BEYOND THE LINES: EXPLORING THE IMPACT OF ADVERSE CHILDHOOD EXPERIENCES ON NCAA STUDENT-ATHLETE HEALTH

by

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National Collegiate Athletic Association (NCAA) student-athletes are faced with unique stressors that put them at increased risk for various biopsychosocial-spiritual (BPSS) health concerns. Additionally, given the high prevalence of adverse childhood experiences (ACEs) in diverse populations, it is likely that many student-athletes are also coping with challenges stemming from negative childhood events. Despite a substantial amount of evidence linking ACEs to deleterious BPSS health outcomes in both young adult and adult populations, little is known about the impact of ACEs on the overall health of student-athletes. This dissertation is comprised of the following six chapters: (a) an introduction to the dissertation, (b) a literature review exploring BPSS health concerns experienced by NCAA student-athletes and the impact of ACEs on health outcomes, (c) a systematic review examining the effectiveness of interventions being used to improve BPSS health outcomes among student-athletes, (d) a proposed methodology for the original research study, (e) an original research study exploring the interplay between ACEs and BPSS health outcomes among Division I, II, and III NCAA student-athletes ($N = 477$) who represented 20 sports across 53 universities, and (f) a series of implications and recommendations for researchers, clinicians, and NCAA athletics personnel.

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DEDICATION

For my eternal family and “best friends forever”—Rachel, Hudson, and Hadley. I am forever grateful for your unwavering support, continual patience, and unconditional love throughout this roller coaster of a journey. Thank you for believing in me. I love you to the moon and stars and back.

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PREFACE

As I reflect on my journey to get to this point in life (and it has been one *heck* of a journey), I would be lying if I didn't admit to being completely and utterly shocked. If someone would have told me six years ago, after retiring from football, that I would go on to earn a master's degree in Marriage and Family Therapy, become a published author, and be moments away from defending my dissertation en route to earning a PhD in Medical Family Therapy, I would have laughed in their face (and thought they were delusional). Nevertheless, here I am. However, how I ended up in this position can be attributed to an overwhelming amount of love and support from family, friends, coaches, teachers, and mentors, in addition to various impactful moments that have occurred throughout my life.

Allow me to begin by acknowledging that I am the epitome of privilege. I was born and raised as a White, Christian, heterosexual, male in a traditional, middle/upper-class family. My father was a chief financial officer (CFO) for various companies throughout my childhood/adolescence and was the sole breadwinner for my family. My mother also worked full-time, but without the usual perks of employment: no salary, overtime pay, 401 (k), paid vacation days, or any other benefits (other than having me as one of her five employers, of course). I don't think I ever truly understood how privileged, blessed, and fortunate I was throughout my childhood, adolescent, and young adult years. I never recall being treated unfairly or feeling unsafe because of my gender, sexual orientation, or color of my skin. If I was sick, I went to the doctor and received quality care. If I needed something, I got it (because my parents paid for it). I never went without food, water, or shelter. In fact, I rarely went without anything I ever needed or wanted. From an outsider's perspective, I had one big, happy, "perfect" family; however, that perception was far from reality.

It was not until I began my master's coursework in marriage and family therapy that I recognized my childhood and adolescent years were also filled with bouts of trauma, psychosocial challenges, and other stressors that not only profoundly affected my family and me, but also opened my eyes to the impact and interplay between trauma and the biological, psychological, social, and spiritual facets of life. One such experience occurred when I was four years old. I remember waking up in the middle of the night to get a drink of water and feeling deathly afraid as I discovered our living room was engulfed in flames. After waking my parents, I hid in my sister's closet as the rest of my family escaped our smoke- and flame-filled home. Realizing that I was unaccounted for, my father (who was 28 years old at the time) rushed back into the house without hesitation—risking his life to save mine. As a result, he sustained third-degree burns over 25 percent of his body and was given a 30 percent chance to live due to excessive smoke inhalation. Over the course of three months, my dad would undergo various skin graft procedures and other grueling treatments in the burn intensive care unit, where he eventually made a full (physical) recovery.

Another integral experience that helped shape me into the person I am today occurred during my youth. Throughout my childhood, I was often made fun of because of my abnormally large stature. To be fair, compared to my age-related peers, I was a *really* big kid! Not only was I at least twice the weight limit for little league football every year, but I also required a special desk in elementary school because I couldn't fit in the normal ones. Unsurprisingly, it didn't take long for me to adopt the nickname, "fat boy" among my peers. I remember coming home from school on various occasions crying as I asked my mom why I was so big/fat. I felt what it was like to be abnormal, made fun of, and ostracized from my peers—and it wasn't a good feeling. Although those were some hurtful and challenging times in my life, as I reflect on those

experiences, I feel grateful. Grateful because those moments of sadness, isolation, and being different shaped me into the sensitive, compassionate, and empathic man I am today. Not to mention it was moments and experiences like these that ultimately fueled my desire to become a marriage and family therapist.

From the age of four (and the subsequent 20 years), my life revolved largely around sports. One could argue I really didn't have much of a choice—my father was a collegiate baseball player and my mother is a 5'10" athletic woman who came from a family of multisport athletes. The reality is, participating in sports is something I really enjoyed (for the most part), and being an athlete quickly became an integral part of my identity. The competitive environment, comradery with my teammates (many of whom are still my best friends), being accountable to my coaches/teammates and something bigger than myself, and traveling across the country to compete against the best of the best are memories I cherish every day. However, it wasn't always sunshine and roses. I also experienced the other side of playing competitive sports—the side that is seldom seen or talked about. The countless hours of film, treatment, strength training/conditioning, and practice. Playing through bumps, bruises, and significant injuries. Getting berated and belittled by coaches in front of teammates, fans, friends, and family members. Making a mistake in a crucial moment of a game and feeling like you let down teammates, coaches, family, friends, the community, and fans throughout the world. Constantly feeling exhausted—physically, mentally, and emotionally—trying to balance the demands of being a full-time university student, elite-level athlete, friend, son, brother, and spouse. And, ultimately, stepping away from the game that you ate, breathed, and slept for 20 years of your life—resulting in the loss of a core piece of your individual identity.

Having said all of that, I miss being a student-athlete. So much so that I chose to do what a younger me would have NEVER considered doing in a million years—pursue a PhD and conduct research aimed to better understand, and develop ways to improve, the unique health experiences and challenges of NCAA student-athletes. Nevertheless, I did it. It wasn't pretty, and it certainly was not easy, but I did it. And believe me, if *I* can do it, you can, too. My hope is that this research will provide a better understanding of the complex interplay among traumatic childhood experiences, spirituality, and the biopsychosocial health of NCAA student-athletes. In doing so, I hope to assist researchers, practitioners, and NCAA athletics personnel in the development of policies, interventions, and educational materials to better address all aspects of student-athlete health—physical, psychological, social, and spiritual—with equal importance.

CHAPTER 1: INTRODUCTION

Participation in NCAA sports has reached an all-time high with nearly 500,000 student-athlete participants at the Division I, II, and III competition levels (NCAA, 2015). For some student-athletes, participation in intercollegiate sports is an uplifting experience that promotes the development of character traits and life skills such as work ethic, integrity, teamwork, learning how to deal with failure, achieving cultural acceptance, expanding life experience, and making friends (Chen, Snyder, & Manger, 2010; Watson & Kissinger, 2007). However, for many student-athletes, balancing the dual role of being a full-time student and athlete is a demanding task that may predispose them to, or exacerbate, various biological (e.g., sports-related injuries), psychological (e.g., depression, anxiety), social (e.g., pressure from family members), and spiritual (e.g., identity development, sense of purpose) health concerns and challenges (Bryant, Choi, & Yasuno, 2003; Chen et al., 2010; Reardon & Factor, 2010; Watson & Kissinger, 2007; Wolanin, Hong, Marks, Panchoo, & Gross, 2016; Yang et al., 2012). As a result, researchers, clinicians, and NCAA athletics' personnel have prioritized conducting research and developing interventions designed to improve the psychosocial health and well-being of NCAA student-athletes, (e.g., Mental Health Best Practices; Rahman, 2016). However, there remains a dearth of literature examining the interplay between and among the biological, psychological, social, and spiritual domains of student-athlete health. In addition to the established present-day stressors encountered by student-athletes, many may also be dealing with challenges related to negative childhood experiences.

Since Felitti and colleagues (1998) landmark study, a substantial body of research has linked adverse childhood experiences (ACEs) such as abuse, neglect, and familial stressors to subsequent adverse physical and psychosocial health outcomes (Brown et al., 2009; Choi,

DiNitto, Marti, & Choi, 2017; Forster, Gower, Borowsky, & McMorris, 2017; Merrick et al., 2017). As a result, exposure to ACEs is recognized as a global health issue (Anda et al., 2010), and researchers are continuing to devote attention to the impact of ACEs on physical and mental health outcomes among various populations. However, research exploring the prevalence and impact of ACEs among NCAA student-athletes is scant. Given that student-athletes represent a distinct population on university campuses, and are considered an at-risk group for mental health disorders (e.g., depression, anxiety) and risky health behaviors (e.g., substance abuse), research examining the impact of ACEs on BPSS health outcomes in this population is needed.

This chapter will first provide a brief overview of the BPSS health outcomes in the NCAA student-athlete population. Next, we will describe the impact of ACEs on health outcomes and introduce the theoretical foundation for this original dissertation study. We will then describe the purpose and design for this original study and conclude by providing an overview of the remaining chapters of this dissertation, which include a literature review (chapter two), systematic review (chapter three), methodology for the original study (chapter four), and results of the original study proposed in chapter four (chapter five).

The Biopsychosocial-Spiritual Health of NCAA Student-Athletes

Participation in intercollegiate athletics is accompanied by various biological, psychological, social, and spiritual challenges. For example, due to the rigorous, year-round training demands, and the overall physical nature of intercollegiate sports, student-athletes are prone to sustaining various injuries and experiencing chronic pain and physical exhaustion (Hootman et al., 2007; Vetter & Symonds, 2010; Yang et al., 2007). Researchers have also highlighted the prevalence of mental health conditions, psychosocial stressors, and risky behaviors (e.g., substance abuse) in the student-athlete population (Kimball & Freysinger, 2003;

Mastroleo, Scaglione, Mallett, & Turris, 2013; Proctor & Boan-Lenzo, 2010; Reardon & Factor, 2010). According to data from the National College Health Assessment (American College Health Association, 2012), 21% of male student-athletes (n = 1,623) and 28% of female student-athletes (n = 3,303) reported feeling so depressed that it was difficult to function in the last 12 months. Additionally, more than 32% of male student-athletes (n = 2,439) and nearly half of female student-athletes (n = 5,747) reported feeling overwhelming anxiety during the past year. Of even greater concern are the incidences and causes of sudden death in NCAA student-athletes. Data captured between the years of 2002 and 2011 revealed that death by suicide and drug-related deaths accounted for nearly 30% of all sudden deaths among NCAA student-athletes (Maron, Haas, Murphy, Ahluwaila & Rutten-Ramos, 2014), making death by suicide the fourth leading cause of death in the student-athlete population (Miller & Hoffman, 2009). Furthermore, Miller and Hoffman (2009) found that an estimated 5% of student-athletes have contemplated suicide. This may be explained by student-athletes' difficulties balancing the rigor of athletic and academic demands, belief that their identities are based solely on their athletic status, and feelings of isolation from the overall campus population (DeFreese & Smith, 2013; Miller & Hoffman, 2009). With statistics like these, it comes as little surprise that the NCAA named mental health as the number one health concern facing today's student-athletes (NCAA, 2013).

Despite the growing evidence that NCAA student-athletes experience biopsychosocial concerns (e.g., injuries, depression, relationship challenges) and engage in risky behaviors (e.g., substance use/abuse) at similar or higher levels than their non-athlete counterparts (Cox, 2015; Mastroleo et al., 2013; Reardon & Factor, 2010), student-athletes are less likely to utilize professional mental health services than non-athletes (Watson, 2005), and access to mental

health services remains a challenge for many student-athletes. For example, due to perceived and societal stigma associated with mental health, fear of lack of support from coaches and teammates, and lack of mental health literacy (Gulliver, Griffiths, & Christensen, 2012), student-athletes may be less likely to recognize and/or acknowledge mental health concerns, let alone seek help from mental health professionals to address such concerns (Wolanin, Gross, & Hong, 2015). Another barrier to help seeking is the lack of awareness of mental health resources available to student-athletes. Although many colleges and universities provide on-campus counseling resources, many student-athletes reported not knowing how or where to access mental health services at their respective institutions (Cox, 2015, Gulliver et al., 2012). As a result, student-athletes are recognized as an underrepresented population within campus counseling services (Watson, 2005). To address this disparity, a recent call-to-action was delivered by the Chief Medical Officer of the NCAA for athletic departments to employ licensed mental health practitioners who have competency-based training in assessing, diagnosing, and treating the psychosocial challenges experienced by intercollegiate student-athletes (NCAA, 2016).

In addition to the various biological, psychological, social, and spiritual (BPSS) health challenges of NCAA student-athletes, many may also be struggling to process and cope with adverse childhood experiences (ACEs), given the high prevalence of ACEs in the general adult population. Although researchers have suggested that athletes, because of their frequent engagement in exercise, may be more resilient to the potentially harmful effects of childhood adversity (Kaier, Cromer, Davis, & Strunk, 2015; McEwen & Seeman, 1999), there is a dearth of literature examining the relationship between ACEs and BPSS health outcomes in the student-

athlete population. In the following section, we will provide a brief overview of the impact of ACEs on subsequent physical and psychosocial health outcomes.

Adverse Childhood Experiences and Health Outcomes

Being exposed to trauma, abuse, or neglect during childhood has been recognized as a major global health issue (Anda et al., 2010). As a result, research on ACEs, defined broadly as child maltreatment (e.g., abuse, neglect) and household dysfunction (e.g., living in a home with domestic violence; Felitti et al., 1998) has received increased attention over the past two decades. Recent statistics highlight the prevalence of ACEs among American adults. For example, several research teams found that over half of their participants reported experiencing at least one adverse childhood experience (Chapman et al., 2013; Felitti et al., 1998; Kessler, Davis, & Kendler, 1997). Additionally, a large body of research has documented the adverse, long-term effects of ACEs on biopsychosocial (BPS) health and risk-taking behaviors in adulthood.

ACEs have been linked to various physical ailments in adulthood such as autoimmune disease (Dube et al., 2009), lung cancer (Brown et al., 2010), liver disease (Dong et al., 2003), somatic complaints (Allen, 2008; Anda et al., 2010), and premature mortality (Brown et al., 2009; Kelly-Irving et al., 2013). Furthermore, researchers found ACEs have a negative impact on mental health outcomes across the life span. In one study, participants who reported ACEs were nearly three times more likely to suffer from depression in adulthood compared to those who endorsed no ACEs (Chapman et al., 2004). Other research teams have established links between ACEs and anxiety disorders (De Venter, Demyttenaere, & Bruffaerts, 2013) suicide (Brockie et al., 2015; Dube et al., 2001), and psychotic symptoms (Whitfield et al., 2005) in adulthood. Elliott and colleagues (2005) found that individuals (N = 1,563) who experienced physical abuse during childhood were more isolated from friends and peers at school compared to those who did

not experience abuse. Lastly, individuals with a history of ACEs are more likely to engage in various risky behaviors such as illicit drug use (Schilling et al., 2007), problematic alcohol use (Rothman et al., 2008), and risky sexual behaviors (Elliott, Avery, Fishman, & Hoshiko, 2002; Felitti et al, 1998). These findings highlight the profound deleterious impact of ACEs on BPS health outcomes across the life span.

The link between ACEs, adverse mental and physical health outcomes, and risky behaviors (e.g., substance use and abuse) in adulthood has been well established. However, the literature exploring these relationships among the student-athlete population is sparse. Given that student-athletes represent a distinct population that experience unique BPSS stressors and challenges, and engage in more frequent risky health behaviors, compared to their age-related peers, it is important to investigate the prevalence and impact of ACEs as it relates to the overall health and well-being of student-athletes. Therefore, the primary aim of this dissertation is to fill this gap in the literature by examining the relationships between and among ACEs and the BPSS health of NCAA student-athletes.

Theoretical Perspective

For this dissertation, the BPS systems metatheory (Anchin, 2008), which is informed by general systems theory (GST; von Bertalanffy, 1968) and the biopsychosocial-spiritual (BPSS) framework (Engel, 1977, 1980; Wright, Watson, & Bell, 1996), and the theory of toxic stress (National Scientific Council on the Developing Child, 2005; 2014; Shern et al., 2016) were selected to lay the theoretical foundation for the research design. The premise of the BPS framework (Engel 1977, 1980) is that the *whole* person is comprised of biological, psychological, and sociocultural domains that are inextricably linked and systemically connected. Through this lens,,"…each biological problem has psychosocial consequences and

each psychosocial problem has biological correlates" (McDaniel, 1995, p. 117). Thus, through a BPS perspective, biological effects of disease and illness may amplify or be exacerbated by psychological stress, which can then be impacted by relational or societal issues (Biderman, Yeheskel, & Herman, 2005; Engel, 1977).

