Acknowledgments

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Special Mention

We extend our gratitude to the following SHAPE members. Emily Kaier conducted data collection and analysis as well as authoring the majority of the sections within this paper under the guidance of Dr. Lisa Cromer. Mitchell Johnson contributed his senior project work on the relevance and impact of stigma under the guidance of Dr. Lisa Cromer. Christopher Cranston authored sections pertaining to the importance and impact of sleep, the incidence and implications of obsessive-compulsive and social anxiety findings from the data as well as editing and final formatting. To Dr. Joanne L. Davis and Kathleen Strunk for offering input throughout the development of this report as well as their considerable contributions to the review and editing process.
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Executive Summary

The Student Health, Athletic Performance, and Education (SHAPE) study was conducted under the auspices of The University of Tulsa Institute of Trauma, Abuse, and Neglect (TITAN) during the 2011-2012 academic year. Data collection from athletes is from the fall semester only. The goal of the study was to improve the academic and athletic performance of TU’s athletes by addressing the interaction between physical and mental health on overall functioning. To do so, SHAPE established four major questions:

1. What are the mental health profile and stressors of TU’s student athletes?
2. What is the impact of health and stress on the athlete’s performance?
3. Are the athletes and athletic staff aware of the available campus support services?
4. What barriers prevent athletes from obtaining services?

To examine these questions, data from athletes ($n = 304$) were collected. Non-athlete ($n = 101$) student data were obtained for the purpose of comparison. Additionally, 27 coaches and 19 support staff returned questionnaires.

Key Findings

Sleep

- Two-thirds of athletes reported poor sleep quality.
- Athletes’ may have a particular problem with sleep-related functioning during the day.

Stress

- Athletes reported experiencing more academic stressors than non-athletes.
- Athletes reported fewer life stressors than non-athletes.
- Within the sample, reported academic stress was lower and life stress was higher with each incremental year of education (from first to senior year).
- While one-third of athletes reported at least one adverse childhood experience; overall athletes reported fewer adverse childhood experiences than non-athletes at TU.

Mental Health

- In general, athletes reported similar levels of psychological problems as non-athletes at TU.
- Athletes reported significantly more obsessive-compulsive symptoms than non-athletes.
Healthcare Utilization

- The TU training room staff documented a total of 315 injuries electronically during the fall assessment period.
- More than half of SHAPE participants (57%) had a documented injury during the assessment period.
- Approximately one third of the SHAPE athletes used the doctors’ clinic (in-clinic).
  - The number of visits ranged from 1 to 6 with most athletes only making 1 visit to the clinic (49.5%), and the average number of visits being 2.
- Eighty-four athletes had at least one outside doctor visit documented in their chart.
  - The number of outside visits ranged from 1 to 7 with most athletes only seeing an outside doctor one time (54.8%).
- Approximately 1/3 of athletes used over the counter medicines.
- The most commonly used prescription and over the counter medications were for pain management.
- There was a lot of missing data that has resulted in an under-representation of medication use; consequently, we limited the use of this data in subsequent analyses.

Stigma

- In general, athletes were less open to psychological help seeking, and were more susceptible to mental illness stigma than their coaches, support staff and non-athlete peers.

Impact of Sleep and Stress on Injury

- TU athletes were similar to other studied populations in that stress (e.g., childhood, lifetime, current) was related to health care utilization.
- Athletes endorsing adverse childhood experiences made significantly more visits to the in clinic (training room sign-in) doctor than athletes without adverse childhood experiences.
- Experiencing more potentially traumatic events was associated with more physical complaints to the training room, more in-clinic doctors’ visits, and higher total number of doctors’ visits (including in-clinic and outside visits).
Higher current stress was associated with more total visits to the doctor.

With regard to sleep:
- More sleep disturbances predicted higher likelihood of being injured
- Lower sleep efficiency predicted higher likelihood of being injured
- More sleeping medication predicted higher likelihood of being injured and more days of treatment
- Lower Daytime dysfunction predicted higher likelihood of being injured and more days of treatment (it is possible that injured people could be sleeping more because they have more time, tired from meds etc.; this finding requires additional exploration)
- Worse sleep quality predicted higher likelihood of being injured
- More sleep (duration) predicted higher likelihood of being injured and more days of treatment (it is possible that injured people could be sleeping more because they have more time, tired from meds etc.; this finding requires additional exploration)

Impact of Injury on Academic Performance:
- Athletes in contact sports had significantly lower GPAs than athletes in non-contact sports.
- Injured athletes had significantly lower GPAs than non-injured athletes.
- Having a concussion was related to lower GPA.

Recommendations

Goal: Improve Sleep Through Education and Awareness
- Who: all athletes should receive this intervention (all sports, injured/non-injured)
- Form of delivery to be determined through focus groups and clinical research summer, 2012.
- Incentivize intervention to increase utilization and adherence

Goal: Improve Recovery of Injured Athletes
- Special attention to sleep as it relates to recovery time and reduction of inflammation
➢ Address increased time burden due to treatment to increase sleep and reduce the (possible) effect of injury on lower GPA

Goal: Increase Service Utilization Through Awareness of Services

➢ Educate athletes about the types of services, the benefits of services, and their access to free services on campus

➢ Focus groups (summer, 2012) to learn about how we can market service utilization in order to reduce stigma and create a culture of strength-based utilization

Obsessive-Compulsive Disorder, Social Anxiety, and Other Mental Health Concerns

➢ Provide educational materials to help coaches and staff identify signs and risk factors involved in the development of these symptoms

➢ Provide psychoeducation materials and workshops offered to athletes in a manner that increases likelihood of utilization of services
Introduction

During the 2011-2012 academic year, The University of Tulsa Institute for Trauma, Abuse and Neglect (TITAN) conducted a mental health needs assessment of the University’s student-athletes. This provided a baseline for an on-going longitudinal study known as the Student Health, Athletic Performance, and Education (SHAPE) project. SHAPE's goal is to improve TU athletes' academic and athletic performance by addressing the interplay of health and stress on functioning. To accomplish this, SHAPE established four main research goals. First, SHAPE assessed the mental health profile and stressors of TU student athletes. Second, SHAPE examined the impact that various indices of health and stress have on athletic and academic performance. Third, SHAPE explored the awareness of campus support services among athletes and athletic staff and explored possible barriers to receiving care. Finally, SHAPE will use information gathered from TU athletes, coaches, and staff to design, implement, and evaluate psychological interventions that have the ultimate goal of improving athletes' performance in the sport environment and in the classroom.

