical challenges of the college transition – social adjustment, career exploration, intellectual growth – but also the added demands of a collegiate athlete: daily practice, adaptations to a higher level of play, collegiate rivalry games, visits to their athletic trainer for injury treatment, travel for away games, studying team plays, etc. (Kirk & Kirk, 1993; Watt & Moore III, 2001). These individuals are required to hold themselves to a higher standard while maintaining an adequate grade point average, fulfilling all obligations to their coaches and team, and following the rules and guidelines set forth by the university and associated programs. The rules and regulations set forth by the National Collegiate Athletic Association (NCAA) for first-year student-athletes supports the idea that the first-year transition is a critical period, vital in the determinants of future success that educators, administrators, and health care providers have a need to recognize (Miller & Kerr, 2002).

After the first year of college, the difficulties of university life do not cease, but rather continue to present different challenges and changes (Stamp et al., 2015). College rivalries are present throughout the four years of university play, bringing unique demands to the table. A rivalry in itself is “a highly salient outgroup that poses acute threat to ingroup identity and/or esteem”, thus provoking stronger emotional reactions, and an added stressor during the time of the rivalry match-up (Kilduff et al., 2010). In the second year, many individuals transition out of on-campus living and adjust to new roommates, as well as new academic advisors, and classes that separate many students from their first-year friends and peers. Grades begin to contribute



more to final degree classification, adding additional pressure to perform. Pressures continue into the third year and beyond as students begin internships, thesis projects, and culmination work for their undergraduate program. They also must begin to think and plan towards their post graduate study and career paths. Student-athletes across all years of study must cope with emerging challenges and can become overwhelmed by each of the demands they are required to occupy, leading to potential physical and psychological issues (Miller & Kerr, 2002).

## **Mental Health**

### *Overview of Mental Health Issues in College Students*

A 2016 survey conducted by the American College Health Association (ACHA) reported that 36 percent of the 95,000 collegiate respondents reported having felt depressed within the last twelve months. Over 50 percent of these respondents also reported having felt overwhelming anxiety during that same time period (American College Health Association, 2016).

“Depression” can be classified simply as a mood disorder, and is characterized by signs or symptoms such as low or sad moods; irritability or anger; feeling worthless, helpless and hopeless; eating and sleeping disturbance; decrease in interest, concentration, motivation, and energy; decrease in activity levels with feelings of fatigue or tiredness; social withdrawal or avoidance; or negative thinking (Thompson, Sherman, & Bloomington Center for Counseling and Human Development, 2014). According to the National Institute of Mental Health, approximately 40 million people over the age of 18 are affected by an anxiety disorder, making it one of the most common types of mental illness in the United States (National Institute of Mental Health, 2016). Although anxiety can come and go, for an individual with an anxiety disorder the anxiety persists and can worsen over time. Symptoms of a generalized anxiety disorder include: restlessness; being easily fatigued; difficulty concentrating; irritability; muscle tension; difficulty

controlling worry; and sleep problems. In the general college population, mental health problems such as depression and anxiety are associated with other behaviors, such as poor academic performance, fewer days devoted to study, suicidal thoughts, and disordered eating (Stamp et al., 2015).

### *Prevalence of Mental Health Issues in Collegiate Athletes and Its Affects*

Athletes are just as likely, if not more likely, to experience mental health issues as their non-athlete peers (Sudano et al., 2017; Wolanin et al., 2015). If left unaddressed, the added stressors and expectations of the student-athlete may lead to the development of depression and anxiety (Sudano et al., 2017). According to studies, prevalence rates of depression among collegiate athletes ranges from 15.6% to 21%, meaning that an estimated one in every five collegiate athletes suffer from depression (Wolanin et al., 2015). Female college athletes also tend to report more depressive symptoms than male athletes (Li et al., 2017; Wolanin et al., 2015; Wolanin, Hong, Marks, Panchoo, & Gross, 2016; Yang et al., 2007). First-year student-athletes are reported to have 3.27 greater odds of experiencing symptoms of depression than their more senior counterparts, according to a study conducted by Yang and his colleagues in 2007 among NCAA Division 1 (D1) athletes. Often, depression and anxiety symptoms can occur concurrently. A 2017 study conducted by Li and colleagues focusing on NCAA D1 athletes reported that 76% of participants experiencing depression symptoms also experienced anxiety symptoms, and nearly 57% of individuals who experience symptoms of anxiety also have experienced depression symptoms.