The primary strength of the BPS systems metatheory, posited by Anchin (2008), is that it provides a comprehensive framework for conceptualizing health phenomena by considering the interplay between and among the biological, psychological, *and* social domains of human functioning. Through this lens, each domain is seen as equally important. However, it appears that Anchin's (2008) BPS systems metatheory is missing another integral domain related to overall health and well-being—spirituality. Wright and colleagues (1996) posited that spirituality—which encompasses one's search for purpose and meaning in life—must also be considered when examining *whole* person health. Although there has been much debate surrounding the definition, validity, and generalizability of spirituality as a scientific construct, MacDonald and colleagues (2015) concluded that spirituality is indeed an empirically viable construct that behaves similarly across different cultures. Given the importance of understanding the role of spirituality in the context of overall student-athlete health, we amended Anchin's (2008) BPS systems metatheory to include spirituality to fully capture the health of NCAA student-athletes.

Dovetailing appropriately with the BPSS systems metatheory (Anchin, 2008), the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016) was selected to more fully explain how ACEs specifically impact the BPSS health of student-athletes. The term "toxic stress" was coined by the National Scientific Council on the Developing Child (2005) to describe the effects of excessive activation of stress response

systems on a child's developing brain, as well as the immune system, metabolic regulatory systems, and cardiovascular system. Through the theory of toxic stress, ACEs can be conceptualized as toxic stressors—defined broadly as prolonged exposure to adversity (e.g., physical/emotional abuse, neglect, exposure to violence) without adequate adult support (National Scientific Council on the Developing Child, 2005/2014). Researchers have recently discovered that exposure to toxic stress during childhood (ACEs) can cause structural remodeling of neural, endocrine, and immune systems, ultimately resulting in subsequent psychosocial concerns and other chronic illnesses (Shern et al., 2016). Through this lens, individuals who are exposed to toxic stressors during childhood—when critical periods of development transpire—are prone to experience adverse physical and psychological health outcomes across the lifespan (Shonkoff, 2010).

Purpose and Design

Although several research teams have examined the prevalence and incidence of various biological, psychological, and social health variables among student-athletes, there is scant research examining the relationship between and among these health variables. Additionally, there is limited research exploring the importance/role of spirituality and ACEs in the context of student-athlete health and well-being. Given the unique intercollegiate athletic environment and stressors, it is essential to investigate the relationships between and among the BPSS health domains to gain a more comprehensive understanding of student-athlete health. In lieu of recent literature highlighting the deleterious effects of ACEs on biological, psychological, and social health outcomes during adolescence and adulthood in the general population (Brown et al., 2009; Choi, DiNitto, Marti, & Choi, 2017; Felitti et al., 1998; Forster, Gower, Borowsky, & McMorris,

2017; Merrick et al., 2017), it is critical to examine to what extent ACEs impact the BPSS health and well-being of intercollegiate student-athletes.

The purpose of this dissertation is to explore the relationship between ACEs and BPSS health variables through the theoretical lenses of the BPSS systems metatheory (Anchin, 2008; Engel, 1977, 1980; Wright, Watson, & Bell, 1996) and the theory of toxic stress (National Scientific Council on the Developing Child, 2005, 2014; Shern et al., 2016). Specifically, we were interested in answering the following research questions: (a) What is the relationship among ACEs, protective and compensatory experiences (PACEs), biological health, psychological health, social health, and spirituality among student-athletes? and (b) Do ACEs predict biological, psychological, and social health outcomes in student-athletes and does spirituality moderate these relationships? To address these research questions, we will distribute a web-based survey via research electronic data capture (REDCap; Harris et al., 2009) to current NCAA student-athletes throughout the country and—after conducting appropriate preliminary analyses—employ structural equation modeling (SEM) to test our hypotheses. Results from this study will provide greater insight into the interplay between ACEs and various physical, psychological, social, and spiritual health outcomes and concerns experienced by student-athletes. Additionally, results from this study will aid clinicians, researchers, and NCAA athletics personnel in the development of interventions, resources, and integrated health care models to provide holistic medical care to student-athletes—addressing the BPSS domains of health and wellness.

Overview

In more detail, chapter two provides an in-depth literature review for this dissertation. Specifically, the literature review will explore: (a) the relevant biopsychosocial (BPS) health

challenges experienced by NCAA student-athletes, (b) the role of spirituality in student-athlete health, well-being, and performance, and (c) the impact of ACEs on the BPSS health of student-athletes. Additionally, chapter two presents the theoretical foundation for this dissertation: (a) the BPS systems metatheory (Anchin, 2008), which is grounded in systems theory (von Bertalanffy, 1968) and the biopsychosocial-spiritual framework (Engel, 1977, 1980; Wright et al., 1996), and (b) the theory of toxic stress (National Scientific Council on the Developing Child, 2005, 2014; Shern et al., 2016). The literature review concludes with recommendations for researchers to examine the interrelationship between and among various BPSS health variables and ACEs to provide a more comprehensive understanding of student-athlete health and well-being.

Chapter three contains a systematic review examining the effectiveness of interventions used to improve psychological, social, and spiritual health outcomes of student-athletes. The systematic review answers the following question: "How effective are existing interventions at treating the psychological, social, and spiritual health of NCAA student-athletes?" After systematically searching five electronic databases (*CINAHL*, *PsycINFO*, *PubMed*, *ERIC*, and *SPORTDiscus)*, over 420 articles were yielded, 20 of which met the inclusion criteria. Results from the systematic review highlight characteristics of interventions being implemented to improve the psychological, social, and spiritual health of student-athletes. Results also point to the paucity of research exploring the spiritual dimension of student-athlete health and well-being.

The methodology proposed in chapter four is based on the results of the literature review in chapter two and systematic review in chapter three. The aims of this dissertation include: (a) gain a deeper understanding of BPSS health and well-being of NCAA student-athletes, and (b) explore the impact of ACEs on student-athlete BPS health variables, and (c) examine the moderating effect of spirituality between ACEs and BPS health outcomes. Structural equation

modeling (SEM) will be implemented to examine the relationships between and among various BPSS health variables. Further, SEM will be employed to analyze the impact of ACEs on various BPS health outcomes of NCAA student-athletes and to what extent spirituality moderates those relationships. For this study, the researchers recruited current NCAA student-athletes to participate in a self-report, web-based survey that inquired about: (a) general and student-athlete specific demographic information, (b) biological health (e.g., injuries, somatic symptoms), (c) psychological health (e.g., depression, anxiety, perceived stress, substance use), (d) social heatlh (e.g., perceived social support), (e) spirituality, and (f) ACEs. Chapter five will be a publishable manuscript that details the results of the original study proposed in chapter four.

Summary

NCAA student-athletes are faced with the task of balancing the roles of full-time student and elite-level athlete, all while continuing to develop their individual identity (Chickering, 1969) and searching for meaning and purpose in life (Bryant, Choi, & Yasuno, 2003). As a result, student-athletes are at risk for various BPSS health challenges that impact not only their athletic performance, but also their overall well-being (Kimball & Freysinger, 2003; Mastroleo et al., 2013; Proctor & Boan-Lenzo, 2010; Reardon & Factor, 2010). Despite evidence linking ACEs to adverse physical (e.g., somatic complaints, cancer), psychological (e.g., depression, substance abuse), and social (e.g., social isolation) health outcomes in the general population (Allen, 2008; Anda et al., 2010; Brown et al., 2010; Chapman et al., 2004; Elliott et al., 2005; Rothman et al., 2008; Schilling et al., 2007), there is a dearth of literature examining the impact of ACEs on BPS health outcomes in the student-athlete population. Using the BPSS systems metatheory (Anchin, 2008; Engel, 1977, 1980; Wright et al., 1996) and the theory of toxic stress (National Scientific Council on the Developing Child, 2005, 2014; Shern et al., 2016) as the

conceptual framework, this dissertation seeks to fill this gap in the literature, and provide further knowledge about the interplay between ACEs and BPSS health of NCAA student-athletes.

REFERENCES

Allen, B. (2008). An analysis of the impact of diverse forms of childhood psychological maltreatment on emotional adjustment in early adulthood. *Child Maltreatment, 13*, 307-312. doi: 10.1177/1077559508318394.

American College Health Association. American College Health Association-National College Health Assessment II: Undergraduate Reference Group Executive Summary Spring 2012. Hanover, MD: American College Health Association; 2012.

Anchin, J. C. (2008). Pursuing a unifying paradigm for psychotherapy: Tasks, dialectical considerations, and biopsychosocial systems metatheory. *Journal of Psychotherapy Integration, 18*(3), 310-349. doi:10.1037/a0013557

Anda, R. F., Butchart, A., Felitti, V. J., & Brown, D. W. (2010). Building a framework for global surveillance of the public health implications of adverse childhood experiences. *American Journal of Preventive Medicine, 39*(1), 93-98. doi:10.1016/j.amepre.2010.03.015

Brockie, T.N., Dana-Sacco, G., Wallen, G.R., Wilcox, H.C., & Campbell, J.C. (2015). The relationship of adverse childhood experiences to PTSD, depression, poly-drug use and suicide attempt in reservation-based Native American adolescents and young adults. *American Journal of Community Psychology, 55,* 411-421. doi: 10.1007/s10464-015-9721-3

Brown, D., Anda, R., Felitti, V., Edwards, V., Malarcher, A. M., Croft, J., & Giles, W. (2010). Adverse childhood experiences are associated with the risk of lung cancer: A prospective cohort study. *BMC Public Health, 10*(1), 20-20. doi:10.1186/1471-2458-10-20

Brown, D. W., Anda, R. F., Tiemeier, H., Felitti, V. J., Edwards, V. J., Croft, J. B., Giles, W. H. (2009). Adverse childhood experiences and the risk of premature mortality. *American Journal of Preventive Medicine*, *37*(5):389 –96.

Bryant, A. N., Choi, J. Y., & Yasuno, M. (2003). Understanding the religious and spiritual dimensions of students‘ lives in the first year of college. *Journal of College Student Development, 44*, 723-745. doi:10.1353/csd.2003.0063

Chapman, D. P., Liu, Y., Presley-Cantrell, L. R., Edwards, V. J., Wheaton, A. G., Perry, G. S., & Croft, J. B. (2013). Adverse childhood experiences and frequent insufficient sleep in 5 U.S. states, 2009: A retrospective cohort study. *BMC Public Health, 13*(1), 3-3. doi:10.1186/1471-2458-13-3

Chapman, D. P., Whitfield, C. L., Felitti, V. J., Dube, S. R., Edwards, V. J., & Anda, R. F. (2004). Adverse childhood experiences and the risk of depressive disorders in adulthood.*Journal of Affective Disorders, 82*(2), 217-225. doi:10.1016/j.jad.2003.12.013

Chen, S., Snyder, S., & Magner, M. (2010). The effects of sport participation on student-athletes' and non-athlete students' social life and identity. *Journal of Issues in Intercollegiate Athletics, 3,* 176-193.

Chickering, A. W. (1969). *Education and identity*. San Francisco, CA: Jossey-Bass.

Cox, C. (2015). *Investigating the prevalence and risk-factors of depression symptoms among NCAA Division I collegiate athletes.* Retrieved from Proquest Digital Dissertations. (1592018)

DeFreese, J. D., & Smith, A. L. (2013). Teammate social support, burnout, and self-determined motivation in collegiate athletes. *Psychology of Sport and Exercise,14*(2), 258-265.

Dong, M., Dube, S. R., Felitti, V. J., Giles, W. H., & Anda, R. F. (2003). Adverse childhood experiences and self-reported liver disease: New insights into the causal pathway. Archives of Internal Medicine, 163, 1949–1956.

Dube, S. R., Fairweather, D., Pearson, W. S., Felitti, V. J., Anda, R. F., & Croft, J. B. (2009). Cumulative childhood stress and autoimmune diseases in adults. *Psychosomatic Medicine, 71*(2), 243-250. doi:10.1097/PSY.0b013e3181907888

Dube, S. R., Anda, R. F., Felitti, V. J., Chapman, D. P., Williamson, D. F., & Giles, W. H. (2001). Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: Findings from the adverse childhood experiences study. *Jama, 286*(24), 3089-3096. doi:10.1001/jama.286.24.3089

Engel, G.L. (1980). The clinical application of the biopsychosocial model. *The American Journal of Psychiatry, 137*, 535–544.

Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science, 196,* 129-136. doi:10.1126/science.847460

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . . Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ACE) study. *American Journal of Preventive Medicine, 14*(4), 245-258. doi:10.1016/S0749-3797(98)00017-8

Gulliver, A., Griffiths, K.M., & Christensen, H. (2012). Barriers and facilitators to mental health help-seeking for young elite athletes: A qualitative study. *BMC Psychiatry, 12*, 157. doi: 10.1186/1471-244X-12-157

Kaier, E., Cromer, L., Davis, J., & Strunk, K. (2015). The relationship between adverse childhood experiences and subsequent health complaints in elite athletes. *Journal of Child & Adolescent Trauma. 8*. doi:10.1007/s40653-015-0041-4.

Kelly-Irving, M., Lepage, B., Dedieu, D., Bartley, M., Blane, D., Grosclaude, P., . . . Delpierre, C. (2013). Adverse childhood experiences and premature all-cause mortality. *European Journal of Epidemiology, 28*(9), 721-734. doi:10.1007/s10654-013-9832-9

Kessler, R. C., Davis, C. G., & Kendler, K. S. (1997). Childhood adversity and adult psychiatric disorder in the US National Comorbidity Survey. *Psychological Medicine*, *27*(5), 1101-1119.

Kimball, A., & Freysinger, V. J. (2003). Leisure, stress, and coping: The sport participation of collegiate student-athletes. *Leisure Sciences, 25*(2-3), 115-141. doi:10.1080/01490400306569

MacDonald, D. A., Friedman, H. L., Brewczynski, J., Holland, D., Salagame, K. K. K., Mohan, K. K., . . . Cheong, H. W. (2015). Spirituality as a scientific construct: Testing its universality across cultures and languages. *PloS One, 10*(3), e0117701. doi:10.1371/journal.pone.0117701

Maron, B.J., Haas, T.S., Murphy, C.J., Ahluwalia, A., & Rutten-Ramos, S. (2014). Incidence and causes of sudden death in U.S. college athletes. *Journal of the American College of Cardiology, 63*(16), 1636-1643. doi: 10.1016/j.jacc.2014.01.041

Mastroleo, N. R., Scaglione, N., Mallett, K. A., & Turrisi, R. (2013). Can personality account for differences in drinking between college athletes and non-athletes? explaining the role of sensation seeking, risk-taking, and impulsivity. *Journal of Drug Education, 43*(1), 81-95. doi:10.2190/DE.43.1.f

Miller, K. E., & Hoffman, J. H. (2009). Mental well-being and sport-related identities in college students. *Sociology of Sport Journal, 26*(2), 335-356.

National Scientific Council on the Developing Child (2005/2014). *Excessive stress disrupts the architecture of the developing brain: Working paper no. 3*. Updated Edition. Retrieved from www.developingchild.harvard.edu.

NCAA.org. "Results from the 2015 GOALS study of the student-athlete experience." Presented at the NCAA Convention, 2016, San Antonio, TX.

NCAA.org. "Examining the student-athlete experience through the NCAA GOALS and SCORE studies." Presented at the NCAA Convention, 2011, San Antonio, TX.

Proctor, S. L., & Boan-Lenzo, C. (2010). Prevalence of depressive symptoms in male intercollegiate student-athletes and nonathletes. *Journal of Clinical Sport Psychology, 4,* 204–220. http://dx.doi .org/10.1123/jcsp.4.3.204

Reardon, C.L., & Factor, R.M. (2010). Sport psychiatry: a systematic review of diagnosis and medical treatment of mental illness in athletes. *Sports Medicine, 40*(11), 961-980. doi: 10.2165/11536580-000000000-00000.

Rothman, E. F., Dejong, W., Palfai, T., & Saitz, R. (2008). Relationship of age of first drink to alcohol-related consequences among college students with unhealthy alcohol use. *Substance Abuse, 29*(1), 33-41. doi:10.1300/J465v29n01_05

Schilling, E., Aseltine, R., Jr., & Gore, S. (2007). Adverse childhood experiences and mental health in young adults: A longitudinal survey. *BMC Public Health*, 7, 30. https://doi.org/10.1186/1471-2458-7-30

Shern, D. L., Blanch, A. K., & Steverman, S. M. (2016). Toxic stress, behavioral health, and the next major era in public health. *American Journal of Orthopsychiatry, 86*(2), 109-123. doi:10.1037/ort0000120

von Bertalanffy, L. (1968). *General system theory: Foundations, developments, applications*. New York: Braziller.

Watson, J.C. (2005). College student-athletes attitudes toward help-seeking behavior and expectations of counseling. *Journal of College Student Development, 46*(4), 442-449.