The following document summarizes relevant information from literature reviews, key findings from the first data collection, and recommendations for future interventions.

IRB Approval

The SHAPE study was approved by the University of Tulsa Institutional Review Board (IRB # 12-04) on October 18, 2011.
Method

During the summer of 2011, the research team met with the athletic director to discuss goals for the assessment. Ultimately, the identified goal was to improve athletic and academic performance for TU athletes by addressing behavioral health related concerns. The team brainstormed key areas to target and generated a list of measures.

Athletes

Data collection was organized in consultation with coaches and training room staff and occurred either during teams’ weight training sessions or team meetings. Each team completed the measures in a group. During the scheduled session, the graduate assistant (GA) introduced the purpose of the study and emphasized the voluntary nature of the project. Athletes who chose to participate ($N = 304$) signed an informed consent form and indicated if researchers had permission to access their academic record through the athletics department. The majority of athletes ($n = 275, 90\%$) gave permission for researchers to access their academic records.

After the initial data collection session was completed, the GA reviewed athletes’ medical charts. Indicators of service use and health status (e.g., clinic visits, weight, height, medication use) were recorded for analyses, along with the electronically generated list of injuries from the training room’s database. The athletics department also provided fall 2011 and cumulative grade point averages (GPAs) for athletes who had consented to this data being released for the study.

Non-athletes

A comparison sample of non-athlete students was recruited using the Department of Psychology Human Subjects Research Pool. Non-athletes ($N = 101$) volunteered to fill out a similar assessment battery as the SHAPE athletes. In contrast to the athletes, non-athletes
completed questionnaires anonymously and online through SONA Systems. Additionally, non-athletes were able to log onto the system at any time during the semester and complete the questionnaires alone at a computer of their choosing. Because of this, time of day, time of the semester, and perceived anonymity could be characteristics between the athletes and non-athletes that could have influenced between group differences scores.

Coaches and support staff

To provide a comprehensive view of athletes’ environment, coaches completed questionnaires. The project GA arranged a time via email to meet with each coach to give them informed consents and a brief questionnaire. All members of the coaching staff (e.g. head coach, assistant coach, graduate assistant coach) were invited to participate. The GA gave coaches the option to return questionnaires using a pre-addressed interoffice envelope or schedule to have questionnaires picked up. A total of 27 coaches (football, softball, rowing, volleyball, women’s basketball, women’s soccer, women’s tennis, men’s and women’s cross country and track and field) returned questionnaires, representing 68.7% of all teams.

Support staff also completed questionnaires about the athletes’ environment. For the purpose of the SHAPE study, “support staff” was conceptualized as any staff member that interacted with athletes on a regular basis to provide a service (e.g., counselor, academic advisor, equipment manager, training room staff, strength and conditioning staff). The support staff questionnaires were completely anonymous and 19 support staff returned questionnaires via interoffice mail.

Demographics

A total of 304 (76%) student-athletes volunteered to participate in the SHAPE project. Participants represented all of the NCAA division I teams on campus (i.e., men’s and women’s
soccer, basketball, tennis, track and field, cross country, men’s football, women’s volleyball, and rowing). Participants were mostly male (57%) and on average 20 years of age ($M = 20.0$, $SD = 1.4$). Almost all of the participants reported their marital status as single (99%) and one-third (34.2%) reported having a boyfriend or girlfriend. Participants’ self-reported ethnicity and year in school are displayed in Figures 1 and 2 below.

Figure 1

Year in School

- Freshman: 30%
- Sophomore: 21%
- Junior: 24%
- Senior: 20%

Figure 2

Ethnicity

- Caucasian: 68%
- African American: 20%
- American Indian: 7%

Sleep

Importance of sleep

Sleep is an important variable to consider when examining students and athletes. The American College Health Association (2005) identified sleep problems as being among the top three obstacles to academic achievement in college. Specifically, the amount and quality of sleep, as well as the sleep-wake cycle directly impact cognitive, psychological, and health-related outcomes. The more pervasive outcomes include difficulty paying attention and poorer academic performance (Pagel, Forister, & Kwiatkowki, 2007), increased risk-taking behavior (O’Brien & Mindell, 2005), impairment in social relationships (Carney, Edinger, Meyer,
Lindman, & Istre, 2006), anxiety (Mellman, 2006), depression (Armstrong & Oomen-Early, 2009; O'Brien & Mindell, 2005), and poorer overall health (Smaldone, Honig, & Byrne, 2007).

Studies have associated poor sleep with health problems. These problems include increased susceptibility to illness (e.g., colds; Cohen, Doyle, Alper, Janicki-Deverts, & Turner, 2009) and reduced overall immune system restoration due to reduced cytokine responsivity (e.g., IL-6; Irwin, 2002). Cytokines are pro-inflammatory proteins that aid in the initiation of immune responses. Poor sleep has also been shown to increase cardiovascular morbidity through increases in C-reactive protein levels (Meier-Ewert et al., 2004). C-reactive proteins increase vascular inflammation responses, which, over time, can lead to coronary heart disease.

Sleep also relates to academic achievement and psychological health. Short sleepers (6 hours or fewer) report a greater number of symptoms related to psychological maladjustment than do long sleepers (i.e., people who typically get nine or more hours per night; Kelly et al, 2001). Kelly et al. (2001) found that long sleepers obtain significantly higher grade point averages (GPAs) than do short sleepers.

Research has shown that the sleep-wake cycle may be more important than total sleep time for academic performance and psychological health. Inconsistency of sleep-wake cycles has been found to be pervasive among college students, and can increase their risk for poor academic performance and psychological health (e.g., depression). Moreover, discrepancies in both the amount of sleep and the sleep-wake cycle are most drastic between weekday and weekend (Gaultney, 2011). Furthermore, research has found significant increases in academic performance following a structured, consistent sleep schedule (i.e., same time to bed, same time to wake), in some cases over and above total sleep time (Eliasson & Lettieri, 2010).
Because of these findings, research has called for the implementation of behavioral intervention programs to target sleep in student athletes (Armstrong & Oomen-Early, 2009).