Collegiate student-athletes undergo a great transition through their undergraduate career. The responsibilities student-athletes maintain and standards that they uphold put them in a position of added risk factors for the development of mental health issues that are unique to their

population. These risk factors include, but are not limited to, the potential of injury, involuntary career termination, performance expectations, and overtraining (Davoren & Hwang, 2014; Sudano et al., 2017; Weigand, Cohen, & Merenstein, 2013; Wolanin et al., 2015). When participating in athletic activity, there is an unavoidable risk for the development of an acute or chronic injury. One study reported that 33% of athletes with injury were identified to have high levels of depression, compared to 27% of non-injured athletes, thus identifying the increased risk of development of depression in injured athletes (Wolanin et al., 2016).

While injured athletes are at an increased risk for the development of depression and anxiety, athletes who have depression or anxiety are also at an increased risk to be injured. Studies have linked feelings of stress, unease and worry – all symptoms of depression and anxiety – to a physical narrowing of the field of vision, increase in muscle tension, and increased distractibility during task completion (Cagle, Overcash, Rowe, & Needle, 2017). Anxiety specifically has supported potential to contribute to musculoskeletal injury in athletes due to its effects on the human body and mental state. Research has provided support for this theory by examining pre-season anxiety symptoms and acute injury during the prospective season. Athletes that presented with pre-season anxiety symptoms were at an increased risk of injury during that prospective season (Li et al., 2017). For all these reasons, it is a current NCAA best practice to include mental health in the college athlete's pre-participation physical and screening.

#### *Screening for Mental Health Issues and Best Practices*

It is essential that health care providers – such as athletic trainers (ATs) – are able to identify the signs and symptoms of depression and anxiety among these collegiate student-athletes (Wolanin et al., 2015). ATs and team physicians are in a position to not only observe and interact with student-athletes on an almost daily basis, but also to be one of the first interactions

with student-athletes as they make their transition to the college experience. Because of this, ATs play an important role in the identification and referral of mental health issues. In 2013, the National Athletic Trainers' Association (NATA) released their "Inter-Association Recommendations for Developing a Plan to Recognize and Refer Student-Athletes with Psychological Concerns at the Collegiate Level". This consensus statement highlighted the important role ATs play in the education of mental health, early recognition of mental health issues, and effective referral into the mental health care system (Neal et al., 2013).

The NCAA followed suit by releasing "Interassociation Consensus Document: Best Practices for Understanding and Supporting Student-Athlete Mental Wellness" that same year. Both consensus documents, as well as supporting studies and reviews of the literature, identify the importance of a pre-participation mental health screening (Li et al., 2017; National Collegiate Athletic Association, 2013; Neal et al., 2013; Wolanin et al., 2016). Specifically, the NCAA Consensus Document states that, "Schools are encouraged to develop and apply mental health screening tools, as well as a written mental health referral plan, prior to a student-athlete's initial participation in college athletics (National Collegiate Athletic Association, 2013)." This recommendation highlights the use of screening tools to identify one or more of the following: attention deficit hyperactivity, alcohol use, anxiety, apnea, depression, disordered eating, and insomnia.

Despite these recommendations, only 40% of NCAA D1 universities use screening instruments to assess student-athletes for mental health issues as suggested above (Sudano et al., 2017). Of the 219 NCAA D1 universities who participated in a 2016 study, only four included all recommended screenings (Galles, 2016). One-hundred and twenty-one (55%) of the participating universities included some type of mental health screening in their pre-participation exam, and

only 99 (45%) screened for symptoms of depressed mood. All of the participating universities conducted a required pre-participation exam, but many missed the opportunity to adequately identify and refer individuals who may be at risk. Additionally, 71 of these programs (32%) have no mental health screening component in their pre-participation exam. One can theorize as to why these universities did not screen for depression or other mental health disorders, but it must be noted that there is no cohesive statement for what specifically constitutes appropriate mental health screening of incoming athletes (Galles, 2016).