Watson, J.C., & Kissinger, D.B. (2007). Athletic participation and wellness: Implications for counseling college student-athletes. *Journal of College Counseling, 10*(2), 153-162. doi: 10.1002/j.2161-1882.2007.tb00015.x

Whitfield, C. L., Dube, S. R., Felitti, V. J., & Anda, R. F. (2005). Adverse childhood experiences and hallucinations. *Child Abuse & Neglect, 29*(7), 797-810. doi:10.1016/j.chiabu.2005.01.004

Wolanin, A., Gross, M., & Hong, E. (2015). Depression in athletes: Prevalence and risk factors. *Current Sports Medicine Reports, 14*(1), 56-60. doi:10.1249/JSR.0000000000000123

Wright, L. M., Watson, W. L., & Bell, J. M. (1996). *Belief: The heart of healing in families and illness.* New York: Basic Books.

CHAPTER 2: ADVERSE CHILDHOOD EXPERIENCES, SPIRITUALITY, AND NCAA STUDENT-ATHLETE HEALTH: A REVIEW

Each year, hundreds of thousands of young adult student-athletes participate in National Athletic Collegiate Association (NCAA) varsity sports throughout the country (NCAA, 2015). In addition to the common challenges faced by their university peers, such as adapting to a new environment, exploring new-found freedom, developing a sense of self, and attempting to meet the demands of college coursework, student-athletes are faced with unique demands and stressors because of their participation in intercollegiate athletics (Etzel, Watson, & Maniar, 2006). For example, student-athletes engage in rigorous, year-round training (e.g., weight lifting, conditioning) for their sport, and spend several hours per day reviewing film, practicing, and receiving treatment in the athletic training room (NCAA, 2016). The demands and expectations to excel as a full-time student and elite athlete, in addition to balancing other personal and social pursuits, put student-athletes at risk for various biological (e.g., overtraining, sport-related injuries), psychological (depression, anxiety, substance abuse), social (diminished time with peers/family), and spiritual (sense of purpose, identity development) challenges and health concerns (Bryant, Choi, & Yasuno, 2003; Chen, Snyder, & Magner, 2010; Neal et al., 2013; Reardon & Factor, 2010; Watson & Kissinger, 2007; Wolanin, Hong, Marks, Panchoo, & Gross, 2016; Yang et al., 2012).

Coupled with these established health concerns and risky health behaviors (e.g., overtraining, substance abuse), student-athletes may also be dealing with challenges in young adulthood associated with negative childhood experiences. A growing body of literature has highlighted the prevalence and occurrence of adverse childhood experiences (ACEs) such as abuse, neglect, and household dysfunction (Felitti et al., 1998). In a survey of over 52,000

participants aged 18-64, 58% of respondents reported experiencing at least one ACE (Monat & Chandler, 2015). The links between ACEs and deleterious health outcomes (physical and mental) and health risk behaviors (alcohol/illicit drug use) in adulthood have been well established (Anda et al., 2006; Anda et al., 2008; Brown et al., 2009; Brown et al., 2010; Chapman et al., 2011; Clark et al., 2010; Dong et al., 2004; Dube et al., 2006; Edwards et al., 2007; Felitti et al., 1998; Felitti & Anda, 2010; Monnat & Chandler, 2015; Whitfield, Dube, Felitti, & Anda, 2005). However, there is scant research examining the impact of ACEs on biological, psychological, social, and spiritual health outcomes in the student-athlete population. Given that student-athletes are recognized as a distinctive population with unique needs, it is essential to further our understanding of the interplay between ACEs and BPSS health outcomes.

Consequently, the purpose of this literature review is to explore the available research pertaining to the following: (a) the biological, psychological, and social health outcomes among NCAA student-athletes, (b) the role of spirituality in the context of student-athlete athlete health and performance, and (c) the impact of ACEs on student-athlete health outcomes. Two complementary frameworks harmonize to establish a sound theoretical foundation for this review. First, the biopsychosocial (BPS) systems metatheory (Anchin, 2008), which is informed by general systems theory (GST; von Bertalanffy, 1968) and the biopsychosocial-spiritual (BPSS) framework (Engel, 1977, 1980; Wright, Watson, & Bell, 1996) effectively conceptualizes the interplay between and among the BPSS domains of student-athlete health. Dovetailing aptly with the BPS systems metatheory, the theory of toxic stress (National Scientific Council on the Developing Child, 2005; 2014; Shern et al., 2016) provides a theoretical framework to understand how ACEs specifically impact the overall health of NCAA student-athletes.

Specifically, this review will address the following: (a) a description of the key tenets of the BPS systems metatheory (Anchin, 2008) and the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016), (b) an overview of extant research considering BPSS health outcomes among NCAA student-athletes, (c) a description of the state of research on the impact of ACEs on student-athlete health, and (d) recommendations for future researchers to explore the relationships among ACEs, spirituality, and BPS health outcomes in the student-athlete population.

The Biopsychosocial-Spiritual Systems Metatheory

The BPS approach to mental health practice originally surfaced in the early 1900s (Meyer, 1917); however, it was first fully articulated by psychiatrist and internal medicine physician, George Engel (1977). In his seminal article, Engel (1977) introduced the BPS model as an alternative framework to the prevailing biomedical model in which biological and psychological processes were assumed to sufficiently explain disease and its treatment. Engel (1977) asserted that, in addition to somatic and psychological determinants of health, psychosocial factors (e.g., the effect of the patient-provider relationship) play an integral role in the etiology, assessment, and treatment outcomes of disease. To provide a theoretical framework to support the suppositions of his BPS model, Engel drew largely from the primary underpinnings of General Systems Theory (GST). Formulated by von Bertalanffy (1962; 1968), GST is a foundational approach to understanding complex phenomena because it emphasizes how parts both within (intrapersonal processes) and between (interpersonal processes) individuals interact within a larger system. Thus, from a GST perspective, the *whole* of a system is greater than the sum of its individual parts (von Bertalanffy, 1968). Consequently, when conceptualizing student-athlete health and well-being, because change in one part of a system

impacts all other parts, it is essential to consider each BPS domain from a systemic point of view with equal importance.

The premise of the BPS framework is that the *whole* person is comprised of many biological (genetics, physiology), psychological (cognition, emotion), and sociocultural (interpersonal relationships, cultural background) domains that are inextricably linked and systemically connected. Therefore, as Engel (1977) proposed, multiple levels of systems are simultaneously impacted by change at one level in the system. Accordingly, through a BPS perspective, biological effects of disease and illness can amplify or be exacerbated by psychological stress, which can then be impacted by relational or societal issues (Biderman, Yeheskel, & Herman, 2005; Engel, 1977). In other words, "each biological problem has psychosocial consequences and each psychosocial problem has biological correlates" (McDaniel, 1995, p. 117). Since Engel's (1977) seminal article, the BPS model has become a widely accepted framework for the conceptualization and treatment of various physical and mental health concerns (Suchman, 2005; White, 2005). Although it was not originally constructed for research purposes (Smith, Fortin, Dwamena, & Frankel, 2013), researchers have recently attempted to integrate the BPS model with GST to form a metatheory (Anchin, 2008) in hopes of offering a way to scientifically test the relationship both within and among various biological, psychological, and social health constructs.

Drawing on the theoretical underpinnings of Engel's BPS model (1977; 1980) and GST (von Bertalanffy, 1962; 1968), Anchin (2008) argued the need for research exploring the relationship within, between, and among BPS health domains from a systemic perspective. Through his proposed BPS systems metatheory, Anchin (2008) offered a framework for conducting and analyzing such research. For example, Anchin (2008) recommended that

researchers conceptualize both micro and macro levels of health on a continuum—rather than through a hierarchy—in which each BPS domain is viewed as equally important (e.g., mental health is no more/less important than physical health) when examining *whole* person health and wellness.

Among the student-athlete population, some researchers have already begun to highlight the significant interplay between various biological, psychological, and social health domains. For example, Armstrong and Oomen-Early (2009) found that the level of social support from family members, friends, teammates, and coaches may be a protective factor against various physical and psychological health outcomes for student-athletes. Additionally, Voelker (2012) discovered that pressure from friends, family members, coaches, teammates, and society to meet appearance-based aspects of sports competition (e.g., attaining a low body weight to achieve faster times) may be a contributing factor to the development and maintenance of disordered eating among student-athletes. Lastly, due to the overwhelming time demands of participating in intercollegiate athletics, student-athletes reported significantly higher rates of academic and relationship stress than their non-athlete counterparts (Wilson & Pritchard, 2005), which may be a contributing factor to the high prevalence rate of alcohol and illicit substance abuse in the student-athlete population (NCAA, 2013; Yusko, Buckman, White, & Pandina, 2008). Although the BPS systems metatheory (Anchin, 2008) provides a comprehensive and holistic lens through which to view most health phenomena, we assert that it is missing another integral domain related to an individual's overall health and well-being—spirituality.

Inclusion of Spirituality.

In addition to acknowledging the interplay between and among the BPS domains of one's health and functioning, Wright and colleagues (1996) proposed that spirituality must also be

considered when conceptualizing *whole* person health to account for the set of beliefs that inform one's meaning-making about health, illness, and life. Bryant (2007) asserted that the college years "represent an ideal moment in which to study intrapersonal, sociological, and educational forces that influence spiritual development" (p. 838) and results from national study highlighted that 77% of college students believe that all people are spiritual beings (Astin & Astin, 2004). Although the role of spirituality and spiritual practices among college-aged individuals has received increased attention during the past decade (Astin & Astin, 2004; Bryant, 2007; Chickering, Dalton, & Stamm, 2006; Gehrke, 2008), there has been much debate surrounding the definition, validity, and generalizability of spirituality as a scientific construct (Piedmont, Ciarrochi, Dy-Liacco, & Williams, 2009). However, in a recent study evaluating the cross-cultural generalizability and validity of spirituality as a psychometric construct (N = 4,325 from eight countries), MacDonald and colleagues (2015) postulated that, "…when defined and assessed quantitatively, spirituality may be viewed as a viable concept which empirically behaves in a similar manner across cultures" (p. 32). Despite student-athletes being recognized as a unique university sub-population who have distinctive college experiences compared to their non-athlete peers (Broughton & Neyer, 2001; Carodine, Almond, & Gratto, 2001), research exploring the role of spirituality among the student-athlete population is limited and warrants further investigation.

Given the intersection of physical (e.g., athletic injury), psychological (e.g., depression), social (e.g., balancing life as a student and an athlete), and spiritual (e.g., developing a sense of purpose) health experiences of NCAA student-athletes, the biopsychosocial-spiritual (BPSS) systems metatheory (Anchin, 2008; Wright et al., 1996) effectively connects the interplay between and among the BPSS domains of student-athlete health and wellness. Additionally, the

theory of toxic stress (National Scientific Council on the Developing Child, 2005; 2014; Shern et al., 2016) strengthens the conceptualization of how ACEs in particular impact the current BPSS health of student-athletes. The connection between the theory of toxic stress and health outcomes is detailed below.

Adverse Childhood Experiences and Toxic Stress Theory

In their landmark study, Felitti and colleagues (1998) were the first to highlight a dose-response relationship between adverse childhood experiences (ACEs) and poor physical (e.g., diabetes, heart disease) and mental (e.g., depression, substance abuse) health outcomes. In the decades since, hundreds of peer-reviewed journal articles have continued to support the link between ACEs and various adverse biopsychosocial (BPS) health concerns and risky health behaviors (Anda et al., 2006; Anda et al., 2008; Brown et al., 2009; Brown et al., 2010; Chapman et al., 2011; Clark et al., 2010; Dong et al., 2004; Dube et al., 2006; Edwards et al., 2007; Felitti & Anda, 2010; Whitfield, Dube, Felitti, & Anda, 2005). Due to the significant, long-term health ramifications of ACEs across many populations throughout the world, exposure to ACEs is recognized as a global health issue (Anda et al., 2010). Although the harmful consequences of ACEs have been well established, the concept of ACEs has not been consistently operationalized in the literature, which is crucial for its effective use in research and translation into practice (Meleis, 2011). However, in 2013, based upon results from their systematic review and an analysis of concept clarification (Norris, 1982), Kalmakis and Chandler offered the following operational definition for ACEs:

> Adverse childhood experiences are childhood events, varying in severity and often chronic, occurring within a child's family or social environment that cause harm or

distress, thereby disrupting the child's physical or psychological health and development (p. 1495).

The initial wave of ACEs research focused on abuse (i.e., emotional, physical, and sexual abuse), neglect (i.e., emotional and physical neglect), and household dysfunction (i.e., parental separation/divorce, domestic violence, mental illness/suicide, substance abuse/misuse, or incarceration of a household member; Anda et al., 2006; Felitti et al., 1998). However, researchers have recently advocated for the inclusion of expanded ACEs to be more inclusive of cultural, ethnic, and socioeconomic diversity. These additional ACEs include family financial problems, food insecurity, homelessness, prolonged parental absence, death of a parent/sibling, and exposure to peer or violent crime victimization (Cronholm et al., 2015; Mersky et al., 2017). Although it has been studied extensively over the past 20 years, ACEs research has been critiqued for lacking a theoretical basis (Kalmakis & Chandlet, 2014). However, in lieu of recent advances in neuroscience, genetics, and social and behavioral sciences, the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016) has emerged as a general theory to conceptualize the relationship between exposure to ACEs and subsequent health outcomes.

Toxic Stress Theory

The concept of "toxic stress" was first coined by the National Scientific Council on the Developing Child (2005) as a way to describe the effects of excessive stress responses on a child's developing brain, immune system, metabolic regulatory systems, and cardiovascular system. To best conceptualize the role of toxic stress, it is important to recognize that not all types of stress or stress responses are harmful to human development. For example, eustress, or "good stress," occurs when an individual maintains a positive perception of stressors (e.g.,

starting a new job), and may result in increased performance or motivation (Seyle, 1964, 1987). Conversely, distress occurs when a negative perception of a stressor takes place (e.g., unemployment) and may result in various physical, mental, and/or emotional health concerns (Seyle, 1964, 1987). The National Scientific Council on the Developing Child (2005/2014) identified three types of stress responses (referring specifically to the stress response systems' effects on the body): positive, tolerable, and toxic. Positive stress responses are considered an important part of healthy development and are characterized as brief, mild reactions to day-to-day stressors such as meeting someone for the first time. Tolerable stress responses occur as a result of longer-lasting stressors (e.g., death of a loved one) and are greater in severity. However, these stress responses are generally time-limited and are buffered by supportive relationships, which may mitigate potential negative developmental outcomes. Conversely, toxic stress responses occur when stressors are severe, chronic, and/or prolonged (e.g., abuse, neglect, caregiver substance abuse) in the absence of supportive/protective relationships.

According to the theory of toxic stress, exposure to toxic stress during childhood can cause structural remodeling of neural, endocrine, and immune systems via allostatic load and biological embedding (Danese & McEwen, 2012). Allostatic load refers to the "wear and tear on the body" that occurs as a result of repeated/chronic exposure to psychosocial stressors and adverse environments (McEwen & Wingfiled, 2003). Thus, allostatic load is believed to mediate the relationship between exposure to chronic stress in childhood and adverse health outcomes later in life (Danese & McEwen, 2012). Moreover, biological embedding is the process by which exposure to stressors during childhood affects anatomical and biological processes (i.e., "stress getting under the skin"), which impacts long-term health outcomes (Hertzman, 2013; Shonkoff, Boyce, & McEwen, 2009). These structural changes can persist into adulthood (Shonkoff, 2012)

and result in psychosocial concerns and other chronic illnesses (Shern et al., 2016). Within the context of the theory of toxic stress, ACEs—because of their timing, severity, and chronicity—can be conceptualized as toxic stressors. Consequently, individuals who experience ACEs—when critical periods of development transpire—are more prone to experience chronic physical and psychological health outcomes and engage in risky health behaviors across the lifespan (Chapman et al., 2004; Danese & McEwen, 2012; Edwards et al., 2003; Felitti et al., 1998; Monnat & Chandler, 2015; Shonkoff, 2010).

ACEs and Health Outcomes

It is estimated that nearly 60% of adults have experienced at least one ACE (Monnat & Chandler, 2015). The Adverse Childhood Experiences (ACE) Study (Felitti et al., 1998) was the first to highlight the link between ACEs and subsequent physical and psychological health outcomes and risky health behaviors. In the decades since, a robust body of literature continues to support this link. In the following paragraphs, we provide an overview of the impact of ACEs on physical and psychosocial health outcomes and risky health behaviors across the lifespan.