**Assessment of sleep among TU athletes**

SHAPE participants were asked to complete the Pittsburgh Sleep Quality Index (PSQI). The PSQI is a well-validated self-report measure that discriminates poor sleepers from good sleepers (Buysse, Reynolds, Monk, & Berman, 1989). The PSQI is scored to compute seven component scores including: subjective sleep quality (i.e. self-reported sleep quality), sleep latency (i.e. length of time to fall asleep), sleep duration (i.e. number of hours of slept), sleep efficiency (i.e. ratio of number of hours spent in bed to number of hours sleeping), sleep disturbances (e.g. snoring roommate), use of sleeping medication, and daytime dysfunction (i.e. daytime sleepiness). Each of these seven components is scored on a 0 to 3 range, with 3 indicating more sleep dysfunction. Summing the seven component scores on the PSQI yields a global score with a range from 0-21, with 21 representing the worst sleep score possible.

There was substantial variability in global sleep scores for the SHAPE participants. Although some of the athletes reported good sleep quality on the PSQI, many athletes were in the clinical range for sleep problems. The worst sleepers’ among the SHAPE athletes scored much higher than a comparison sample published on insomnia and clinical depressed patients (Backhaus, Junghanns, Broocks, Riemann, & Hohagen, 2002; Buysse, et al., 1989). In fact, SHAPE athletes mean score of daytime dysfunction was similar to the clinically depressed comparison sample.

The average global sleep score for all SHAPE athletes was 6.64 ($SD = 2.75$). On this scale, higher numbers indicate worse quality of sleep. The SHAPE average exceeds 5 which is typically considered the indicator value of poor sleep quality (Buysse, et al., 1989). Further,
65% of the SHAPE athletes reported a global sleep score above 5, indicating the majority of athletes are experiencing some level of sleep dysfunction. Moreover, when compared to healthy controls (in the published literature), SHAPE athletes reported worse scores on each sleep component on the PSQI (see Table 1). These high scores further indicate the relatively poor sleep quality among athletes.

Table 1.

<table>
<thead>
<tr>
<th>Component</th>
<th>Healthy Controls</th>
<th>Depressed Patients</th>
<th>SHAPE Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjective Sleep Quality</td>
<td>.40</td>
<td>1.92</td>
<td>1.06</td>
</tr>
<tr>
<td>Sleep Latency</td>
<td>.70</td>
<td>1.96</td>
<td>1.22</td>
</tr>
<tr>
<td>Sleep Duration</td>
<td>.31</td>
<td>1.74</td>
<td>0.59</td>
</tr>
<tr>
<td>Habitual Sleep Efficiency</td>
<td>.11</td>
<td>1.63</td>
<td>0.47</td>
</tr>
<tr>
<td>Sleep Disturbances</td>
<td>.95</td>
<td>1.45</td>
<td>1.20</td>
</tr>
<tr>
<td>Use of Sleeping Medication</td>
<td>.12</td>
<td>0.08</td>
<td>0.31</td>
</tr>
<tr>
<td>Daytime Dysfunction</td>
<td>.44</td>
<td>1.83</td>
<td>1.75</td>
</tr>
<tr>
<td>PSQI Global Score</td>
<td>2.67 ± 1.70</td>
<td>11.09 ± 4.31</td>
<td>6.64 ± 2.75</td>
</tr>
</tbody>
</table>

*Note. Adjusted means from Buysse et al., 1998. Higher scores indicate worse sleep.*

**Key findings on sleep**

- The vast majority of TU student athletes reported poor sleep quality.
- TU athletes are comparable to clinically depressed patients on a measure of daytime dysfunction.

**Stress**

**Impact of stress**

Research consistently finds that stress impacts health and functioning (Dougall, 2012; Marin et al., 2011). The construct of stress encompasses childhood, lifetime (chronic), and current stress. When looking at lifetime trajectories of stress the unique impact of adverse childhood experiences (ACEs) are observed in the literature. For example, ACEs have been linked to numerous health concerns many of which relate to premature death (Felitti et al., 1998). Additionally, stress has a cumulative effect such that the more lifetime and adult stressors one...
experiences, the worse are the health outcomes (Dube et al., 2009; Felitti, et al., 1998; Follette, Polusny, Bechtle, & Naugle, 1996). Cumulative stress over the lifetime is a different construct than recent stress, because recent stress may be transient. Therefore each of the following was examined in SHAPE: ACES, lifetime stressors, and recent stress.

Prior research has shown that adverse childhood experiences (ACEs) lead to a variety of long standing chronic health conditions that ultimately result in change in the brain and stress-response system (Anda et al., 2006; Felitti, et al., 1998; McGuinness, 2010; O'Donovan, Neylan, Metzler, & Cohen, 2012). Additionally, research supports the notion that ACEs have a dose effect, with more types of occurrences leading to worse health outcomes (Felitti, et al., 1998). In other words, the more types of adversity one experiences, the worse the impact on the developing immune system. This is true even if each type of adversity is only experienced one time. Aside from physical health outcomes, ACEs relate to a variety of mental and behavioral health concerns (Anda et al., 1999). ACEs have also been linked to increased healthcare utilization (Chartier, Walker, & Naimark, 2010).