Two screenings commonly utilized for the identification and referral of depression and anxiety are the Patient Health Questionnaire 9 (PHQ9) and the Generalized Anxiety Disorder 7-item (GAD7) (Sudano et al., 2017). Both questionnaires have support of their validity and reliability, but rely on self-report with pointed questions toward their subject (Donker et al., 2011; Marrie et al., 2018). This combination may be adding additional challenges in the identification of depression and anxiety, as there continues to be a stigma surrounding mental health issues. College student-athletes are reportedly less likely than their non-athlete peers to report symptoms due to this surrounding stigma. Male athletes, in particular, may be likely to deny depression and anxiety symptoms given the nature of the athletic culture (Li et al., 2017; Wolanin et al., 2016).

Within the sports culture – especially at the elite level – there is a tendency to minimize mental disorders or psychological distress due to the expectations of strength, stability, and toughness by fellow athletes and coaches (Davoren & Hwang, 2014; Reynon et al., 2014). Despite the attempts to combat these stigmas, they continue to remain present. Athletic trainers, and fellow healthcare providers that make up the mental health referral team, must seek other avenues in which they can appropriately identify student-athletes at risk, as well as open a door

for education regarding mental health. A suggested route is through the theory of “mental toughness” in athletes (Gucciardi et al., 2017).

## **Mental Toughness**

### *Definition & Theory*

Throughout the years, mental toughness (MT) has been a character trait used to describe high performance athletes, and has been considered a key component to an athlete’s success (Cattell, 1957; Kroll, 1967; Werner & Gottheil, 1964). Cattell’s 1957 seminal work on personality identified tough-mindedness as being:

“tough, realistic, down-to-earth, independent, responsible, but skeptical of subjective cultural elaborations. They are sometimes unmoved, hard, cynical, smug. They tend to keep a group operating on a practical and realistic, no-nonsense basis (IPAT Staff, 1979, p. 23).”

He further defined tender-minded individuals as emotionally sensitive, temperamental, dependent, and fussy. Cattell’s work identified tough-mindedness as an integral dimension of personality, and others were soon to follow his lead (Kroll, 1967; Werner & Gottheil, 1964). While many have proposed varying definitions of MT and how to enhance it, these works lack in a sound theoretical and scientific investigation of the theory backing their definition (Goldberg, 1998; Loehr, 1986). More recently, researchers have highlighted the importance and need to develop conceptualizations and measures of mental toughness that appropriately reflect it’s unique characteristics and have a solid theoretical foundation (Clough et al., 2002; Middleton, Marsh, Martin, Richards, & Perry, 2004).

In the early 2000s, two new working definitions of MT were produced, with the most widely adapted being that of Clough and his colleagues in 2002. Following Cattell, Clough defined mentally tough individuals as:

“sociable and outgoing; as they are able to remain calm and relaxed, they are competitive in many situations and have lower anxiety levels than others. With a high sense of self-belief and an unshakable faith that they control their own destiny, these individuals can remain relatively unaffected by competition or adversity (Clough et al., 2002, p. 38).”

Clough and his colleagues believe that MT is represented by four key components (4C's): 1. Control, 2. Commitment, 3. Challenge, and 4. Confidence. Following these 4C's, mentally tough individuals will tend to view negative experiences as a challenge necessary for growth and development, possess the belief that they themselves can control negative life experiences, are highly committed to achieving their goals, and are confident in their abilities to assess and overcome trying life experiences (Clough et al., 2002). Middleton broke down these 4C's even more, to 12 components of mental toughness: self-efficacy, potential mental self-concept, task familiarity, value, personal bests, goal commitment, perseverance, task focus, positivity, stress minimization, and positive comparisons (Middleton et al., 2004).

Throughout the many definitions and theories, there is a common trend of perseverance and conviction toward a goal despite adversity. This brings forth the most current and accepted definition of MT proposed by Gucciardi et al. in 2017:

“Mental toughness can be defined as a state-like psychological resource that is purposeful, flexible, and efficient in nature for the enactment and maintenance of goal-directed pursuits (Gucciardi, 2017, p. 18).”

This definition creates a link to MT, established theory, and research utilizing the key dimensions proposed by Gucciardi's 2015 work as its foundation: generalized self-efficacy, buoyancy, success mindset, optimistic style, context knowledge, emotion regulation, and attention regulation (Gucciardi et al., 2015).