Impact of ACEs on physical health. Over the past two decades, researchers have established a link between ACEs and several chronic diseases that consistently represent the leading causes of death in the U.S. For example, a growing body of evidence has shown a link between ACEs and cancer (Brown et al., 2010; Brown, Thacker, & Cohen, 2013) cardiovascular disease (Dong et al., 2003; Monnat & Chandler, 2015), chronic obstructive pulmonary disease (Anda et al., 2008; Cunningham et al., 2014), diabetes (Monnat & Chandler, 2015), obesity (Williamson et al., 2002), hypertension (Riley et al., 2010), autoimmune disease (Dube et al., 2009), and experiencing a stroke (Gilbert et al., 2015). Additionally, individuals with a history of ACEs experience higher rates of gastrointenstinal disorders, chronic pain syndromes, and

neuromuscular disorders (Chartier, Walker, & Naimark, 2009; Kendall-Tackett, 2000; Sachs-Ericsson, Kendall-Tackett, & Hernandez, 2007). Although studied less frequently than other health-related constructs, there also appears to be a positive association between ACEs and somatic complaints (e.g., headaches, nausea, chronic pain; Samelius, Wijma, Wingren, & Wijma, 2007). For example, several research groups found that rates of somatization disorder and other medically unexplained somatic symptoms were higher among participants who endorsed childhood adversity (Allen, 2008; Anda et al., 2010). Moreover, some evidence suggests that individuals with a history of ACEs have a shorter life expectancy. Brown and colleagues (2009) found that individuals who reported six or more ACEs died an average of 25 years earlier compared to those who endorsed no ACEs. In addition to the multitude of adverse physical health conditions and diseases impacted by ACEs, researchers have also highlighted the negative impact of ACEs on psychosocial health outcomes throughout the lifespan.

Impact of ACEs on psychosocial health. In addition to ACEs being inversely related to physical health conditions and diseases, a large body of evidence has shown a robust relationship between ACEs and deleterious psychosocial outcomes. For example, exposure to ACEs has been linked to depression in both adolescent and adult populations (Campbell, Walker, & Egede, 2016; Karatekin, 2018; Merrick et al., 2017; Mersky, Topitzes, & Reynolds, 2013; Lee & Chen, 2016; Schilling et al., 2007). ACEs have also been linked to anxiety (Karatekin, 2018; Mersky et al., 2013), social isolation (Elliott et al., 2005; Schilling et al., 2007), decreased life satisfaction (Mersky et al., 2013), reduced self-esteem (Oates, 1984), increased rates of hostility and anger (Teicher et al., 2006), underperformance in school (Kiesel, Piescher, & Edleson), and suicide (Brockie et al., 2015; Dube et al., 2001; Karatekin, 2018; Merrick et al., 2017). Researchers have highlighted a dose-response relationship between number of reported ACEs and negative

psychosocial health outcomes (e.g., Forster, Gower, Borowsky, & McMorris, 2017; Merick et al., 2017). Strikingly, Merrick and colleagues (2017) found that participants who reported more than five ACEs were 24.36 times more likely to attempt suicide. Exposure to ACEs has also been linked to engagement in risky behaviors (e.g., substance use/abuse) which is detailed below.

Impact of ACEs on risky behaviors. In addition to the deleterious impact of ACEs on physical and psychosocial health outcomes, researchers continue to highlight a strong link between ACEs and health risk behaviors in adolescence and adulthood. A growing body of research has demonstrated strong links between ACEs and alcohol use/abuse (Brady & Back, 2012; Dube et al., 2002; Dube et al., 2006; Lee & Chen, 2017; Merrick et al., 2017; Mersky et al., 2013), tobacco use/abuse (Anda et al., 1999; Mersky et al., 2013; Spratt et al., 2009), illicit drug use/abuse (Dube et al., 2002; Merrick et al., 2017; Nomura et al., 2012; Schilling et al., 2007), and prescription drug abuse (Forster et al., 2017). Consistent with the physical and psychosocial health outcomes, there appears to be a dose-response relationship between ACEs and alcohol, tobacco, and drug abuse. For example, individuals who endorsed four of more ACEs had a 6.2-fold increase in alcohol use during early adolescence, and two-, three-, and four-fold increases in heavy drinking, self-reported alcohol problems, and alcoholism, respectively, during adulthood (Dube et al., 2006). Similarly, each endorsed ACE resulted in a two to four-fold increase in illicit drug before the age of 14, and individuals who reported five or more ACEs were seven to ten times more likely to endorse drug use problems (e.g., drug addiction; Dong et al., 2003; Dube et al., 2003). In addition to increased likelihood of drug use/abuse, ACEs have been linked to increased physical inactivity (Felitti et al., 1998; Monnat & Chandler, 2015) obesity (Felitti et al., 2998), self-harm (Baiden, Stewart, and Fallon, 2017), and sexually transmitted diseases and number of sexual partners (Hillis et al., 2000).

ACEs and student-athlete health. As detailed above, there is a robust amount of research examining the relationship between ACEs and BPS health outcomes in the general population. However, research exploring this relationship in the intercollegiate student-athlete population has received less attention. In one study, 30.8% of the Division I NCAA student-athletes surveyed ($N = 304$) reported experiencing at least one ACE ($M = 2.1$, $SD = 1.5$; Kaier, Cromer, Davis, & Strunk, 2015). Consistent with findings from research with other populations, the authors found that ACEs were positively associated with somatization disorder, problematic alcohol use, and prescription medication use. Specifically, compared to those who endorsed no or one ACE, student-athletes who reported multiple ACEs were 3.9 times more likely to report physical health symptoms and more than two times more likely to report problematic alcohol and prescription medication use. In another study, Barnard, Athey, Killgore, Alfonso-Miller, and Grandner (2018) found that in a sample of Division I NCAA student-athletes ($N = 189$), ACEs were associated with worse self-reported insomnia, sleep quality, and shorter sleep duration. The authors highlighted that mental health (e.g., depressive and anxiety symptoms) mediated the relationship between ACEs and insomnia and sleep quality. Additionally, of the eight ACEs assessed in their study, Barnard and colleagues (2018) found that "feeling alone" had the strongest individual impact on the sleep outcomes of interest. Taken together, these findings highlight the profound impact of ACEs on a myriad of physical and psychosocial health outcomes, many of which are concerns faced by today's NCAA student-athletes. However, to fully understand the potential impact of ACEs on health outcomes among NCAA student-athletes, it is essential to review the current literature examining their BPSS health challenges.

The Biopsychosocial-Spiritual Health of NCAA Student-Athletes

With nearly 500,000 student-athletes competing in 24 sports throughout the country each year, participation in NCAA varsity sports is at an all-time high (NCAA, 2018). For many student-athletes, participation in sports may be a rewarding experience that aids in the development of important life skills such as personal responsibility, teamwork, and work ethic (NCAA, 2015). However, the demands and requirements of being a full-time university student and elite athlete present unique challenges for student-athlete participants. In addition to the common challenges experienced by their non-athlete university peers (e.g., moving away from home, meeting the demands of college coursework), student-athletes are exposed to additional stressors that increase their risk for various biological (e.g., exposure to injury), psychological (e.g., anxiety), social (e.g., relationship challenges), and spiritual (e.g., developing a sense of purpose/identity) health concerns (Bauman, 2016; Donohue et al., 2007; Neal et al., 2013; Wiese-Bjornstal, 2010).

Biological Health of Student-Athletes

In addition to in-season competition against other individuals and/or teams, participation in intercollegiate sports requires demanding year-round training (e.g., weight training, conditioning) and practicing. As a result, student-athletes are regularly exposed to, and at risk for, sustaining an injury or experiencing symptoms of burnout (e.g., physical exhaustion, diminished performance; Neal et al., 2013). In fact, researchers estimate that over 50% of collegiate athletes will sustain at least one sport-related injury during their collegiate playing years (Yang et al., 2007; Hootman et al., 2007), resulting in hundreds of thousands of NCAA student-athletes sustaining sport-related injuries of varying degrees each year (Kerr et al., 2015). Due to recent media coverage of chronic brain encephalopathy (CTE) and the established long-

term adverse psychological effects (e.g., depression), research examining the prevalence and effects of sport-related concussions among intercollegiate student-athletes has received increased attention (Guskiewicz et al., 2007; Kreutzer, Seel, & Gourley, 2001). Statistics from the NCAA indicate that across the 24 NCAA varsity sports teams, concussions account for nearly 7% of all documented injuries (Kerr et al., 2015). Although participation in sports increases the chance of sustaining an injury (Kahlenberg, Nair, Monroe, Terry, & Edwards, 2016), many injuries may also occur as a result of overtraining.

For some time, coaches have adopted the "more is better" approach to training athletes. However, without ample recovery time, athletic performance may suffer and student-athletes may eventually reach a state of burnout—characterized by the absence of motivation and complete mental and physical exhaustion (Vetter & Symonds, 2010). In one study, student-athletes reported engaging in 10 to 13 hours of moderate to high intensity training, four hours of light intensity training, and four hours of leisure physical activity per week (Vetter & Symonds, 2010). In the same study, over 50% of the student-athletes reported having a chronic injury, and many reported frequent physical and mental exhaustion during both the competition season and off-season due to their rigorous training regimens (Vetter & Symonds, 2010). Other research teams have also highlighted the injury risk among student-athletes resulting from overtraining. For example, Yang and colleagues (2012) found that repeated movements during long training sessions accounted for nearly 30% of all injuries sustained by student-athletes in their study (N = 573), with the majority (over 60%) of overuse injuries (e.g., stress fractures, tendinitis) occurring in female athletes. Another factor that may play a vital role in the injury prevalence and physical health functioning among student-athletes is sleep.

It has been well documented that disturbed/inadequate sleep has deleterious effects on one's physical health and athletic performance due to increased cortisol levels (the "stress" hormone) and decreased production of glycogen and carbohydrates—important sources of energy recruited during physical activity (The National Sleep Foundation, 2016). Additionally, Fullagar and colleagues (2015) highlighted a strong relationship between poor sleep quality and autonomic nervous system imbalance, immune system dysfunction, and slower and less accurate cognitive performance. Although the amount of sleep necessary for optimal cognitive, emotional, and physical development and functioning remains unclear, many experts recommend eight hours of sleep per night (Van Dongen, Maislin, Mullington, & Dinges, 2003). However, across all NCAA divisions, student-athletes reported sleeping an average of just over six hours on a typical weeknight during their sport season (NCAA, 2015). Additionally, more than half of student-athletes reported poor quality of sleep, stating that they felt rested between zero and three days during the past week (NCAA, 2015). These reports are consistent with findings from other studies highlighting the poor quality of sleep among student-athletes. For example, Armstrong and Oomen-Early (2009) found that student-athletes reported only two days of rested sleep per week. The lack of sleep quantity and poor sleep quality is concerning given the amount of physical, mental, and emotional stress student-athletes endure on a regular basis. Moreover, the combination of overtraining and under-sleeping may increase the possibility of physical and mental exhaustion, decreased energy, and poor focus—factors that may contribute to both the prevalence of, and recovery from, sustained injuries. Sustaining an injury, overtraining, and getting inadequate sleep also puts student-athletes at an increased risk of experiencing a number of psychological health concerns, which will be described in further detail below.

Psychological Health of Student-Athletes

The increasing prevalence of various types and severity of mental health conditions among the young adult U.S. population is a growing concern. Researchers estimate that one in five young adults (ages 18-25) experience some form of mental illness such as depression or anxiety (Locke, Wallace, & Brunner, 2016); however, the nature and prevalence of mental health disorders in the student-athlete population is unclear. For some, participation in college sports may improve their self-confidence, self-esteem, and social support system (Armstrong, Burcin, Bjerke, & Early, 2015). However, due to the rigorous time commitments and immense pressure to perform at a high level both on the field and in the classroom (Brown, 2014), many student-athletes may develop or exacerbate an existing mental health illness. In the paragraphs below, we detail the existing literature related to the following common mental illnesses/concerns experienced by NCAA student-athletes: depression, anxiety, psychological stress, and substance use/abuse.

Depression. Current trends indicate that the overall self-reported happiness of male and female student-athletes has significantly decreased during the past decade (NCAA, 2011). A survey of university athletic trainers found that 77% reported managing mood disorders (e.g., depression) among the student-athletes under their care (NCAA, 2010). Due to the growing concern related to the mental health and well-being of NCAA student-athletes, researchers have given increased attention to the severity and prevalence of depression in this population. Data from the National College Health Assessment (NCHA, as cited in NCAA GOALS Study, 2011), showed that 21% of male student-athletes (n = 1,623) and 28% of female student-athletes (n = 3,303) reported that they felt “so depressed that it was difficult to function” in the last 12 months. Similarly, in a study of male (n = 199) and female (n = 263) student-athletes participating in a

variety of NCAA Division I sports, Wolanin and colleagues (2016) found that nearly 25% of the participants endorsed clinically relevant depressive symptoms (i.e., scores greater than 15 on the Center for Epidemiological Studies Depression Scale). In a 2017 study, Li, Moreland, Peek-Asa, and Yang found that 22% of the 958 student-athletes endorsed depressive symptoms. Of those who reported depressive symptoms, nearly half (48.5%) endorsed comorbid symptoms of anxiety. Another noteworthy finding was the link between depression and sustaining a sport-related injury, with nearly a quarter of the documented injuries occurring among student-athletes who endorsed depressive symptoms (Li et al., 2017). Consistent with other studies highlighting gender differences in reported depression (e.g., Storch et al., 2005; Yang et al., 2007), both Wolanin et al. (2016) and Li et al. (2017) found that female student-athletes were more likely to endorse depressive symptoms compared to their male counterparts. Of even greater concern is the incidence and causes of sudden death in the student-athlete population. Between the years of 2002 and 2011, death by suicide and/or drugs accounted for nearly 30% of all sudden deaths among NCAA student-athletes (Maron et al., 2014). These findings are consistent with a substantial body of literature highlighting the comorbidity of depression with other mental health concerns such as anxiety and stress (Kessler et al., 2005; Pollack, 2005).

Anxiety. Anxiety is another growing psychological concern for student-athletes. Anxiety disorders are recognized as the most common mental health disorder in the U.S., affecting an estimated 20% of the adult population each year (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). Among adolescents (ages 15-18) and young adults (ages 18-29), the prevalence of anxiety disorders is even greater, impacting approximately 32% and 22.3%, respectively (Merikangas et al., 2010). Although anxiety disorders (e.g., generalized anxiety disorder, panic disorder) have been minimally studied among NCAA student-athletes (Reardon & Factor, 2010),

emerging research supports the high prevalence of potential anxiety disorders in this population. In one study, over 85% of university athletic trainers indicated that anxiety was a notable concern among student-athletes on their university campuses (Brown, 2014). Additionally, Li, and colleagues (2017) found that nearly 30% of male and female student-athletes reported anxiety symptoms. The authors also highlighted strong link between anxiety and athletic injury, noting that over half (52.8%) of the injuries occurred among athletes who endorsed anxiety symptoms. Furthermore, data collected from the National College Health Assessment revealed that one-third of male student-athletes (n = 2,439) and nearly half of female student-athletes (n = 5,747) reported feeling "overwhelming anxiety" in the last 12 months (As cited in NCAA GOALS Study, 2011). Additionally, results from the 2015 NCAA GOALS study showed that 30% of student-athletes (N = 21,233) reported feeling "inextricably overwhelmed" during the past month.

Psychological stress. The demands and challenges of being both a student and an athlete can have a profound impact on psychological stress experienced by student-athletes. Results from the American College Health Association- National College Health Assessment (ACHA-NCHA; 2016) revealed that the most prominent stressors reported by student-athletes were related to academic challenges, intimate relationships, other social relationships, finances, and sleep difficulties (American College Health Association, 2016). Consistent with these findings, Seunghayn and Yougjun (2016) found that the greatest stressors endorsed by student-athletes were factors related to academics, physical well-being, and diminished social life. In addition to sport-specific stressors (e.g., time demands, pressure to perform), student-athletes encounter stressors that are common for many young adult university students such as navigating career preparation and developing interpersonal skills, self-sufficiency, and independence (Etzel, 2009).

Recognizing, and helping student-athletes cope with these stressors is important because, as Ford, Eklund, and Gordon (2000) purported, "…athletes with high life stress, poor coping skills or behavior, or low social support appear more vulnerable to injury" (p. 302). Similar to anxiety, there is evidence to support the link between life stress and sustaining a sport-related injury (Kleinert, 2007; Mann et al.. 2016; Yusko et al., 2008). In addition to stress impacting student-athletes' physical health, academic performance, and social lives, another growing concern related to psychological stress in the student-athlete population is the use/abuse of alcohol and other substances as potential coping mechanisms.