With regard to the impact of lifetime stress and health outcomes, The Mayo Clinic (2010) reports that chronic stress (stressors that are present throughout life) places one’s body in a state of constant arousal. Although stress is a normal and adaptive response in some situations, long-term activation, which leads to increases in and overexposure to stress hormones (e.g., cortisol), results in disruption of normal bodily functioning (e.g., digestion, metabolism, and storage of fat), elevations in pro-inflammatory hormones in the circulatory system, which increase the risk for long-term health problems (e.g., heart disease). Furthermore, constant exposure to stress can have profound effects on memory, sleep, fatigue, and increases risk of depression (Mayo Clinic., 2010).
Current stressors also impact daily functioning. In particular, the transition to college is often a highly stressful period for students due to increased academic demands, difficulty adjusting to a new environment, social pressures, being away from family, and financial difficulties (Gadzella, 2004; Misra, McKean, West, & Russo, 2000; Towbes & Cohen, 1996). Student-athletes may experience even greater levels of stress, beyond what the typical student faces, due to the additional demands of their athletic participation. Unique stressors related to student-athletes include extensive time demands that reduce available time for schoolwork, missing class due to travel, the threat of injury, performance anxiety, and an elevated risk for physical health concerns, such as lack of sleep, digestive problems, and fatigue (Humphrey, Yow, & Bowden, 2000; Papanikolaou, Nikolaidis, Patsiaouras, & Alexopoulos, 2003).

Assessment of current stress

The College Adjustment Rating Scale (CARS) was used as one index of current stress. The CARS is a 30 item self-report checklist that queries stressors that occurred in the previous 6 months (Zitzow, 1984). On average SHAPE athletes endorsed experiencing 3.4 ($SD = 2.4$) stressors over the previous 6 months; the range of responses in the sample was from a low of zero (no stressors) up to a high of 12. The most commonly endorsed stressor was increased workload in studies ($n = 142, 48\%$), followed by lower grades than expected ($n = 118, 39\%$).

In addition to examining overall stress the checklist was divided to compute two separate scores representing “life stress” and “academic stress.” Items on the life stress scale included stressors like change in sleeping habits and death of a loved one while the academic stress scale included items that dealt directly with school related concerns (e.g. lower grades than expected). Athletes endorsed experiencing more academic stressors than non-athletes and conversely endorsed experiencing less life stressors than non-athletes (see Figure 3 and 4). Finally, the data
revealed that as year in school increases athletes endorsed more life stressors and less academic ones.

Assessment of past stress

The Life Events Checklist (LEC) is a self-report questionnaire that queries lifetime history of traumatic events. The LEC lists 16 events known to potentially result in PTSD or distress (e.g. sexual assault, motor vehicle accident). For each item, the respondent checks whether the event: happened to me, witnessed the event, learned about the event, not sure, or if the item does not apply (Blake, Weathers, Nagy, & Kaloupek, 1995). On average, SHAPE
athletes reported experiencing (happened to them directly) at least one potentially traumatic event during their lifetime ($M = 1.43$, $SD = 1.37$). The most commonly endorsed events in this study were natural disasters such as a tornado ($n = 107$, 36.8%), transportation accidents ($n = 84$, 29.2%), and the sudden, unexpected death of someone close ($n = 73$, 25.3%).

The Adverse Childhood Experiences scale (ACEs) is a measure of aversive conditions occurring before the age of 18 (Felitti, et al., 1998). This brief self-report measure assesses ten areas of adverse childhood experiences, such as abuse, neglect, and other family and/or household dysfunction, before the age of 18. The total number of adverse childhood experiences creates an “ACE Score” ranging from 0 to 10 (Felitti, et al., 1998). Most SHAPE student-athletes endorsed not experiencing ACEs (69%), 14% endorsed a single ACE and 17% endorsed multiple ACEs. For SHAPE athletes the most commonly endorsed ACE was having parents separated or divorced ($n = 66$, 22.5%), followed by feared physical abuse ($n = 29$, 9.9 %), and having a household member mentally ill or commit suicide ($n = 28$, 9.2 %). The average ACE score of all athletes was a .65 ($SD = 1.28$). These results were lower than those found in the non-student sample wherein 47% reported no ACEs, 22% endorsed a single ACE, and 31% endorsed multiple ACEs.

**Key findings on stress**

- Athletes reported experiencing more academic stressors than did the non-athletes at TU.
- Athletes reported fewer life stressors than did non-athletes at TU.
- As year in school increases, athletes report less academic stress and more life stress.
- Athletes reported fewer adverse childhood experiences than did non-athletes at TU.
  - Still, about one third of athletes reported experiencing adverse childhood experiences.
Mental health

Mental health and athletes

Currently there is limited research on the role of mental health among elite athletes (Hughes & Leavey, 2012). Athletes typically view mental health struggles as an indication of weakness, which may lead to under-reporting of health concerns (Reardon & Factor, 2010). Large-scale epidemiological studies suggest that one in five Americans has a diagnosable form of mental disorder. Three quarters of these diagnosable mental disorders have a typical age of onset of 24 (Kessler et al., 2005). As college athletes fall in this age-range, they may be part of a population that is especially vulnerable to developing mental illness. Moreover athletes may constitute a vulnerable population due to the unique stressors related to their athlete-status in addition to the typical stressors most college students experience, including increased responsibilities and social pressure.

Few studies have compared rates of psychopathology between college student-athletes and non-athletes. Research has found that female athletes reported lower levels of social support and greater levels of depressive and social anxiety symptoms than female non-athletes; however, there were no differences between male and female student-athletes and non-athletes in rates of clinically significant mental health problems (Storch, Storch, Killiany, & Roberti, 2005). While few studies have actually measured rates of psychopathology within student-athlete populations, several studies have estimated that 10-15% of college student-athletes are experiencing issues significant enough to warrant the need for professional psychological services (Ferrante & Etzel, 1991; Ferrante, Etzel, & Lantz, 1996; Parham, 1993; Watson, 2005)

Mental health profile of SHAPE athletes

To assess the mental health profile of the SHAPE athletes, participants completed the Psychiatric Diagnostic Screening Questionnaire (PDSQ). The PDSQ is a validated measure
commonly used in clinical settings for symptom screening (Zimmerman, 2002). The PDSQ has 14 subscales that screen for Axis I disorders commonly encountered in primary care and has been shown to have good sensitivity to detecting clinical concerns (Zimmerman & Chelminski, 2006). On each of the 14 subscales a cut off score was used to determine if an athlete met PDSQ symptom threshold that is suggestive of a given disorder. However, it is important to note that the PDSQ cannot make diagnostic determinations and serves only as a screener for self-reported symptomatology. Responses on the PDSQ are shown in Table 2. In general, athletes reported fewer symptoms of the Axis I disorders assessed than the non-athletes.

Table 2.