### *Influence of Mental Toughness*

Mental toughness is found in goal driven individuals such as athletes, military men and women, and those in a competitive work environment, with MT being a key element - for athletes especially - to rise above their competitors (Buhrow et al., 2017). More mentally tough individuals have the ability to cope more easily with high physical and mental demands placed on them (Clough et al., 2002). In studies conducted by previous researchers, there has been a positive correlation identified between MT and performance in competition-based, work, and lab settings (Cowden, 2017; Gucciardi, 2017; Gucciardi et al., 2015; Rigoni, 2013). Individuals with higher levels of MT performed better than their peers with lower MT scores in these demanding settings. Higher MT has also been linked to higher academic performance, better rehabilitation program adherence post-injury, and higher self-awareness (Cowden, 2017; Crust et al., 2014; Gucciardi, 2017; Levy et al., 2006; Rigoni, 2013). In Levy's 2006 study, those with high MT displayed more positive threat appraisals, better coping mechanisms with pain, and a higher attendance to rehabilitation sessions.

Within the last five to ten years, researchers have begun to explore the connection between MT and mental health (Gucciardi et al., 2017; Kaiseler et al., 2009; Micoogullari et al., 2017; Stamp et al., 2015). It has been argued that MT may represent a positive indicator of mental health and has the potential to facilitate its attainment among those who still stigmatize mental health. A 2009 study conducted by Kaiseler, Polman, and Nicholls supports this



connection by identifying that the characteristics of MT in athletes are predictors of coping and coping effectiveness in response to a self-selected sport stressor. Additionally, subdimensions of MT – more so than variables such as gender, age, and year of schooling – are considered moderate to strong predictors of psychological well-being in undergraduate students and student athletes (Micoogullari et al., 2017; Stamp et al., 2015). With these two studies providing evidence among samples of undergraduate students, there is considerable proof that MT is important not only relating to performance outcomes, but also mental health and positive psychological functioning (Stamp et al., 2015). These connections support the suggestion that MT could be used as a ‘hook’ to attract athletes into an open dialogue on the importance of mental health as well as introduce and improve knowledge of key issues (Gucciardi et al., 2017).

Due to the more recent development of theory and theological framework of MT, there continues to be a need for experimental studies, longitudinal research, and psychophysiological approaches to MT (Crust, 2008). MT questionnaires have also been suggested as a beneficial screening tool for undergraduate students at risk of failing academically or for the identification of individuals with low psychological well-being (Crust et al., 2014; Micoogullari et al., 2017). The logical next step would be to identify if MT can be utilized as a screening tool to anticipate the development of mental health issues – such as depression and anxiety.

### *Measures of Mental Toughness*

As the theoretical framework of mental toughness has developed through the years, so has its measurement. Much of the early work on MT adopted a more exploratory approach, focused on qualitative data, with athletes, thus limiting the extent to which these findings can be generalized to other populations or achievement contexts (Gucciardi et al., 2015). There are currently three common questionnaires utilized to measure an individual’s level of MT: Mental

Toughness Questionnaire-48 (MTQ48), Sports Mental Toughness Questionnaire (SMTQ), and the Mental Toughness Index (MTI). The MTQ48 is based upon Clough's 4C's, and is supported for its validity and reliability among athletic and non-athletic populations (Clough et al., 2002; Crust & Swann, 2011; Perry, Clough, Crust, Earle, & Nicholls, 2013). However, in studies looking into the validity and reliability of this measure, it is suggested that there is a need for a consensual definition and common understanding of MT, which comes in the years to follow. The SMTQ is geared specifically towards the measurement of MT in athletes and is significantly related to the MTQ48 (Crust & Swann, 2011). However, the SMTQ has an inadequate internal consistency of control and constancy subscales in its measure – two key components in the 2002 theory by which it is intending to identify MT. The SMTQ represents a combination of the important components of MT in its questions that might be more appropriately measured via separate scales. In its attempts of brevity, it sacrificed some of its validity.