Substance use and abuse. Excessive alcohol consumption, negative alcohol-related consequences and behaviors, and abuse of stimulant and narcotic medications are recognized as major health concerns in the student-athlete population (Wechsler et al., 2002). A growing body of research indicates that student-athletes engage in more problematic drinking behaviors compared to their non-athlete peers. For example, Martens, Dams-O'Connor, and Beck (2006) found that college athletes consumed more alcohol, engaged in more frequent heavy episodic drinking, and experienced more negative consequences related to alcohol use (e.g., regretting one's actions, getting hurt/injured) compared to non-athlete college students. Similarly, Ford (2007) found that, compared to the general student population, student-athletes viewed alcohol use as being more normative and were more likely to report binge drinking—defined as consuming five or more alcoholic drinks in one sitting (National Institute of Alcohol Abuse and Alcoholism, 2017). Results from the 2010 NCAA GOALS survey indicated that 40% of Division I male student-athletes reported drinking—in one sitting—more than five drinks and 15% reported drinking ten or more drinks. Among Division I females, 32% said they had more than four drinks in one sitting. Division III student-athletes reported the greatest alcohol abuse, with

50% of males and 38% of females reported drinking more than five and four drinks in one sitting, respectively, and 20% of males reported drinking ten or more drinks in one sitting.

Although the reasons for the problematic drinking behavior among student-athletes are unclear, a number of researchers have found a potential link between non-sport specific factors (e.g., being a White male, involvement in fraternities/sororities, drinking motives) and problematic alcohol use among student-athletes (Leihliter et al., 1998; Meilman et al., 1999; Martens, Cox, & Beck, 2003). Moreover, several theorists have postulated that various factors specific to being a student-athlete may better explain the excessive alcohol consumption in the student-athlete population (see Martens et al., 2006). These sport-specific factors include, but are not limited to, pressure and stress related to being a student and an athlete, coping with physical pain/injury, dealing with the emotional highs and lows of athletics, and pressure from coaches to perform at a high level (Morse, 2013). In support of these hypotheses, Miller, Miller, Verhegge, Linville, and Pumariega (2002) discovered a dose-dependent relationship between alcohol abuse and symptoms of depression and anxiety ($N = 262$).

In addition to alcohol abuse, there has been an emergence of other drug use, such as marijuana and prescriptions narcotics and stimulants, among student-athletes. Data from the 2010 NCAA GOALS study revealed an increase in both prescription and non-prescription use of stimulant medications (e.g., Adderall) and narcotic pain medications. Additionally, in a survey of nearly 21,000 NCAA student athletes, nearly one-fourth (22%) reported using marijuana in the past year (NCAA, 2013). Although nearly 60% of student-athletes ($N = 19,676$) who endorsed alcohol/drug use believed that their alcohol/drug use had no effect on their athletic performance or health in general, nearly one-third (30%) reported performing poorly in practice or a game due to their alcohol/drug use (NCAA Study of Substance Use of College Student-Athletes, 2005).

Taken together, these findings highlight the growing concerns related to the psychological health of student-athletes. In addition to the above-mentioned psychological health concerns, student-athletes are also faced with various social challenges and stressors, which will be described below.

Social Health of Student Athletes

Due to their increased visibility in the community and generally diverse nature, student-athletes represent a distinctly identifiable subpopulation on university campuses (Etzel et al., 2006). Although student-athletes are faced with many of the same academic, emotional, and social goals and concerns as their non-athlete peers (Broughton & Neyer, 2001), they are also expected to manage several unique challenges associated with participation in their particular sport. Among the many social adjustments and challenges that are unique to student-athletes are the rigorous time demands, pressure to perform, and finding a sense of belonging.

Time demands. Making the transition from high school to college can be a stressful time for young adults as they adjust to new routines that require balancing a host of responsibilities (e.g., work, study, social life). Perhaps the greatest adjustment faced by student-athletes is the demanding time commitments required to excel as both a student and an athlete. In addition to maintaining a full course load as a full-time university student and meeting GPA requirements to remain academically eligible, student-athletes are required to devote a significant amount of time to practice, training, film study, physical therapy, and many other sport-related activities (Martens et al., 2006). In an effort to enhance the feasibility of the student-athlete dichotomy, the NCAA implemented rules and limitations regarding the amount of time student athletes are allowed to train/practice for their sport (e.g., "the 20-hour per week" rule) during in-season competition and off-season training. However, according to self-reports from NCAA

student-athletes, these time limitations are grossly surpassed. Results from the 2010 NCAA GOALS survey revealed that Division I athletes spend upwards of 40 hours per week on athletic activities in season. Further, female and male student-athletes reported spending up to 77 (women's basketball players) and 81 (football players) hours per week on athletic and academic activities combined. Moreover, more than half (55%) of the female student-athletes and close to three-fourths (70%) of male student-athletes reported spending as much or more time on athletic activities during the off-season. Given these overwhelming time constraints, it is not surprising that student-athletes report significantly higher rates of academic stress and relationship stress than their non-athlete counterparts (Wilson & Pritchard, 2005). These time demands may also pose a threat to the development of a student-athlete's social life, interpersonal relationships, life experiences, and identity formation outside of athletic and academic contexts.

Pressure to perform. An additional social concern for student-athletes is the pressure from family members, friends, teammates, coaches, and fans to perform at a high level athletically. Results from a large NCAA (2015) survey revealed that the pressure to excel in sports was felt by most student-athletes long before arriving on university campuses, with many specializing in their college sport by the age of 12. Similarly, a majority of NCAA student-athletes feel pressure from parents and other family members to play college sports from a young age (NCAA, 2015). These early family expectations appear to carry over in the form of unrealistic expectations to play at the professional level following college. For example, although a very small percentage of college athletes go on to play professionally (about 2% of athletes from all NCAA men's and women's sports teams), the majority of Division I student-athletes from many sports teams (78% Men's Ice Hockey, 73% Men's Basketball / 47% Women's Basketball, 72 % Men's Golf / 41% Women's Golf, 64% Football, 53% Men's Soccer, 49%

Baseball) expect to go pro in their sport (NCAA, 2015). In addition to familial pressures to compete at the collegiate and professional level, a number of cultural factors amplify the pressure of different ethnic groups to participate in competitive athletics. Researchers have highlighted that Black student-athletes in particular may be socialized to value sports over academics during their childhood (Beamon & Bell, 2006; Benson, 2000). As a result, many Black athletes—males in particular—may grow up with the belief that participation in athletics will provide them with the greatest chance to succeed in life (Harrison, Harrison, & Moore, 2002). Consequently, student-athletes, particularly those of color, may view themselves as "athlete-students" (Beamon, 2008, p. 356) to emphasize the importance of their athletic identity over their statuses as students, potentially resulting in increased alienation from their peers.

Sense of belonging. For many, transitioning to college is the first extended time away from home and serves as the first step towards developing an adult identity. Because student-athletes devote much of their time to athletic achievement in college, many develop a strong personal identity around their involvement in sport (i.e., athletic identity; Brewer, Van Raalte, & Linder, 1993). Additionally, due largely to extensive media publicity, student-athletes may have a reputation for "improper behaviors and poor character…[such as] cheating scandals, drugs, violence, disrespect, and other inappropriate behaviors in sport, have almost become expected or the norm" (Doty, 2006, p. 1). As a result, there is a level of separation among student-athletes and the rest of university students (Cooper, Davis, & Dougherty, 2017).

Results from a 2015 NCAA GOALS study showed that a majority of male and female student-athletes reported having a sense of belonging at their respective universities, felt that their coaches and teammates created an inclusive team environment, and felt that their coaches and teammates were accepting of individuals from diverse racial or ethnic backgrounds.

However, non-White student-athletes reported feeling less likely to find the university campus and team environments inclusive and accepting. These findings are consistent with other literature indicating that athletes of color encounter a range of unique social challenges due to their race, gender, and athletic status, which may result in increased levels of social isolation (Davis & Cooper, 2014). Moreover, minority student-athletes may be at an increased risk of feeling lonely, unwelcome, and isolated from the rest of campus due to stereotypical and discriminatory behaviors (e.g., "dumb jock") from professors and other students (Comeaux, 2010; Melendez, 2008) in addition to various forms of institutional racism (Coakley, 2009).

The level of social support from family members, friends, teammates, and coaches has been found to be a protective factor against various physical and psychological student-athlete health outcomes (Armstrong & Oomen-Early, 2009). For example, Malinauskas (2010) found that higher perceived stress following an injury was associated with diminished life satisfaction for student-athletes who sustained a major injury. However, results revealed that student-athletes who perceived having higher levels of social support from family members, friends, and significant others following an injury, were significantly more likely to report higher levels of life satisfaction following the injury. Interestingly, student athletes' perceived support from their significant other accounted for the greatest difference in life satisfaction, followed by friends and family members. These findings are consistent with existing research illustrating that people who are more socially connected report less psychological distress, such as depression and low self-esteem, than those who are less socially connected (Hamarat et al., 2002; Warren et al., 1996).

Mental health help-seeking among student-athletes. Another noteworthy topic within the social construct of the student-athlete experience is the utilization of mental health services. Compared to their university peers, student-athletes are less likely to seek help for mental health

concerns, which may put them at even greater risk for exacerbating or developing a mental illness (Watson, 2005). Researchers have identified several barriers for student-athletes seeking mental health care. Gulliver, Griffiths, and Christensen (2012) revealed that the greatest obstacles to seeking mental health services among student-athletes included stigma (e.g., viewing depression or help-seeking as a sign of weakness), lack of mental health literacy, lack of time, difficulty or unwillingness to express emotion, and negative past experiences. Additional barriers to seeking treatment for mental health concerns include increased feelings of shame, being accustomed to working through pain, and a fear of social status being negatively affected for seeking mental health support services (Neal et al., 2013; Putukian, 2015; Reardon & Factor, 2010).

Conversely, there are a number of facilitators that may aid student-athlete mental health seeking. In particular, Gulliver et al. (2012) noted that having an established relationship with a mental health provider, receiving encouragement from trusted relationships, and perceiving positive attitudes of others towards seeking help were the greatest help-seeking facilitators. Further, the authors found that student-athletes rely heavily on the attitude, encouragement, and support of their coach to seek help from mental health providers, outranking all other sources of student-athlete support including friends, family members, and teammates. Lastly, student-athletes are more likely to seek help from mental health providers when trusted sources (i.e., coaches, athletic trainers, teammates) normalize the prevalence and treatment of mental health issues (Gulliver et al., 2012).

Spirituality and Student-Athletes

Many strong arguments have been made both for and against the utility of spirituality as a scientific construct. Many researchers have argued that spirituality is a complex,

multidimensional phenomenon that is difficult to test empirically because of its many definitions and the difficulty in distinguishing it from other constructs (e.g., religiosity, personality, well-being; Cook, 2004; Hill et al., 2000; Koenig, 2008; Moberg, 2002). Moreover, Piedmont (1999) argued that to be deemed a scientific construct, spirituality must demonstrate significant predictive power above and beyond that of other personality and health-related constructs. However, though it may not be scientifically possible to confirm the existence of an existential source/being, there is evidence that spirituality, when defined and assessed quantitatively, is considered to be a valid scientific construct across various cultures (MacDonald et al., 2015). Additional findings from Piedmont (2007) revealed that spirituality evidenced a broad range of predictive power even after controlling for the effects of personality (i.e., made a unique contribution), suggesting that spirituality "…is a significant, universal, motivational quality that exists in all cultures" (p. 102). Nevertheless, spirituality remains a recognized area of scientific inquiry, and continues to receive increased attention across various fields, particularly in the context of BPS health and well-being (Koenig, 2012).

To date, spirituality—defined broadly as one's search for meaning, purpose, and the "pursuit toward interconnectedness with self, others, community, and a higher power" (Raikes, 2010, p. 17)—has been linked to better physical, psychological, and social health outcomes. In a systematic review of over 3,000 peer-reviewed studies, Koenig (2012) found among the studies with the greatest methodological rigor that the overwhelming majority revealed a link between spirituality and better mental health (e.g., decreased depression and anxiety, improved self-esteem), life satisfaction, decreased completed/attempted suicide, decreased alcohol and drug use/abuse, and increased social support. Results also highlighted associations between spirituality and several physical health issues including greater self-rated health and lower risk of

cancer, coronary heart disease, hypertension, and dementia. Lastly, Koenig (2012) revealed that spirituality was helpful for individuals coping with adversities, such as a variety of physical and psychiatric illnesses, in addition to other adverse life situations. Although the impact of spirituality has been studied extensively in various populations, it has received less attention among the student-athlete population.

The few studies that have examined the impact of spirituality among NCAA student-athletes, spiritualty may aid in improved performance on the field/court and recovery from athletic injuries. For example, McKnight and Juillerat (2011) found that a large majority of university athletic trainers agreed that addressing the spiritual concerns of student-athletes (e.g., listening to the injured athlete's spiritual views) resulted in a more positive outcome when treating an injury (e.g., faster return to play). Additionally, researchers have examined the relationship between spirituality and the "flow" experience—a phenomenon in athletic competition defined as, "an optimal psychological state in which complete absorption in the task at hand leads to a number of positive experiential qualities" (Jackson, 2000, p. 140). For example, Dillon and Tait (2000) discovered a significant, positive, relationship between spirituality (i.e., experiencing the presence of a power, an energy, or a God) and "being in the zone" during sports competition (p. 93). These findings suggest there may be a connection between spirituality, athletic performance, and various BPS domains of student-athlete health. Additionally, there is evidence that spirituality may serve as a healthy coping strategy for those who have experienced stressful experiences. Pargament and Mahoney (2005) found that those who viewed traumatic life experiences through a spiritual lens were able to better cope with those crises. Thus, spirituality may buffer the effects of ACEs on subsequent BPS health outcomes; however, further research is needed to test this hypothesis.

Discussion

The BPSS systems metatheory (Engel, 1977, 1980; Wright, Watson, & Bell, 1996) provides a strong theoretical foundation to conceptualize the interplay between and among the BPSS health domains among NCAA student-athletes. Additionally, the theory of toxic stress (National Scientific Council on the Developing Child, 2005; 2014; Shern et al., 2016) presents a theoretical framework to inform how ACEs specifically impact the BPSS health of NCAA student-athletes. In response to the increasing concern regarding student-athletes' mental/psychological health and risky behaviors, the NCAA Sport Science Institute encouraged researchers to conduct more studies focused on improving the overall health and well-being of student-athletes. Among the studies that examined the prevalence and severity of BPS health concerns of student-athletes, a notable limitation is the racially homogenous samples (i.e., mostly White student-athletes), which does not accurately reflect the racial and ethnic diversity of NCAA sports participants (NCAA, 2018). Future research needs to seek to identify barriers specific to different races and ethnicities in order to highlight culturally proficient ways to address the BPSS health concerns and disparities experienced by student-athletes.

Additionally, as highlighted in this review, there is a substantial body of literature supporting the link between ACEs and subsequent negative physical and psychosocial health outcomes, in addition to increased risky health behaviors. Yet, in the writing of this review, the author was only able to locate two articles that explored the impact of ACEs on health outcomes among NCAA student-athletes (Barnard et al., 2018; Kaier et al., 2015). Given that student-athletes are recognized as an at-risk group for risky behaviors (e.g., substance abuse) and various physical and psychosocial concerns, it is vital to investigate how ACEs influence these BPS health outcomes.

Researchers have also highlighted the importance of spirituality among college-aged individuals (Astin & Astin, 2004). Among student-athletes, spirituality is associated with recovery from injury and increased performance. Although researchers have highlighted a link between various biological (sustained injury) and/or psychosocial (depression) health outcomes among NCAA student-athletes, there is currently no research exploring the interplay between and among all domains of health and wellness—biological, psychological, social, *and* spiritual. Therefore, it is essential for researchers to examine this complex interplay in this population to develop a more comprehensive understanding of student-athlete health and wellness from a holistic perspective.

Conclusion

The purpose of this review was to explore the available literature concerning the common BPSS challenges and concerns that are unique to NCAA student-athletes, and the impact of ACEs on subsequent health outcomes. Due to the unique demands and stressors of being an elite-level athlete and full-time university student, NCAA student-athletes are recognized as a "high-risk" subculture for physical health concerns (e.g., overtraining, athletic injuries), psychosocial health issues (e.g., depression, anxiety), and maladaptive health behaviors (e.g., substance use/abuse) (Etzel, Watson, Visek, & Maniar, 2006). Thus, it could be that balancing the dual roles as both a student and an athlete heightens many unique BPSS challenges and stressors faced by student-athletes. However, despite the many BPSS health challenges experienced by student-athletes, many of these challenges remain silent due to the lack of help-seeking behaviors among this population. Although there is a growing body of research exploring the (a) impact of ACEs on health outcomes in various populations, and (b) BPSS health and well-being of NCAA student-athletes, there are considerable gaps in the extant literature. Informed by the themes and

gaps in the literature highlighted in this review, there is a need to further study interplay between ACEs and the BPSS health outcomes among student-athletes. Additionally, due to the diverse nature of NCAA student-athletes (NCAA, 2018), ACEs research with this population should include second-generation ACEs (e.g., financial problems, food insecurity, homelessness, parental absence, parent/sibling death, peer victimization, and being a the victim of a violent crime; Mersky et al., 2017) to best reflect the ethnic, cultural, and socioeconomical diversity among NCAA student-athletes. Lastly, there is a need to further explore the role and impact of spirituality on the BPS health of student-athletes. Specifically, researchers need to explore the utility (e.g., predictor variable, outcome variable, mediator/moderator) of spirituality in the context of overall health.