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Base rate (%)</th>
<th>Athletes n(%)</th>
<th>Non Athletes n(%)</th>
<th>Chi Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Depressive Disorder</td>
<td>5</td>
<td>27 (10%)</td>
<td>9 (9.2%)</td>
<td>0.19</td>
</tr>
<tr>
<td>Posttraumatic Stress Disorder</td>
<td>8</td>
<td>12 (4.4%)</td>
<td>11 (11.2%)</td>
<td>12.92**</td>
</tr>
<tr>
<td>Bulimia/Binge-Eating Disorder</td>
<td>2</td>
<td>12 (4.5%)</td>
<td>4 (4%)</td>
<td>0.16</td>
</tr>
<tr>
<td>Obsessive-Compulsive Disorder</td>
<td>2</td>
<td><strong>54 (20.1%)</strong></td>
<td>15 (15%)</td>
<td>5.43*</td>
</tr>
<tr>
<td>Panic Disorder</td>
<td>2</td>
<td>7 (2.6%)</td>
<td>9 (10%)</td>
<td>16.15**</td>
</tr>
<tr>
<td>Agoraphobia</td>
<td>1</td>
<td>15 (5.6%)</td>
<td>6 (6.1%)</td>
<td>0.10</td>
</tr>
<tr>
<td>Social Phobia</td>
<td>2</td>
<td>70 (26.6%)</td>
<td><strong>38 (38.4%)</strong></td>
<td>15.40**</td>
</tr>
<tr>
<td>Alcohol Abuse/Dependence</td>
<td>6</td>
<td>34 (12.5%)</td>
<td>18 (18.4%)</td>
<td>6.19*</td>
</tr>
<tr>
<td>Drug Abuse/Dependence</td>
<td>2</td>
<td>8 (2.9%)</td>
<td>6 (6.1%)</td>
<td>5.00*</td>
</tr>
<tr>
<td>Generalized Anxiety Disorder</td>
<td>4</td>
<td>20 (7.4%)</td>
<td><strong>16 (16%)</strong></td>
<td>15.13**</td>
</tr>
<tr>
<td>Somatization Disorder</td>
<td>1</td>
<td>27 (9.9%)</td>
<td>12 (12.2%)</td>
<td>1.38</td>
</tr>
<tr>
<td>Hypochondria</td>
<td>4</td>
<td>26 (9.4%)</td>
<td>10 (10.3%)</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Note. p < .05*, p < .001**, base rates reported from PDSQ manual (Zimmerman, 2002).

Interestingly, the incidence rate of obsessive-compulsive symptoms among SHAPE athletes was high compared to TU non-athletes. Some literature suggests that commitment to intensive exercise is associated with higher levels of trait anxiety, obsessive-compulsive symptoms, and narcissistic traits within normal participant (non-elite athlete) populations (Gulker, Laskis, & Kuba, 2001; Spano, 2001). However, these non-athlete studies may not be representative of behaviors in elite athletes. It is too early to make conclusive statements regarding OCD among these athletes. Upon examination of the items that comprised this
subscale, we noted that obsessive-compulsive traits on the PDSQ related to superstitious, ritualistic, and perfection tendencies that may be an acceptable component of athletic culture. On the other hand, traits such as perfectionism are not to be dismissed as potential stressors. In order to understand how these traits are contributing to the overall stress profile of the athletes, we will examine this construct more fully in year 2 of the SHAPE study.

Another area of interest is social anxiety (previously known as social phobia). Over a quarter of the athletes (26.6%) in the present study reported symptoms consistent with social anxiety. Although fewer athletes reported social anxiety compared to non-athletes at TU, it is a notable finding because the incidence rate is higher for both athletes and non-athletes at TU. Fear of being evaluated and scrutinized by others in the social context form the core of social anxiety disorder, which is often strongly related to perfectionism (American Psychiatric Association., 2000; Villiers, 2009). This may not be surprising given that athletes opt into an environment (competitive sports) wherein constant evaluation and pressure to perform is the norm. Although the attention gained from involvement in sports is not always negative, for perfectionistic athletes the attention may be a contributing factor to the exacerbation and maintenance of distress (Storch, et al., 2005).

A dearth of literature examining OCD and social anxiety is likely doing a disservice to the student athlete community in that awareness may be limited, thus programs aimed at early detection and intervention are not as abundantly available as is likely necessary. Ultimately, this could suggest that TU athletes are coping with a great deal of distress alone. Creating readily utilizable, athlete-focused interventions may help to improve their quality of life by targeting their concerns and reducing stress. However, it is also important to highlight the finding that,
overall, TU athletes are reporting similar or fewer levels of psychopathology compared to non-athletes. This may be indicative of resilience of the athletes at TU.

**Key findings on mental health**

- In general athletes reported similar levels of psychopathology as non-athletes.
- Athletes reported significantly more symptoms of obsessive-compulsive disorder than non-athletes.

**Healthcare utilization**

**Injuries of TU athletes**

Over the fall assessment period (August 4th, 2011 to December 15th, 2011) for SHAPE a total of 315 injuries were documented electronically by the TU training room staff. More than half of SHAPE participants (57%) had a documented injury during the assessment period. The five most common documented injuries were sprain ($n = 68, 21.6\%$), strain ($n = 63, 20.0\%$), contusion ($n = 29, 9.2\%$), tendonitis ($n = 25, 7.9\%$), and concussion ($n = 19, 6.0\%$). The average length of time open for treatment was 18.91 days ($SD = 30.1$). The length of treatment varied substantially, in fact, some athletes were in treatment the entire assessment period (133 days). Of those athletes who were injured, almost a third ($n = 67, 24.4\%$) missed practice due to the injury. The average number of days out for practice was 3.87 ($SD = 12.88$).

The frequency of in-clinic visits was obtained from the training room sign in sheet. During the assessment period about a third of the SHAPE athletes ($n = 99, 32.7\%$) used the doctors’ clinic (i.e., seeing the doctor in the athletics training room clinic, also referred to as in-clinic). The number of visits ranged from 1 to 6, with most athletes only making 1 visit to the clinic (49.5%), and the average number of visits being 1.93 ($SD = 1.2$). Outside doctors visits (doctors visits occurring outside of the in-clinic) were obtained from student-athletes medical
charts within the training room. Over the fall semester 84 athletes (28.8%) had at least one outside doctor visit documented in their chart. The number of outside visits ranged from 1 to 7, with most athletes only seeing an outside doctor one time \((n = 46, 54.8\%)\).