Most recently developed was the Mental Toughness Index (MTI), proven to have validity and reliability across general, military, and athletic populations. This index provides a valid and reliable measure of MT in an 8-item likert scaled questionnaire, coordinating with Gucciardi's 2015 definition of MT (Gucciardi et al., 2015). The MTI focuses on seven core components, based on extensive review of MT literature: generalized self-efficacy, buoyancy, success mindset, optimistic style, context knowledge, emotion regulation, and attention regulation. This particular direct assessment of MT performed better than the indirect approach utilized by the MTQ48 in terms of predictive validity. When comparing the traits of these three popular measures of MT, the MTI appears most appropriate for current day application of the identification and scaling of MT.

## APPENDIX C: DEMOGRAPHIC FORMS AND QUESTIONNAIRES

**Pre-Season Student-Athlete Demographic Form**

Please Indicate Your Gender:

Male

Female

Age (*select from drop-down menu*):

18

22

19

23

20

24

21

25

Sport (*select from drop-down menu*):

Football

Women's Soccer

Volleyball

Men's Soccer

Athletic Year (*select from drop-down menu*):

1

4

2

5

3

Have you previously been diagnosed by a medical professional or treated (medication, counseling, etc.) for depression?

Yes

No

Have you previously been diagnosed by a medical professional or treated (medication, counseling, etc.) for anxiety?

Yes No

Can the researcher contact you for follow-up participation in questionnaires for this study? If so, you will be contacted twice after the completion of the pre-season survey. All personal information will remain confidential, and you will be assigned a participant identification number in coordination with your contact information. If yes, please provide your Georgia Southern e-mail address below:

\_\_\_\_\_@georgiasouthern.edu

**Mental Toughness Index (MTI)**  
Gucciardi, Hanton, Gordon, Mallett, & Temby, 2015

*Rate how true each statement is of how you typically think, feel, and behave while participating in your sport on a scale of 1 (false, 100% of the time) to 7 (true, 100% of the time).*

- | False, 100% of the time  | True, 100% of the time |
|--|------------------------|
| 1. I believe in my ability to achieve my goals.                                |                        |
| 1    2    3    4    5    6    7  |                        |
| 2. I am able to regulate my focus when performing tasks.                       |                        |
| 1    2    3    4    5    6    7  |                        |
| 3. I am able to use my emotions to perform the way I want to.                  |                        |
| 1    2    3    4    5    6    7  |                        |
| 4. I strive for continued success.   |                        |
| 1    2    3    4    5    6    7  |                        |
| 5. I effectively execute my knowledge of what is required to achieve my goals. |                        |
| 1    2    3    4    5    6    7  |                        |
| 6. I consistently overcome adversity.  |                        |
| 1    2    3    4    5    6    7  |                        |
| 7. I am able to execute appropriate skills or knowledge when challenged.       |                        |
| 1    2    3    4    5    6    7  |                        |
| 8. I can find a positive in most situations.                                   |                        |
| 1    2    3    4    5    6    7  |                        |

### Patient Health Questionnaire-9 (PHQ-9)

*Please remember you have the right to terminate your participation at any time. If the following question produces anxiety or causes you to feel more emotional than usual please contact your GSU Team Athletic Trainer, the Georgia Crisis & Access Line at 1-800-715-4225, or the GSU On-Campus Counseling Center at 912-478-5541.*

Over the last 2 weeks, how often have you been bothered by any of the following problems?

	<b>Not at all</b>	<b>Several Days</b>	<b>More than half of the days</b>	<b>Nearly every day</b>
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down.	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television.	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual?	0	1	2	3
9. Thoughts that you would be better off dead or off hurting yourself	0	1	2	3
10. If you checked off <u>any problems</u> , how <u>difficult</u> have these problems made it for you to do your work, take care of things at home, or get along with other people?				
<input type="checkbox"/> Not difficult at all	<input type="checkbox"/> Somewhat difficult		<input type="checkbox"/> Very difficult	
<input type="checkbox"/> Somewhat difficult			<input type="checkbox"/> Extremely difficult	

*Developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues, with an educational grant from Pfizer Inc. No permission required to reproduce, translate, display or distribute.*

### Generalized Anxiety Disorder 7-Item (GAD-7)

*Please remember you have the right to terminate your participation at any time. If the following question produces anxiety or causes you to feel more emotional than usual please contact your GSU Team Athletic Trainer, the Georgia Crisis & Access Line at 1-800-715-4225, or the GSU On-Campus Counseling Center at 912-478-5541.*

Over the last 2 weeks, how often have you been bothered by any of the following problems?