REFERENCES

Allen, B. (2008). An analysis of the impact of diverse forms of childhood psychological maltreatment on emotional adjustment in early adulthood. *Child Maltreatment, 13*, 307-312. doi: 10.1177/1077559508318394.

Anchin, J. C. (2008). Pursuing a unifying paradigm for psychotherapy: Tasks, dialectical considerations, and biopsychosocial systems metatheory. *Journal of Psychotherapy Integration, 18*(3), 310-349. doi:10.1037/a0013557

Anda, R. F., Brown, D. W., Dube, S. R., Bremner, J. D., Felitti, V. J., & Giles, W. H. (2008). Adverse childhood experiences and chronic obstructive pulmonary disease in adults. *American Journal of Preventive Medicine, 34*(5), 396-403. doi:10.1016/j.amepre.2008.02.002

Anda, R. F., Butchart, A., Felitti, V. J., & Brown, D. W. (2010). Building a framework for global surveillance of the public health implications of adverse childhood experiences. *American Journal of Preventive Medicine, 39*(1), 93-98. doi:10.1016/j.amepre.2010.03.015

Anda, R. F., Croft, J. B., Felitti, V. J., Nordenberg, D., Giles, W. H., Williamson, D. F., & Giovino, G. A. (1999). Adverse childhood experiences and smoking during adolescence and adulthood. *Jama, 282*(17), 1652-1658. doi:10.1001/jama.282.17.1652

Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C., Perry, P. D., … Giles, W. H. (2006). The enduring effects of abuse and related adverse experiences in childhood: A convergence of evidence from neurobiology and epidemiology. *European Archives of Psychiatry and Clinical Neuroscience, 256*, 174-186. doi:10.1007/s00406-005-0624-4

Armstrong, S. N., Burcin, M. M., Bjerke, W. S., & Early, J. (2015). Depression in student athletes: A particularly at-risk group? a systematic review of the literature. *Athletic Insight, 7*(2), 177.

Armstrong, S., & Oomen-Early, J. (2009). Social connectedness, self-esteem, and depression symptomatology among collegiate athletes versus nonathletes. Journal of American College Health, 57(5). 521-526.

Astin, A., & Astin, H. (2004). *The spiritual life of college students: A national study of college students' search for meaning and purpose*. Los Angeles, CA: UCLA Higher Education Research Institute.

Baiden, P., Stewart, S. L., & Fallon, B. (2017). The role of adverse childhood experiences as determinants of non-suicidal self-injury among children and adolescents referred to community and inpatient mental health settings. *Child Abuse & Neglect, 69*, 163-176. doi:10.1016/j.chiabu.2017.04.011

Barnard, S., Athey, A., Killgore, W. D., Alfonso-Miller, P., & Grandner, M. A. (2018). 0962 adverse childhood experiences among student athletes are associated with sleep disturbances: Evaluating the mediating roles of depression and anxiety. *Sleep, 41*(suppl_1), A357-A357. doi:10.1093/sleep/zsy061.961

Beamon, K., & Bell, P. A. (2006). Academics versus athletics: An examination of the effects of background and socialization on african american male student athletes. *The Social Science Journal, 43*(3), 393-403. doi:10.1016/j.soscij.2006.04.009

Benson, K. F. (2000). Constructing academic inadequacy: African american athletes' stories of schooling. *The Journal of Higher Education, 71*(2), 223-246. doi:10.1080/00221546.2000.11778835

Biderman, A., Yeheskel, A., & Herman, J. (2005). The biopsychosocial model: Have we made any progress since 1977? Families, Systems, & Health, 23(4), 379-386.

Brady, K. T., & Back, S. E. (2012). Childhood trauma, posttraumatic stress disorder, and alcohol dependence. *Alcohol Research, 34*(4), 408.

Brewer, B. W., Van Raalte, J. L., & Linder, D. E. (1993). Athletic identity: Hercules' muscles or Achilles heel? *International Journal of Sport Psychology, 24*(2), 237-254.

Brockie, T.N., Dana-Sacco, G., Wallen, G.R., Wilcox, H.C., & Campbell, J.C. (2015). The relationship of adverse childhood experiences to PTSD, depression, poly-drug use and suicide attempt in reservation-based Native American adolescents and young adults. *American Journal of Community Psychology, 55,* 411-421. doi: 10.1007/s10464-015-9721-3

Broughton, E., & Neyer, M. (2001). Advising and counseling student athletes. *New Directions for Student Services, 93*(1), 47-53. doi:10.1002/ss.4

Brown, D. W., Anda, R. F., Tiemeier, H., Felitti, V. J., Edwards, V. J., Croft, J. B., Giles, W. H. (2009). Adverse childhood experiences and the risk of premature mortality. *American Journal of Preventive Medicine*, *37*(5):389 –96.

Brown, D., Anda, R., Felitti, V., Edwards, V., Malarcher, A. M., Croft, J., & Giles, W. (2010). Adverse childhood experiences are associated with the risk of lung cancer: A prospective cohort study. *BMC Public Health, 10*(1), 20-20. doi:10.1186/1471-2458-10-20

Brown GT, Hailine B, Kroshus E, Wilfert M, editors. Mind, body and sport: understanding and supporting student-athlete mental wellness. Indianapolis, IN: National Collegiate Athletic Association; 2014.

Brown, M. J., Thacker, L. R., & Cohen, S. A. (2013). Association between adverse childhood experiences and diagnosis of cancer. *PloS One, 8*(6), e65524. doi:10.1371/journal.pone.0065524

Bryant, A. N. (2007). Gender differences in spiritual development during the college years. *Sex Roles, 56*, 835-846. doi:10.1007/s11199-007-9240-2

Bryant, A. N., Choi, J. Y., & Yasuno, M. (2003). Understanding the religious and spiritual dimensions of students‘ lives in the first year of college. *Journal of College Student Development, 44*, 723-745. doi:10.1353/csd.2003.0063

Campbell, J. A., Walker, R. J., & Egede, L. E. (2016). Associations between adverse childhood experiences, high-risk behaviors, and morbidity in adulthood. *American Journal of Preventive Medicine, 50*(3), 344-352. doi:10.1016/j.amepre.2015.07.022

Carodine, K., Almond, K. F., & Gratto, K. (2001). College student athlete success both in and out of the classroom. *New Directions for Student Services, 93*(1), 19-33. doi:10.1002/ss.2

Chapman, D. P., Whitfield, C. L., Felitti, V. J., Dube, S. R., Edwards, V. J., & Anda, R. F. (2004). Adverse childhood experiences and the risk of depressive disorders in adulthood.*Journal of Affective Disorders, 82*(2), 217-225. doi:10.1016/j.jad.2003.12.013

Chapman, D. P., Wheaton, A. G., Anda, R. F., Croft, J. B., Edwards, V. J., Liu, Y., . . . Perry, G. S. (2011). Adverse childhood experiences and sleep disturbances in adults. *Sleep Medicine, 12*(8), 773-779. doi:10.1016/j.sleep.2011.03.013

Chartier, M. J., Walker, J. R., & Naimark, B. (2009). Health risk behaviors and mental health problems as mediators of the relationship between childhood abuse and adult health. *American Journal of Public Health, 99*(5), 847-854. doi:10.2105/AJPH.2007.122408

Chen, S., Snyder, S., & Magner, M. (2010). The effects of sport participation on student-athletes' and non-athlete students' social life and identity. *Journal of Issues in Intercollegiate Athletics, 3,* 176-193.

Chickering, A. W., Dalton, J. C., & Stamm, L. (2006). Encouraging authenticity and spirituality in higher education. San Francisco, CA: Jossey-Bass.

Clark, C., PhD, Caldwell, T., PhD, Power, C., PhD, & Stansfeld, S. A., PhD. (2010). Does the influence of childhood adversity on psychopathology persist across the lifecourse? A 45-year prospective epidemiologic study. *Annals of Epidemiology, 20*(5), 385-394. doi:10.1016/j.annepidem.2010.02.008

Coakley, J. (2009). *Sports in society: Issues and controversies* (10th ed.). New York, NY: McGraw-Hill.

Covassin, T., Moran, R., & Elbin, R. J. (2016). Sex differences in reported concussion injury rates and time loss from participation: An update of the national collegiate athletic association injury surveillance program from 2004-2005 through 2008-2009. *Journal of Athletic Training, 51*(3), 189-194. doi:10.4085/1062-6050-51.3.05

Cronholm, P. F., Forke, C. M., Wade, R., Bair-Merritt, M. H., Davis, M., Harkins-Schwarz, M., …Fein, J. A. (2015). Adverse childhood experiences: Expanding the concept of adversity. *American Journal of Preventative Medicine, 49*(3), 354-361. doi:10.1016/j.amepre.2015.02.001

Cunningham, T. J., Ford, E. S., Croft, J. B., Merrick, M. T., Rolle, I. V., & Giles, W. H. (2014). Sex-specific relationships between adverse childhood experiences and chronic obstructive pulmonary disease in five states. *International Journal of Chronic Obstructive Pulmonary Disease, 9*(default), 1033-1043. doi:10.2147/COPD.S68226

yu, A., & McEwen, B. S. (2012). Adverse childhood experiences, allostasis, allostatic load, and age-related disease. *Physiology & Behavior, 106*, 29-39. doi:10.1016/j.physbeh.2011.08.019

Dillon, K. M., & Tait, J. L. (2000). Spirituality and being in the zone in team sports: A relationship? *Journal of Sport Behavior, 23*, 91-100. Retrieved from Academic Search Premier database.

Dong, M., Dube, S. R., Felitti, V. J., Giles, W. H., & Anda, R. F. (2003). Adverse childhood experiences and self-reported liver disease: New insights into the causal pathway. Archives of Internal Medicine, 163, 1949–1956.

Dong, M., Giles, W. H., Felitti, V. J., Dube, S. R., Williams, J. E., Chapman, D. P., & Anda, R. F. (2004). Insights into causal pathways for ischemic heart disease: Adverse childhood experiences study. *Circulation, 110*(13), 1761-1766. doi:10.1161/01.CIR.0000143074.54995.7F

Doty, J. (2006). Sports build character?! *Journal of College & Character, 7*(3), 1-9.

Dube, S. R., Anda, R. F., Felitti, V. J., Chapman, D. P., Williamson, D. F., & Giles, W. H. (2001). Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: Findings from the adverse childhood experiences study. *Jama, 286*(24), 3089-3096. doi:10.1001/jama.286.24.3089

Dube, S. R., Anda, R. F., Felitti, V. J., Edwards, V. J., & Croft, J. B. (2002). Adverse childhood experiences and personal alcohol abuse as an adult. *Addictive Behaviors, 27*(5), 713-725. doi:10.1016/S0306-4603(01)00204-0

Dube, S. R., Fairweather, D., Pearson, W. S., Felitti, V. J., Anda, R. F., & Croft, J. B. (2009). Cumulative childhood stress and autoimmune diseases in adults. *Psychosomatic Medicine, 71*(2), 243-250. doi:10.1097/PSY.0b013e3181907888

Dube, S. R., Felitti, V. J., Dong, M., Giles, W. H., & Anda, R. F. (2003). The impact of adverse childhood experiences on health problems: Evidence from four birth cohorts dating back to 1900. *Preventive Medicine, 37*(3), 268-277. doi:10.1016/S0091-7435(03)00123-3

Dube, S. R., Miller, J. W., Brown, D. W., Giles, W. H., Felitti, V. J., Dong, M., & Anda, R. F. (2006). Adverse childhood experiences and the association with ever using alcohol and initiating alcohol use during adolescence. *Journal of Adolescent Health, 38*(4), 444.e1-444.e10. doi:10.1016/j.jadohealth.2005.06.006

Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science, 196,* 129-136. doi:10.1126/science.847460

Engel, G.L. (1980). The clinical application of the biopsychosocial model. *The American Journal of Psychiatry, 137*, 535–544.

Edwards, V. J., Holden, G. W., Felitti, V. J., & Anda, R. F. (2003). Relationship between multiple forms of childhood maltreatment and adult mental health in community respondents: Results from the adverse childhood experiences study. *American Journal of Psychiatry, 160*(8), 1453-1460. doi:10.1176/appi.ajp.160.8.1453

Edwards, V. J., Dube, S. R., Felitti, V. J., & Anda, R. F. (2007). It's ok to ask about past abuse. *The American Psychologist, 62*(4), 327-328. doi:10.1037/0003-066X62.4.327

Etzel, E.F., Watson, J.C., Visek, A.J., & Maniar, S.D. (2006). Understanding and promoting college student-athlete health: Essential issues for student affairs professionals. *NASPA Journal, 43*(3), 518-546.

Felitti, V. J., & Anda, R. F. (2010). The relationship of adverse childhood experiences to adult health, well-being, social function, and healthcare. In R. Lanius, E. Vermetten, & C. Pain (Eds.). *The impact of early life trauma on health and disease; The hidden epidemic* (pp. 77-87). New York: Cambridge University Press.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . . Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ACE) study. *American Journal of Preventive Medicine, 14*(4), 245-258. doi:10.1016/S0749-3797(98)00017-8

Ford, I. W., Eklund, R. C., & Gordon, S. (2000). An examination of psychosocial variables moderating the relationship between life stress and injury time-loss among athletes of a high standard. *Journal of Sports Sciences, 18*(5), 301-312. doi:10.1080/026404100402368

Forster, M., Gower, A. L., Borowsky, I. W., & McMorris, B. J. (2017). Associations between adverse childhood experiences, student-teacher relationships, and non-medical use of prescription medications among adolescents. *Addictive Behaviors, 68,* 30-34. doi:10.1016/j.addbeh.2017.01.004

Fullagar, H. H. K., Skorski, S., Duffield, R., Hammes, D., Coutts, A. J., & Meyer, T. (2015). Sleep and athletic performance: The effects of sleep loss on exercise performance, and

physiological and cognitive responses to exercise. *Sports Medicine, 45*(2), 161-186. doi:10.1007/s40279-014-0260-0

Gehrke, S. (2008). Leadership through meaning-making: An empirical exploration of spirituality and leadership in college students. *Journal of College Student Development, 49*, 351-359. doi:10.1353/csd.0.0014

Gilbert, L. K., Breiding, M. J., Merrick, M. T., Thompson, W. W., Ford, D. C., Dhingra, S. S., & Parks, S. E. (2015). Childhood adversity and adult chronic disease: An update from ten states and the district of columbia, 2010. *American Journal of Preventive Medicine, 48*(3), 345.

Gulliver, A., Griffiths, K. M., & Christensen, H. (2012). Barriers and facilitators to mental health help-seeking for young elite athletes: A qualitative study. *BMC Psychiatry, 12*(1), 157-157. doi:10.1186/1471-244X-12-157

Guskiewicz, K.M., Marshall, S.W., Bailes, J., McCrea, M., Harding, H.P., Matthews, A., …Cantu, R.C. (2007). Recurrent concussion and risk of depression in retired professional football players. *Medicine and Science in Sports and Exercise, 39*(6), 903-909.

Hamarat, E., Thompson, D., Steele, D., Matheny, K., & Simons, C. (2002). Age differences in coping resources and satisfaction with life among middle-aged, young-old, and oldest-old adults. *The Journal of Genetic Psychology, 163*(3), 360-367. doi:10.1080/00221320209598689

Harrison, L., Jr., Harrison, C. K., & Moore, L. N. (2002). African American racial identity and sport. *Sport, Education and Society, 7*(2)*,* 121-133.

Hertzman, C. (2013). Commentary on the symposium: Biological embedding, life course development, and the emergence of a new science. *Annual Review of Public Health, 34*(1), 1-5. doi:10.1146/annurev-publhealth-031912-114500

Hillis, S. D., Anda, R. F., Felitti, V. J., Nordenberg, D., & Marchbanks, P. A. (2000). Adverse childhood experiences and sexually transmitted diseases in men and women: A retrospective study. *Pediatrics, 106*(1), E11-e11. doi:10.1542/peds.106.1.e11

Hootman, J.M., Dick, R., & Agel, J. (2007). Epidemiology of collegiate injuries for 15 sports: Summary and recommendations for injury prevention initiatives. *Journal of Athletic Training, 42*(2), 311-319.

Jackson, S. A. (2000). Joy, fun, and flow state in sport. In Y. L. Hann (Ed.). *Emotions in sport* (pp. 135-156). Champaign, IL: Human Kinetics.

Kahlenberg, C. A., Nair, R., Monroe, E., Terry, M. A., & Edwards, S. L. (2016). Incidence of injury based on sports participation in high school athletes. *The Physician and Sportsmedicine, 44*(3), 269-273. doi:10.1080/00913847.2016.1180269

Kaier, E., Cromer, L., Davis, J., & Strunk, K. (2015). The relationship between adverse childhood experiences and subsequent health complaints in elite athletes. *Journal of Child & Adolescent Trauma. 8*. doi:10.1007/s40653-015-0041-4.