**Medication use**

To explore the frequency and use of over the counter (OTC) medications the training room OTC sign out sheet was coded. For all participants the type of medication signed out as well as dosage (i.e. number of packets) was recorded. Approximately a third of the sample signed out OTC medication during the assessment period \((n = 103, 33.9\%)\). When the OTC medications were grouped by class (i.e. pain management, digestive, allergy, unclassified), the most commonly used type of medication was for pain management (see Figure 4). On average, athletes received 3.4 doses of OTC medication and the number of sign outs per athlete ranged from 1 to 17. Unfortunately, OTC sign out sheets were only available for athletes from August 2011 up until October 2011 so the following results likely represent an underestimation of medication use.

To examine prescription medication use within the athletic department the training room’s prescription medication sign out sheet was coded. Less than a third of SHAPE athletes \((n = 94, 30.9\%)\) had a prescription medication signed out during the fall semester. On average, participants signed out 1.6 \((SD = .88)\) prescription medications. When prescriptions were grouped by class (i.e. pain management, infection, and allergy), the most commonly prescribed medications were for pain management (see Figure 5).
Key findings on healthcare utilization

- Approximately 1/3 of athletes used OTC medicines
- The most commonly used prescription and OTC medications were for pain management.
- There was a lot of missing data that has resulted in an under-representation of medication use; therefore, we limited the use of this data in subsequent analyses.

Stigma

Relevance of stigma

The National Institute of Mental Health considers stigma the primary explanation for the persistent impediment in seeking treatment for a mental illness (United States Department of Health and Human Services, 1999). Previous literature has demonstrated college student-athletes report less positive attitudes toward help-seeking behavior than do other college students (Martin, 2005; Martin, Wrisberg, Beitel, & Lounsbury, 1997; Watson, 2005). These findings demonstrate the need to better understand the stigma reported by student-athletes in order to create effective interventions aimed at reducing these negative attitudes and ultimately improving the mental health of student-athletes.

Despite their elevated risk for psychological distress, college student-athletes underutilize mental health services relative to their non-athlete peers (Watson, 2006). Different explanations
have been offered for underutilization of mental health services. The college athletics environment emphasizes the importance of resilience and self-reliance (Etzel, Ferrante, & Pinkney, 1991). Additionally, the “good of the team” or the “overall athletic performance” takes precedence over personal problems (Etzel et al., 1991). For most students, seeking help is typically an anonymous act. However, student-athletes may possess a “celebrity status” on campus and thus fear seeking campus psychological services due to the fear of being recognized (Etzel, et al., 1991). This fear may be justified by the results of a study in which male and female undergraduate students rated student-athletes lower in prestige if they were said to be seeking counseling services (Linder, Pillow, & Reno, 1989).

**Stigma among athletes**

To measure attitudes toward seeking professional psychological help, athletes were administered the Inventory of Attitudes Toward Seeking Mental Health Services (IASMHS). The IASMHS is brief self-report measure that explores attitudes toward seeking professional psychological help and is comprised of three subscales: *psychological openness*, *help-seeking propensity* and *indifference to stigma*. Psychological openness measures how willing a person is to see psychological services as an option. Help-seeking propensity is how likely a respondent is to actually seek out psychological services if they are needed. Indifference to stigma measures how much the respondent would be concerned about “important others” knowing about their psychological service use (Mackenzie, Knox, Gekoski, & Macaulay, 2004). The three subscales are measured on a 0 to 32 scale, with a score of 32 indicating the most positive attitudes possible. A total score is also given (the sum of the subscales) which ranges from 0 to 96, with 0 representing the most negative attitude, 48 being neutral, and 96 being the most positive attitudes.
Overall, SHAPE athletes reported relatively neutral attitudes ($M = 53.6, SD = 11.7$) toward psychological services on the IASMHS. However, this average score is also significantly lower than non-athletes who tended to have more positive attitudes about psychological services ($M = 66.5, SD = 13.4$). Additionally, on the measure of help-seeking athletes reported an average overall score of 18.8 ($SD = 6.0$), which was lower than non-athletes ($M = 24.03, SD = 5.4$) indicating a lower help-seeking propensity. Athletes also demonstrated more negative attitudes on measures of indifference to stigma ($M = 18.6$ versus $M = 21.6$) and psychological openness ($M = 16.21$ versus $M = 20.58$).

**Stigma among coaches and support staff**

To compare mean levels on the IASMHS between athletes, non-athletes, coaches and support staff an ANOVA with Bonferroni comparisons was performed. The ANOVA revealed that athletes had significantly more negative attitudes than coaches, support staff, and non-athletes on measures of psychological openness and help-seeking propensity. Non-athletes showed no significant differences between coaches and support staff. On the measure of indifference to stigma, no significant differences were found between coaches and athletes but athletes had significantly more negative attitudes than non-athletes.

**Key findings on stigma**

- In general, athletes report less positive attitudes about psychological openness, help seeking, and indifference to stigma as compared to coaches, support staff and non-athlete peers.
- Stigma and a lack of psychological openness, as well as a tendency to be self-reliant and not seek help, may be barriers to athletes seeking psychological services if and when they
are needed. However, results from the PDSQ also suggest less overall symptomatology, thus the need for services may be lower.

**Implications of stress and sleep on injuries**

**Sleep and injury**

To explore how sleep related to injury a logistic regression was performed with injury status (yes or no) as the criterion and the PSQI component scores as the predictors. In other words, these analyses reveal whether particular facets of sleep are associated with injury status. The logistic regression yielded a number of sleep components significantly relating to injury (see Table 3).

**NOTEs:**

- More sleep disturbances = more likely to be injured
- Lower sleep efficiency = more likely to be injured
- More sleeping medication = more likely to be injured
- Lower Daytime dysfunction = more likely to be injured (it is possible that injured people could be sleeping more because they have more time, tired from meds etc.; this finding requires additional exploration)
- Worse sleep quality = more likely to be injured
- More sleep (duration) = more likely to be injured (it is possible that injured people could be sleeping more because they have more time, tired from meds etc.; this finding requires additional exploration)

Table 3.