	<b>Not at all</b>	<b>Several Days</b>	<b>More than half of the days</b>	<b>Nearly every day</b>
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it's hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

8. If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

- Not difficult at all
- Somewhat difficult
- Very difficult
- Extremely difficult

Source: Spitzer RL, Kroenke K, Williams JBW, Lowe B. A brief measure for assessing generalized anxiety disorder. Arch Intern Med. 2006;166:1092-1097.

### Follow-Up Demographic Information

During the 2018 Fall Athletic Season did you sustain any injury as a direct result of athletic participation that required medical attention by your team athletic trainer (AT) or team physician and resulted in time-lost or restriction for one or more days post-injury?

- No
- Yes

If yes, how many injuries did you sustain during the 2018 Fall Season? \_\_\_\_\_

If yes, were any of these injuries re-injuries?

- No
- Yes

During the 2018 Fall Athletic Season, did you sustain a concussion diagnosed by your AT or team physician?

- No
- Yes

During the 2018 Fall Athletic Season, did you utilize support for depression and/or anxiety symptoms from any of the following (*check all that apply*):

- |  |   |
|--|---|
| <input type="checkbox"/> Coach (Head Coach, Assistant Coach, Graduate Assistant Coach) | <input type="checkbox"/> Counselor/Psychologist |
| <input type="checkbox"/> Team Athletic Trainer   | <input type="checkbox"/> Sport Psychologist     |
| <input type="checkbox"/> Team Physician  | <input type="checkbox"/> Family Doctor          |
|  | <input type="checkbox"/> Other: _____           |



## APPENDIX D: INSTITUTIONAL REVIEW BOARD DOCUMENTS

Georgia Southern University Office of Research Services & Sponsored Programs <b>Institutional Review Board (IRB)</b>	
Phone: 912-478-5465	Veazey Hall 3000 P.O. Box 8005 Statesboro, GA 30460
Fax: 912-478-0719	IRB@GeorgiaSouthern.edu

**To:** Bohannon, Colleen J.; Mutchler, Jessica; Asplund, Chad; Harris, Brandonn

**From:** Office of Research Services & Sponsored Programs, Institutional Review Board (IRB)

**Approval Date:** 6/12/2018

**Expiration Date:** 5/31/2019

**Subject:** Approval with Conditions from the Georgia Southern University Institutional Review Board

After a review of your proposed research project numbered: "**H18421**" titled: "**Mental Toughness as a Predictor for Changes in Depression and Anxiety over the Course of an Athletic Season,**" it appears that (1) the research subjects are at minimal risk, (2) appropriate safeguards are planned, and (3) the research activities involve only procedures which are allowable.

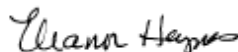
Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that the Institutional Review Board has approved your proposed research **with the understanding that you will abide by the following conditions:**

- Please be aware that the format by which you plan to collect your data appears to fall under the requirements of the Georgia Southern University Survey Policy. Your IRB approval does not address your access to the GS email system for survey research purposes. Once you have received IRB approval for your research methodology, the IRB approval is conditioned upon you taking the additional step of submitting your survey delivery methodology for President's council approval through the Provost's office (faculty, student) or the Office of Strategic Research & Analysis (Staff, NonGSU affiliates).

Brief study description: The purpose of this study is to determine if the Mental Toughness Index can be used as a predictor of the changes in the self-report of two mental health conditions over the course of a competitive athletic season in Georgia Southern University athletes.

**This IRB approval is in effect for one year from the date of this letter.** If at the end of that time, there have been no changes to the research protocol; you may request an extension of the approval period for an additional year. In the interim, please provide the IRB with any information concerning any significant adverse event, **whether or not it is believed to be related to the study**, within five working days of the event. In addition, if a change or modification of the approved methodology becomes necessary, you must notify the IRB Coordinator **prior** to initiating any such changes or modifications. At that time, an amended application for IRB approval may be submitted. Upon completion of your data collection, you are required to complete a *Research Study Termination* form to notify the IRB Coordinator, so your file may be closed.

Sincerely,



Eleanor Haynes  
Compliance Officer

## REFERENCES

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