Kalmakis, K. A., & Chandler, G. E. (2014). Adverse childhood experiences: Towards a clear conceptual meaning. *Journal of Advanced Nursing, 70*, 1489-1501. doi:10.1111/jan.12329

Karatekin, C. (2018). Adverse childhood experiences (ACEs), stress and mental health in college students. *Stress and Health : Journal of the International Society for the Investigation of Stress, 34*(1), 36-45. doi:10.1002/smi.2761

Kendall-Tackett, K. A. (2000). Physiological correlates of childhood abuse: Chronic hyperarousal in PTSD, depression, and irritable bowel syndrome. *Child Abuse & Neglect, 24*(6), 799-810. doi:10.1016/S0145-2134(00)00136-8

Kerr, Z. Y., Marshall, S. W., Dompier, T. P., Corlette, J., Klossner, D. A., & Gilchrist, J. (2015). College Sports–Related injuries — united states, 2009–10 through 2013–14 academic years. *Morbidity and Mortality Weekly Report, 64*(48), 1330-1336. doi:10.15585/mmwr.mm6448a2

Kessler, R. C., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Wittchen, H. (2012). Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the united states. *International Journal of Methods in Psychiatric Research, 21*(3), 169-184. doi:10.1002/mpr.1359

Kiesel, L. R., Piescher, K. N., & Edleson, J. L. (2016). The relationship between child maltreatment, intimate partner violence, and academic performance. *Journal of Public Child Welfare, 10*, 434-456. doi:10.1080/15548732.2016.1209150

Kleinert, J. (2007). Mood states and perceived physical states as short term predictors of sport injuries: Two prospective studies. *International Journal of Sport and Exercise Psychology, 5*(4), 340-351. doi:10.1080/1612197X.2007.9671840

Koenig, H. G. (2008). Concerns about measuring "Spirituality" in research. *The Journal of Nervous and Mental Disease, 196*(5), 349-355. doi:10.1097/NMD.0b013e31816ff796

Koenig, H. G. (2012). Religion, spirituality, and health: The research and clinical implications.*ISRN Psychiatry, 2012*, 278730-33. doi:10.5402/2012/278730

Kreutzer, J.S., Seel, R.T., & Gourley, E. (2001). The prevalence and symptom rates of depression after traumatic brain injury: A comprehensive examination. *Brain Injury, 15,* 563-576.

Lee, R. D., & Chen, J. (2017). Adverse childhood experiences, mental health, and excessive alcohol use: Examination of race/ethnicity and sex differences. *Child Abuse & Neglect*, *69*, 40-48. doi:10.1016/j.chiabu.2017.04.004

Locke, B., Wallace, D., & Brunner, J. (2016). Emerging issues and models in college mental health services. *New Directions for Student Services, 2016*(156), 19-30. doi:10.1002/ss.20188

MacDonald, D. A., Friedman, H. L., Brewczynski, J., Holland, D., Salagame, K. K. K., Mohan, K. K., . . . Cheong, H. W. (2015). Spirituality as a scientific construct: Testing its universality across cultures and languages. *PloS One, 10*(3), e0117701. doi:10.1371/journal.pone.0117701

Malinauskas, R. (2010). The associations among social support, stress, and life satisfaction as perceived by injured college athletes. *Social Behavior and Personality: An International Journal, 38*(6), 741-752. doi:10.2224/sbp.2010.38.6.741

Merikangas, K. R., He, J., Burstein, M., Swanson, S. A., Avenevoli, S., Cui, L., . . . Swendsen, J. (2010). Lifetime prevalence of mental disorders in U.S. adolescents: Results from the national comorbidity survey Replication–Adolescent supplement (NCS-A). *Journal of the American Academy of Child & Adolescent Psychiatry, 49*(10), 980-989. doi:10.1016/j.jaac.2010.05.017

Maron, B.J., Haas, T.S., Murphy, C.J., Ahluwalia, A., & Rutten-Ramos, S. (2014). Incidence and causes of sudden death in U.S. college athletes. *Journal of the American College of Cardiology, 63*(16), 1636-1643. doi: 10.1016/j.jacc.2014.01.041

Martens, M. P., Dams-O'Connor, K., & Beck, N. C. (2006). A systematic review of college student-athlete drinking: Prevalence rates, sport-related factors, and interventions. *Journal of Substance Abuse Treatment, 31*(3), 305-316. doi:10.1016/j.jsat.2006.05.004

McDaniel, S. H. (1995). Collaboration between psychologists and family physicians: Implementing the biopsychosocial model. *Professional Psychology: Research and Practice, 26*(2), 117-122.

McEwen, B. S., & Wingfield, J. C. (2003). The concept of allostasis in biology and biomedicine. *Hormones and Behavior, 43*(1), 2-15. doi:10.1016/S0018-506X(02)00024-7

McKnight, C. M., & Juillerat, S. (2011). Perceptions of clinical athletic trainers on the spiritual care of injured athletes. *Journal of Athletic Training, 46*(3), 303.

Meleis A.I. (2011). Concept analysis. In Meleis, A.I.(Ed.), *Theoretical nursing: Development and progress* (pp. 371-390). Philadelphia, PA: WoltersKluwer/Lippincott Williams &Wilkins.

Merrick, M. T., Ports, K. A., Ford, D. C., Afifi, T. O., Gershoff, E. T., & Grogan-Kaylor, A. (2017). Unpacking the impact of adverse childhood experiences on adult mental health. *Child Abuse & Neglect, 69*, 10-19. doi:10.1016/j.chiabu.2017.03.016

Mersky, J. P., Janczewski, C. E., & Topitzes, J. (2017). Rethinking the measurement of adversity: Moving toward second-generation research on adverse childhood experiences. *Child Maltreatment, 22*(1), 58-68. doi:10.1177/1077559516679513

Mersky, J.P., Topitzes, J., & Reynolds, A.J. (2013). Impacts of adverse childhood experiences on health, mental health, and substance use in early adulthood: A cohort study of an urban, minority sample in the U.S. Child Abuse & Neglect, 37(11), 917-925. doi:10.1016/j.chiabu.2013.07.011

Meyer, A. (1917). Progress in teaching psychiatry. *Journal of the American Medical Association, 69*, 861–863.

Monnat, S. M., & Chandler, R. F. (2015). Long-Term physical health consequences of adverse childhood experiences. *The Sociological Quarterly, 56*(4), 723-752. doi:10.1111/tsq.12107

NCAA.org. "Examining the student-athlete experience through the NCAA GOALS and SCORE studies." Presented at the NCAA Convention, 2011, San Antonio, TX.

National Collegiate Athletic Association. (2018). *NCAA Demographics Database* [Data visualization dashboard]. Retrieved from http://www.ncaa.org/about/resources/research/ncaa-demographics-database

National Collegiate Athletic Association. (2013). *NATA, NCAA and others announce mental health recommendation*. Retrieved from http://www.ncaa.org/about/resources/media-center/news/nata-ncaa- and-others-announce-mental-health- recommendations.

National Collegiate Athletic Association. (2013). *NCAA national study of substance use habits of college student- athletes.* Retrieved from http://www.ncaa.org/sites/default/files/Substance%20Use%20Final20Report_FINAL.pdf.

National Collegiate Athletic Association (2010). *Student-athlete ethnicity* [Data file]. Retrieved from http://www.ncaapublications.com/productdownloads/SAEREP11.pdf

National Collegiate Athletic Association (2015). *Student-athlete participation* [Data file]. Retrieved from https://www.ncaa.org/sites/default/files/Participation%20Rates%20Final.pdf

NCAA.org. "Results from the 2015 GOALS study of the student-athlete experience." Presented at the NCAA Convention, 2016, San Antonio, TX.

NCAA Sport Science Institute, NCAA. Mental Health Best Practices: Inter-Association Consensus Document: Best Practices for Understanding and Supporting Student-Athlete Mental Wellness. Indianapolis, IN: NCAA; 2016.

National Scientific Council on the Developing Child. (2005/2014). *Excessive stress disrupts the architecture of the developing brain: Working paper 3*. Updated Edition. Retrieved from http://www.developingchild.harvard.edu

Neal, T.L., Diamond, A.B., Goldman, S., Klossner, D., Morse, E.D., Pajak, D.E., …Welzant, V. (2013). Mental health and the college student athlete: Developing a plan to recognize and refer student athletes with psychological concerns at the collegiate level. *Journal of Athletic Training, 50*(3), 231-249. doi: 10.4085/1062-6050-50.3.03

Nomura, Y., Hurd, Y. L., & Pilowsky, D. J. (2012). Life-time risk for substance use among offspring of abusive family environment from the community. *Substance use & Misuse, 47*(12), 1281-1292. doi:10.3109/10826084.2012.695420

Norris, C. M. (1982). *Concept clarification in nursing*. Rockville, MD: Aspen Systems Corporation.

Oates, R. K., & Forrest, D. (1985). Self-esteem and early background of abusive mothers.*Child Abuse & Neglect, 9*(1), 89-93. doi:10.1016/0145-2134(85)90096-1

Piedmont, R. L. (1999). Does spirituality represent the sixth factor of personality? spiritual transcendence and the Five-Factor model. *Journal of Personality, 67*(6), 985-1013. doi:10.1111/1467-6494.00080

Piedmont, R. L. (2007). Cross-cultural generalizability of the spiritual transcendence scale to the philippines: Spirituality as a human universal. *Mental Health, Religion & Culture, 10*(2), 89-107. doi:10.1080/13694670500275494

Piedmont, R. L., Ciarrochi, J. W., Dy-Liacco, G. S., & Williams, J. E. G. (2009). The empirical and conceptual value of the spiritual transcendence and religious involvement scales for personality research. *Psychology of Religion and Spirituality, 1*(3), 162-179. doi:10.1037/a0015883

Raikes, M. H. (2010). *Exploring the essence of student-athlete spirituality: A phenomenological investigation of NCAA division I athletes* (Doctoral dissertation). Retrieved from http://scholars.indstate.edu/bitstream/handle/10484/8061/Raikes%2C%20Mark.PDF?sequence=2&isAllowed=y

Reardon, C.L., & Factor, R.M. (2010). Sport psychiatry: a systematic review of diagnosis and medical treatment of mental illness in athletes. *Sports Medicine, 40*(11), 961-980. doi: 10.2165/11536580-000000000-00000.

Riley, E. H., Wright, R. J., Jun, H. J., Hibert, E. N., & Rich-Edwards, J. W. (2010). Hypertension in adult survivors of child abuse: Observations from the nurses' health study II.*Journal of Epidemiology and Community Health (1979-), 64*(5), 413-418. doi:10.1136/jech.2009.095109

Sachs-Ericsson, N., Kendall-Tackett, K., & Hernandez, A. (2007). Childhood abuse, chronic pain, and depression in the national comorbidity survey. *Child Abuse & Neglect, 31*(5), 531-547. doi:10.1016/j.chiabu.2006.12.007

Samelius, L., Wijma, B., Wingren, G., & Wijma, K. (2007). Somatization in abused women. *Journal of Women's Health (2002), 16*(6), 909-918. doi:10.1089/jwh.2006.0103

Schilling, E., Aseltine, R., Jr., & Gore, S. (2007). Adverse childhood experiences and mental health in young adults: A longitudinal survey. *BMC Public Health*, 7, 30. https://doi.org/10.1186/1471-2458-7-30

Selye, H. (1964). *From dream to discovery*. New York, NY: McGraw-Hill.

Selye, H. (1987). *Stress without distress*. London: Transworld.

Shern, D. L., Blanch, A. K., & Steverman, S. M. (2016). Toxic stress, behavioral health, and the next major era in public health. *American Journal of Orthopsychiatry, 86*(2), 109-123. doi:10.1037/ort0000120

Shonkoff, J. P. (2010). Building a new biodevelopmental framework to guide the future of early childhood policy. *Child Development, 81*(1), 357-376. doi:10.1111/j.1467-8624.2009.01399.x

Shonkoff, J. P. (2012). Leveraging the biology of adversity to address the roots of disparities in health and development. *Proceedings of the National Academy of Sciences of the United States of America, 109*(2), 17302-17307. doi:10.1073/pnas.1121259109

Shonkoff, J. P., Boyce, W. T., & McEwen, B. S. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. *Journal of the American Medical Association, 301*, 2252-2259. doi:10.1001/jama.2009.754

Smith, R. C., Fortin, A. H., Dwamena, F., & Frankel, R. M. (2013). An evidence-based patient centered method makes the biopsychosocial model scientific. *Patient Education and Counseling, 91*(3), 265-270. doi:10.1016/j.pec.2012.12.010

Spratt, E. G., Back, S. E., Yeatts, S. D., Simpson, A. N., McRae-Clark, A., Maria, M. M. M., . . . Brady, K. T. (2009). Relationship between child abuse and adult smoking. *The International Journal of Psychiatry in Medicine, 39*(4), 417-426. doi:10.2190/PM.39.4.f

Storch, E. A., Storch, J. B., Killiany, E. M., & Roberti, J. W. (2005). Self-reported psychopathology in athletes: A comparison of intercollegiate student-athletes and non-athletes. *Journal of Sport Behavior, 28*(1), 86.

Suchman, A. L. (2005). The current state of the biopsychosocial approach. *Families, Systems, and Health, 23*, 450–452.

Teicher, M. H., Samson, J. A., Polcari, A., & McGreenery, C. E. (2006). Sticks, stones, and hurtful words: Relative effects of various forms of childhood maltreatment. *American Journal of Psychiatry, 163*(6), 993-1000. doi:10.1176/appi.ajp.163.6.993

Van Dongen, Hans P A, Maislin, G., Mullington, J. M., & Dinges, D. F. (2003). The cumulative cost of additional wakefulness: Dose-response effects on neurobehavioral functions and sleep physiology from chronic sleep restriction and total sleep deprivation. *Sleep, 26*(2), 117-126. doi:10.1093/sleep/26.2.117

Vetter, R. E., & Symonds, M. L. (2010). Correlations between injury, training intensity, and physical and mental exhaustion among college athletes. *Journal of Strength & Conditioning Research, 24*(3), 587-596.

Voelker, D. K. (2012). Weight pressures: What coaches need to know. *Game Plans: Coaching Advancement Program Newsletter*, *8*(5), 2-3.

von Bertalanffy, 1962. *Modern theories of development*. New York: Harper.

von Bertalanffy, L. (1968). *General system theory: Foundations, developments, applications*. New York: Braziller.

Watson, J.C., & Kissinger, D.B. (2007). Athletic participation and wellness: Implications for counseling college student-athletes. *Journal of College Counseling, 10*(2), 153-162. doi: 10.1002/j.2161-1882.2007.tb00015.x

Wechsler, H., Davenport, A. E., Dowdall, G. W., Grossman, S. J., & Zanakos, S. I. (1997). Binge drinking, tobacco, and illicit drug use and involvement in college athletics: A survey of students at 140 american colleges. *Journal of American College Health, 45*(5), 195-200. doi:10.1080/07448481.1997.9936884

White, P. (2005). *Biopsychosocial medicine: An integrated approach to understanding illness.* New York: Oxford University Press.

Whitfield, C. L., Dube, S. R., Felitti, V. J., & Anda, R. F. (2005). Adverse childhood experiences and hallucinations. *Child Abuse & Neglect, 29*(7), 797-810. doi:10.1016/j.chiabu.2005.01.004

Williamson, D. F., Thompson, T. J., Anda, R. F., Dietz, W. H., & Felitti, V. J. (2002). Body weight, obesity, and self-reported abuse in childhood. *International Journal of Obesity, 2*(26), 1075-1082. doi:10.1038/sj.ijo.0802038

Wilson, G. W. & Pritchard, M. P. (2005). Comparing Sources of stress in college student athletes and non-athletes. *Athletic Insight*. *7*(1) 1-8.

Wolanin, A., Hong, E., Marks, D., Panchoo, K., & Gross, M. (2016). Prevalence of clinically elevated depressive symptoms in college athletes and differences by gender and sport. *British Journal of Sports Medicine, 50*(3), 167–171.

Wright, L. M., Watson, W. L., & Bell, J. M. (1996). *Belief: The heart of healing in families and illness.* New York: Basic Books.

Yang, J., Peek-Asa, C., Corlette, J.D., Cheng, G., Foster, D.T., & Albright, J. (2007). Prevalence of and risk factors associated with symptoms of depression in competitive collegiate student athletes. *Clinical Journal of Sport Medicine, 17*, 481–487.

Yang, J., Tibbetts, A. S., Covassin, T., Cheng, G., Nayar, S., & Heiden, E. (2012). Epidemiology of overuse and acute injuries among competitive collegiate athletes. *Journal of Athletic Training, 47*(2), 198–204.