*Logistic Regression Predicting Injury*

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>95% CI</th>
<th>Wald Statistic</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>0.67</td>
<td>.17</td>
<td>[1.39, 2.72]</td>
<td>15.05</td>
<td>.00</td>
</tr>
<tr>
<td>Disturbances</td>
<td>0.06</td>
<td>.04</td>
<td>[0.98, 1.13]</td>
<td>2.33</td>
<td>.13</td>
</tr>
<tr>
<td>Latency</td>
<td>-0.01</td>
<td>.01</td>
<td>[0.98, 1.01]</td>
<td>0.42</td>
<td>.52</td>
</tr>
<tr>
<td>Daytime Dysfunction</td>
<td>-0.30</td>
<td>.12</td>
<td>[0.61, 0.97]</td>
<td>4.82</td>
<td>.03</td>
</tr>
<tr>
<td>Efficiency</td>
<td>-0.07</td>
<td>.02</td>
<td>[0.91, 0.96]</td>
<td>18.96</td>
<td>.00</td>
</tr>
<tr>
<td>Subjective Quality</td>
<td>0.66</td>
<td>.25</td>
<td>[1.17, 3.17]</td>
<td>6.70</td>
<td>.01</td>
</tr>
<tr>
<td>Sleeping Medication</td>
<td>0.47</td>
<td>.20</td>
<td>[1.08, 2.39]</td>
<td>5.40</td>
<td>.02</td>
</tr>
</tbody>
</table>
To further explore the relationship between injuries and sleep a multiple regression was performed with number of days open (i.e. treatment length) as the dependent variable and the sleep components as predictors (see Table 4). This analysis helps to determine how each component of sleep explains variance in the number of days injured. Doing so helps to understand the relationship observed between days injured and sleep. If a component was statistically significant, then this facet of sleep was significantly contributing to our understanding of a sleep-days injured relationship. We cannot call this a causal relationship, because it is possible that more days injured relates to more disruptions of certain components of sleep; nonetheless, it helps to determine what aspects of sleep may be most important to target when designing an intervention.

Table 4.

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>7.02</td>
<td>2.06</td>
<td>0.23</td>
<td>3.40</td>
<td>0.01</td>
</tr>
<tr>
<td>Disturbances</td>
<td>0.80</td>
<td>0.48</td>
<td>0.11</td>
<td>1.67</td>
<td>0.10</td>
</tr>
<tr>
<td>Latency</td>
<td>-0.14</td>
<td>0.13</td>
<td>-0.07</td>
<td>-1.08</td>
<td>0.28</td>
</tr>
<tr>
<td>Daytime Dysfunction</td>
<td>-2.09</td>
<td>1.52</td>
<td>-0.09</td>
<td>-1.38</td>
<td>0.17</td>
</tr>
<tr>
<td>Efficiency</td>
<td>-0.87</td>
<td>0.20</td>
<td>-0.28</td>
<td>-4.33</td>
<td>0.00</td>
</tr>
<tr>
<td>Subjective Quality</td>
<td>6.33</td>
<td>3.03</td>
<td>0.15</td>
<td>2.09</td>
<td>0.04</td>
</tr>
<tr>
<td>Sleeping Medication</td>
<td>6.66</td>
<td>2.70</td>
<td>0.15</td>
<td>2.47</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Lastly, a multiple regression was used with the number of days out (i.e. missed practice) as the dependent variable and the sleep subscales as predictors (raw scores). This regression found significant predictors of days of missed practice (see Table 5).

NOTES (comparisons in Table 4):

- Lower sleep efficiency = More days of treatment
- Longer duration of sleep = More days of treatment
- Worse sleep quality = more days of treatment
- More use of sleep medication = more days of treatment

Table 5. *Multiple Regression Analysis Predicting Number of Days Out*

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>1.03</td>
<td>0.98</td>
<td>0.08</td>
<td>1.01</td>
<td>0.29</td>
</tr>
<tr>
<td>Disturbances</td>
<td>0.58</td>
<td>0.26</td>
<td>0.02</td>
<td>0.26</td>
<td>0.80</td>
</tr>
<tr>
<td>Latency</td>
<td>-0.03</td>
<td>0.06</td>
<td>-0.04</td>
<td>-0.52</td>
<td>0.60</td>
</tr>
<tr>
<td>Daytime Dysfunction</td>
<td>-0.44</td>
<td>0.72</td>
<td>-0.04</td>
<td>-0.61</td>
<td>0.55</td>
</tr>
<tr>
<td>Efficiency</td>
<td>-0.23</td>
<td>0.09</td>
<td>-0.17</td>
<td>-2.40</td>
<td>0.02*</td>
</tr>
<tr>
<td>Subjective Quality</td>
<td>1.31</td>
<td>1.42</td>
<td>0.07</td>
<td>0.92</td>
<td>0.34</td>
</tr>
<tr>
<td>Sleeping Medication</td>
<td>2.10</td>
<td>1.24</td>
<td>0.11</td>
<td>1.70</td>
<td>0.09</td>
</tr>
</tbody>
</table>

*Note.* $p < .05$

**Stress, injury, and healthcare utilization**

To explore the relationships between stress, injury, and healthcare utilization, a series of bivariate correlations were performed. Among all participants, ACE scores significantly correlated with the total number of outside doctor visits ($r = .17$, $p = .006$) such that a higher ACE score was related to more doctor visits. In other words, the more adverse childhood experiences that athletes reported, the more doctors’ visits they made during the fall semester. ACE scores did not relate to injuries, days out of practice, or days of treatment. Among athletes endorsing ACEs ($n = 90$), a higher ACE score was associated with more total doctors visits ($r = .35$, $p = .001$). When athletes were grouped by those endorsing ACEs and athletes who did not endorse ACEs an association was shown between in-clinic visits. Moreover, an independent samples t-test revealed that athletes with ACEs visited the in-clinic doctor ($n = 89$, $M = .84$) more than athletes without ACEs ($n = 200$, $M = .52$) and that this difference was statistically significant, $t(136.6) = -2.1$, $p = .04$. In other words, when we categorized athletes into either a “yes, childhood adversity” or “no childhood adversity” group, the group that had any childhood adversity was using more in-house services than the non-childhood adversity group.
Bivariate correlations revealed a number of relationships between lifetime stress, injury and healthcare utilization. The total number of potentially traumatic events endorsed on the Life Events Checklist (LEC) was associated with in clinic visits \( (r = .13, p = .04) \), total doctors visits \( (r = .17, p = .007) \), number of complaints to the training room \( (r = .13, p = .04) \). This suggests that the more athletes experience adversity over the lifespan, the more services they are utilizing in-house. No relationship was found between the LEC and days in treatment or days missed from practice.

Finally, the roles of current stress, injury, and healthcare utilization were explored. The sum of stressors endorsed on the College Adjustment Rating Scale was correlated with total doctors visits \( (r = .25, p = .04) \). There was no relationship observed between the CARS and number of in clinic visits, number of injured, days out from practice, or days in treatment. These findings suggest that the more current stress is related to more doctor visits. It is important to remember that these data are cross sectional and that causality cannot be determined.

**Key findings on the Implication of stress and sleep on injuries**

- Athletes are similar to other studied populations in that more precipitating and current stressors (e.g. childhood, lifetime, current) relate to more health care utilization.
- Athletes endorsing adverse childhood experiences (ACEs) made significantly more visits to the in clinic doctor than athletes without ACEs.
- Having experienced more potentially traumatic events was associated with more health complaints as indexed by complaints to the training room, in clinic doctors visits, and total number of doctors visits.
- Higher current stress was associated with more total visits to the doctor.
Implications of injury and sleep on academic performance

Sleep and academic performance

A multiple regression with the raw scores of each sleep component as predictors and the fall 2011 semester GPA as the criterion was used to explore which sleep components predicted academic performance. The regression revealed that only daytime dysfunction was a statistically significant predictor of academic performance (see table 6) and the overall model was not significant. More specifically, more daytime dysfunction predicted higher fall GPAs. As these data are cross-sectional it is impossible to determine the direction of these findings. It is possible that obtaining higher GPAs required more work that resulted in greater sleepiness during the day (i.e., greater daytime dysfunction).

Table 6.

*Multiple Regression Analysis Predicting Academic Performance*

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>.08</td>
<td>.06</td>
<td>.10</td>
<td>1.20</td>
<td>.20</td>
</tr>
<tr>
<td>Disturbances</td>
<td>-.02</td>
<td>.01</td>
<td>-.10</td>
<td>-1.40</td>
<td>.16</td>
</tr>
<tr>
<td>Latency</td>
<td>.00</td>
<td>.00</td>
<td>.03</td>
<td>0.47</td>
<td>.64</td>
</tr>
<tr>
<td>Daytime Dysfunction</td>
<td>.09</td>
<td>.04</td>
<td>.15</td>
<td>2.12</td>
<td>.04*</td>
</tr>
<tr>
<td>Efficiency</td>
<td>.00</td>
<td>.01</td>
<td>.06</td>
<td>0.79</td>
<td>.43</td>
</tr>
<tr>
<td>Subjective Quality</td>
<td>-.09</td>
<td>.09</td>
<td>-.08</td>
<td>-1.01</td>
<td>.31</td>
</tr>
<tr>
<td>Sleeping Medication</td>
<td>-.03</td>
<td>.08</td>
<td>-.03</td>
<td>-0.41</td>
<td>.66</td>
</tr>
</tbody>
</table>

*Note. R² = .04, * p < .05.*

Injury and academic performance

A one-way between subjects ANOVA was conducted with injury status (no injury, concussion, and injury other than concussion) entered as the between subjects independent variable and GPA as the dependent variable. A significant main effect for injury status was found, $F(2, 272) = 10.19, p < .001$. Bonferroni multiple comparisons indicated that athletes with
no injuries had significantly higher fall GPAs than those with a concussion or an injury other than concussion. No significant different in GPA was found between athletes who had concussions and injuries other than concussion.

When the analysis was examined a second time using contact sports (i.e. 5 teams: football, men’s and women’s basketball and men’s and women’ soccer) versus non-contact sport as second independent variable the main effect of injury status dropped out, $F(2, 272) = 2.17, p = .12$ and a main effect of sport type emerged, $F (2, 274) = 11.62, p < .01$. More specifically, contact sports had significantly lower GPA’s ($M = 2.69, SD = .86$) than non-contact sports ($M = 3.19, SD = .69$) but there were no differences between injury groups (see Figure 6).

**Key findings on the implications of injury and sleep on academic performance**

- Injured athletes had significantly lower GPAs than non-injured athletes.
- Athletes in contact sports had significantly lower GPAs than athletes in non-contact sports.
Recommendations

Goal: Improve Sleep Through Education and Awareness

- **Who:** all athletes should receive this intervention (all sports, injured/non-injured)
- **Form of delivery to be determined through focus groups and clinical research summer, 2012.**
- **Incentivize intervention to increase utilization and adherence**

Goal: Improve Recovery of Injured Athletes

- **Special attention to sleep as it relates to recovery time and reduction of inflammation**
- **Address increased time burden due to treatment to increase sleep and reduce the (possible) effect of injury on lower GPA**

Goal: Increase Service Utilization Through Awareness of Services

- **Educate athletes about the types of services, the benefits of services, and their access to free services on campus**
- **Focus groups (summer, 2012) to learn about how we can market service utilization in order to reduce stigma and create a culture of strength-based utilization**

Obsessive-Compulsive Disorder, Social Anxiety, and Other Mental Health Concerns

- **Provide educational materials to help coaches and staff identify signs and risk factors involved in the development of these symptoms**
- **Provide psychoeducation materials and workshops offered to athletes in a manner that increases likelihood of utilization of services**
References


Gadzella, B. M. (2004). Three stress groups on their stressors and reactions to stressors in five studies. Psychological Reports, 94(2), 562-564. doi: 10.2466/pr0.94.562-564