Yusko, D., Buckman, J., White, H., & Pandina, R. (2008). Alcohol, tobacco, illicit drugs, and performance enhancers: A comparison of use by college student athletes and nonathletes. *Journal of American College Health, 57*(3), 281-29

CHAPTER 3: MIND, BODY, SPIRIT, AND SPORT: A SYSTEMATIC REVIEW EXAMINING THE EFFECTIVENESS OF INTERVENTIONS TARGETING THE BIOPSYCHOSOCIAL-SPIRITUAL HEALTH OF NCAA STUDENT-ATHLETES

Introduction

Each year, nearly 500,000 young adults participate in National Collegiate Athletic Association (NCAA) varsity sports (NCAA, 2018). For some, being a student-athlete is an uplifting experience that aids in the development of character traits and life skills, such as work ethic, integrity, teamwork, learning how to deal with failure, achieving cultural acceptance, expanding life experiences, and making friends (Chen, Snyder, & Magner, 2010; Watson & Kissinger, 2007). However, for many student-athletes, balancing the dual role of being a full-time student and full-time athlete is a demanding task that is accompanied by many biological (e.g., sports-related injuries), psychological (e.g., depression), social (e.g., pressure to perform), and spiritual (e.g., identity development) stressors and challenges (Malinauskas, 2010; McKnight & Juillerat, 2011; Wolanin, Hong, Marks, Panchoo, & Gross, 2016; Yang et al., 2012).

Biopsychosocial-Spiritual Health of Student-Athletes

Participation in college sports requires demanding, year-round training and unavoidable exposure to risk of injury. Researchers estimate that 50% of student-athletes sustain at least one sport-related injury during their collegiate playing years (Yang et al., 2007; Hootman, Dick, & Agel, 2007). Additionally, researchers have begun highlighting the prevalence of mental health concerns, psychosocial stressors, risky behaviors (e.g., substance abuse), and the role of spirituality among NCAA student-athletes (Kimball & Freysinger, 2003; NCAAa, 2016; Mastroleo, Scaglione, Mallett, & Turris, 2013; Proctor & Boan-Lenzo, 2010; Reardon & Factor, 2010; Yang et al., 2007). According to data from the National College Health Assessment

(American College Health Association, 2012), 21% of male college athletes (*n* = 1,623) and 28% of female college athletes (*n* = 3,303) reported feeling so depressed that it was difficult to function in the last year. Moreover, one-third of male athletes (*n* = 2,439) and nearly half of female athletes (*n* = 5,747) reported feeling overwhelming anxiety in the last 12 months. Of even greater concern are the incidences and causes of sudden death in the student-athlete population. Research indicates that nearly 5% of student-athletes have contemplated suicide (Miller & Hoffman, 2009), and that death by suicide and drug-related deaths account for nearly 30% of sudden deaths among student-athletes, making death by suicide the fourth leading cause of death (Maron, Haas, Murphy, Ahluwaila, & Rutten-Ramos, 2014). Researchers hypothesize that suicidal ideation and completion among student-athletes may be due to their struggle to cope with both athletic pressure and academic demands, belief that their identity is based solely on their athlete status, and feeling isolated from the overall campus population (DeFreese & Smith, 2013; Miller & Hoffman, 2009). With statistics like these, there is little surprise that the NCAA recognized mental health as the number one health concern facing today's student-athletes (NCAA, 2013).

The unique combination of time commitment, physical demands, and high expectations placed on student-athletes from coaches, family members, and fans, may trigger various psychological concerns or exacerbate existing mental health conditions such as depression, anxiety, disordered eating, and substance use and abuse (Etzel, Watson, Visek, & Maniar, 2006; Martens, Dams-O'Connor, & Beck, 2006; Wilson & Pritchard, 2005). Despite the growing evidence that NCAA student-athletes may experience psychosocial concerns (e.g., depression, substance abuse) at similar or higher levels than their non-athlete peers (Cox, 2015; Yusko, Buckman, White, & Pandina, 2008), utilizing mental health services remains a challenge for

many student-athletes. Researchers have highlighted that student-athletes may be less likely to seek help for mental health concerns due to stigma (e.g., mental, perceived lack of support from coaches and teammates, and lack of mental health literacy (Gulliver, Griffiths, & Christensen, 2012). Another barrier to help seeking is lack of availability of mental health resources tailored to student-athletes in terms of convenience and cultural sensitivity (Watson, 2005). For example, it has been estimated that only 20% of Division I athletic departments are staffed with licensed mental health professionals (Sudano & Miles, 2017) who have the skills and training necessary to accurately assess, diagnose, and treat mental health conditions presented by student-athletes (Neal et al., 2013). As a result, Dr. Brian Hainline, Chief Medical Officer of the NCAA, delivered a call-to-action for athletic departments to employ licensed mental health practitioners who have competency-based training in assessing, diagnosing, and treating the psychosocial challenges commonly experienced by student-athletes (NCAAb, 2016). Accordingly, researchers, athletic departments, and university officials are dedicating more resources to address the overall health and wellness of NCAA student-athletes (Neal et al., 2013).

The purpose of this systematic review is to identify how the biopsychosocial-spiritual (BPSS) needs of NCAA student-athletes are being addressed and treated. To accomplish this, we will first provide a description of the theoretical framework guiding this review—the biopsychosocial-spiritual (BPSS)-systems metatheory (Anchin, 2008; Wright, Watson, & Bell, 1996). We will then illustrate our plan to systematically review the current literature exploring current interventions aimed at improving the biological, psychological, social, and/or spiritual health of NCAA student-athletes. Finally, we will disseminate a series of recommendations for future researchers that emphasize the need to conceptualize student-athlete health and wellness

through a holistic and comprehensive lens, recognizing the systemic relationship between and among the biological, psychological, social, *and* spiritual domains of health.

Biopsychosocial-Spiritual Systems Metatheory

In his seminal article, psychiatrist George Engel (1977) first introduced the biopsychosocial (BPS) model of healthcare. Engel (1977) challenged the medical field to expand its biomedical approach to the assessment, diagnosis, and treatment of health problems to account for psychosocial factors (e.g., patient-provider relationship) that invariably impact the etiology and treatment of disease(s). The premise of the BPS framework is that the *whole* person is comprised of biological (genetics, physiology), psychological (cognition, emotion), and sociocultural (interpersonal relationships, cultural background) components that are inextricably linked and systemically connected (Engel, 1977; 1980). Stated differently, "…each biological problem has psychosocial consequences and each psychosocial problem has biological correlates" (McDaniel, 1995, p. 117).

Though the BPS model was not originally constructed for research purposes (Smith, Fortin, Dwamena, & Frankel, 2013), Anchin (2008) argued the need for research that accounts for the relationship within, between, and among BPS health domains from a systemic perspective. Through his proposed BPS-systems metatheory, Anchin (2008) offered a theoretical framework that conceptualizes both micro and macro levels of health on a continuum—rather than through a hierarchy—in which each BPS domain is viewed as equally important (e.g., physical health is no more/less important than mental health) when conceptualizing *whole* person health. Although the BPS-systems metatheory (Anchin, 2008) provides a comprehensive and holistic lens through which to view most health phenomena, we assert that it is missing an integral domain related to an individual's overall health and well-being—spirituality.

Wright and colleagues (1996) posited that spirituality—which encompasses an individual's sense of belonging, inner peace, hope, and search for purpose and meaning in life (Underwood & Teresi, 2002)—must also be considered when exploring *whole* person health. Researchers have established a connection between components of spirituality (e.g., experiencing the presence of a power or energy) and various BPS outcomes (e.g., recovery from injury, improved athletic performance) among student-athletes (Dillon & Tait, 2000; McKnight & Juillerat, 2011). Thus, when examining the effectiveness of interventions targeting the health and well-being of NCAA student-athletes, it is essential to consider how an intervention not only impacts one domain of BPSS health (e.g., psychological health), but also each of the other domains (i.e., biological, social, and spiritual).

Due to the intersection of physical (e.g., athletic injury), psychological (e.g., depression), social (e.g., balancing life as a student and an athlete), and spiritual (e.g., identity development) experiences of NCAA student-athletes, the BPSS-systems metatheory (Anchin, 2008; Wright et al., 1996) will serve as the theoretical guide for this review. Previous systematic reviews focused on various psychosocial health outcomes among intercollegiate student-athletes such as health-related quality of life (Houston, Hoch, & Hoch, 2016), prevalence of depression (Armstrong, Burcin, Bjerke, & Early, 2015), body image concerns (Varnes et al., 2013) and alcohol consumption (Martens, Doms-O'Connor, & Beck, 2006). However, no known systematic reviews have explored the effectiveness of interventions targeting BPSS health outcomes among NCAA student-athletes.

Objectives

This systematic review was guided by the following research question: How effective are existing interventions at treating the BPSS health of NCAA student-athletes? The aims of this

systematic review were to: (a) explore the current interventions aimed at improving the BPSS health and well-being of NCAA student-athletes, (b) assess the methodological quality and rigor of articles evaluating these interventions, (c) identify participant characteristics (e.g., gender, race, sport), and (d) highlight the impact of these interventions on student-athlete BPSS health outcomes. Regarding clinical outcomes, effectiveness is broadly viewed as positive outcomes in one's behaviors, thoughts, feelings, and/or overall health. Thus, for the purpose of this review, effectiveness was operationalized as whether or not the intervention(s) of a study had a significant effect on the BPSS health outcomes of interest (e.g., reduced depressive symptoms) among student-athlete participants. In this systematic review, "(NCAA) student-athlete" is defined as a male or female athlete participating on an NCAA-affiliated college or university varsity sports team.

Method

We incorporated Cooper's (2010) seven-step protocol for research synthesis to guide this review. First (step one), we formulated the problem (i.e., the need to examine the effectiveness of interventions targeting BPSS health outcomes among NCAA student-athletes). Next (step two), we systematically searched published, peer-reviewed, intervention-based studies that included a treatment focus on BPSS health outcomes among NCAA student-athletes. Due to the scope of this review, interventions targeting biological outcomes (e.g., recovery from injury) were only included if the study also contained psychological, social, and/or spiritual outcome measures. We searched for relevant articles in the following electronic databases: *CINAHL*, *PsycINFO*, *PubMed*, *ERIC*, and *SPORTDiscus*. To maximize the review's reach, search terms were entered individually (e.g., 'athletes') and conjointly (e.g., 'athletes' OR 'intercollegiate athletes' AND 'intervention') with one another in each database. To ensure consistency of the search strategy

across databases, the first author evaluated Medical Subject Heading (MeSH) terms and database thesauruses with a university librarian to verify that all relevant search terms were included in the full search for each database. Additionally, search terms were selected based on previous systematic reviews conducted with the student-athlete population. The final search terms included the following: 'athlete(s),' 'college athlete(s),' 'NCAA,' 'intercollegiate athlete(s),' 'student athlete(s),' 'intervention,' 'treatment,' 'therapy,' 'mindfulness,' 'mental health,' 'well being,' 'depression,' 'anxiety,' 'stress,' 'substance abuse,' 'eating disorder,' 'body image,' and 'spirituality.' No publication timeline was set in the search parameters and searches were conducted in January 2018.

Study Selection and Data Collection

To gather information from studies (step three), we first exported search results by individual database into subfolders (i.e., CINAHL, PsycINFO, PubMed, ERIC, SPORTDiscus) in RefWorks. After duplicate articles were identified and removed, we uploaded the remaining articles into Rayyan (Ouzzani, Hammady, Fedorowicz, & Elmagarmid, 2016) for title and abstract review. Articles were considered for full-text review based on the following inclusion criteria: (a) peer-reviewed publication, (b) published in the English language, (c) participants were current intercollegiate student-athletes, (d) the study contained a clearly defined intervention that targeted biological, psychological, social, and/or spiritual health variables, and (e) the study reported quantitative and/or qualitative data on psychological, social, and/or spiritual health outcomes. Conversely, articles were removed based on the following exclusion criteria: (a) the study contained a heterogeneous sample (i.e., a mixed sample of NCAA and non-NCAA student-athletes) without reporting findings for each group separately and (b) the study was only available in abstract form, precluding full quality assessment.

Both quantitative and qualitative studies were considered for inclusion in this review. However, grey literature (e.g., dissertations, reports, policy documents), theoretical or conceptual articles, and opinion or editorial writings were excluded. If information reviewed in the title and abstract was unclear, we more thoroughly screened and examined the full-text article. The first author and a second researcher screened all relevant titles and abstracts to assess their eligibility for full-text screening. Next, to ensure inter-rater consistency, two researchers independently screened 20% of all excluded titles and abstracts. Discrepancies were resolved through consultation with co-researchers until a final consensus was made. Lastly, the reference lists of the articles that warranted full-text review were searched for additional studies that our initial search strategy did not yield.

Quality Assessment and Risk of Bias

To determine the quality and risk of bias of included studies (step four), we adopted guidelines from the Cochrane Collaboration for assessing methodological quality in systematic reviews **(**Higgins & Altman, 2008). For studies that were categorized as randomized controlled trials, we used the Cochrane Collaboration's tool for assessing the risk of bias (Higgins et al., 2011), which includes the following five domains: (a) selection bias (random sequence generation and allocation concealment), (b) performance bias (blinding of participants and personnel), (c) detection bias (blinding of outcome assessment), (d) attrition bias (incomplete outcome data), and (e) reporting bias (selective reporting). Each domain receives a rating of low (1), unclear (2), or high (3) risk of bias assessment and an overall judgment is accumulated based on the following criteria: (a) low risk—each domain receives a low risk of bias rating, (b) unclear risk—each domain receives a low and/or unclear risk of bias rating, and (c) high risk—one or more domains receive a high risk of bias rating.

For non-randomized studies, we employed the Quality Assessment Tool for Quantitative Studies (QATSQ; Effective Public Health Practice Project, 1998), which has been recommended for use in systematic reviews exploring effectiveness of interventions (Thomas, Ciliska, Dobbins, & Micucci, 2004). The QATSQ includes the following six domains: (a) selection bias, (b) study design, (c) confounders, (d) blinding, (e) data collection method, (f) withdrawals and dropouts. Each domain receives a rating as weak (3), moderate (2), or strong (1) and a global rating is determined by the following criteria: (a) weak rating—two or more domains receive a weak rating, (b) moderate rating—one domain receives a weak rating, and (c) strong rating—no weak ratings on any domain.

Study samples were evaluated by extracting participant information from each article and included total sample size and demographic information (e.g., age, gender, race, sport). Information about measures used in the studies was organized according to the assessments' target outcome (e.g., depression, social support, etc.). For assessing the effect of the study interventions, we extracted the name of the outcome measures and reported effect sizes when applicable (i.e., for quantitative studies) related to psychological, social, and/or spiritual variables in the study. In the following section, we provide results generated from steps six (interpreting the evidence) and seven (presenting the results; Cooper, 2010).

Study Extraction Process

A summary of the process by which we reviewed and selected articles can be found in Figure 1. After removal of duplicate studies (n = 56), the aforementioned search strategy yielded 420 articles. Of the 420 titles and abstracts reviewed, 345 were identified as irrelevant (e.g., wrong population, study design, or publication type) and were excluded. Two reviewers screened 20% of excluded titles and abstracts and reached a full consensus for their exclusion. A total of

75 articles were identified and underwent a more detailed screening to determine eligibility for full-text review. Authors were unable to access or find full-text version of seven articles, which were removed due to preclusion of full quality assessment. From the 68 remaining articles, authors agreed to remove 46 articles that did not meet the predefined inclusion criteria on at least one level. Authors agreed to remove four additional articles that originally met full inclusion criteria, but lacked rigorous methodological and sampling procedures (i.e., used single-participant case reports). After reviewing reference lists of the remaining 18 articles, two additional articles were discovered and included (Baltzell & Akhtar 2014; Savoy & Beitel, 1997). There was 100% author agreement to include all 20 remaining articles for this review. [*Insert Figure 1 around here*]

Results

Studies admitted into the review were published between September 1989 and June 2017. Table 1 summarizes the name of the first author who conducted the study, the year of publication, and sample characteristics (e.g., sample size, race, sport). A description of interventions used and a summary of the included studies' findings can be found in Table 2. Study characteristics, quality assessment, and risk of bias of the 20 included studies is detailed below. We will then assess the effectiveness of study interventions by providing a narrative summary of the studies' combined outcomes in accordance with the following constructs: biological, psychosocial, and spiritual health. Refer to Table 5 for a detailed description of outcome measures used in each study.

Study Characteristics

A summary of study characteristics can be found in Table 1. A total of 2,434 student-athletes took part in the 20 included studies. Of these, 1,343 (55%) identified as female and 738

identified as male (30%). Two studies did not report gender, which included 291 (12%) and 62 (3%) participants, respectively. Caucasian student-athletes represented 82% or more of the total sample in seven studies, and 72% or more in five studies. Seven studies reported no information regarding the race or ethnicity of the student-athletes in their sample.

[*Insert Table 1 around here*]

Quality Assessment and Risk of Bias

Among the six studies that employed randomized controlled trials (Table 3), none demonstrated a low risk of bias. Three studies exhibited an unclear risk of bias (Buffington et al., 2016; Holm et al., 1996; Martens et al., 2010), making it difficult to assess limitations, potential problems, and validity of the studies' results. The remaining three studies exhibited a high risk of bias (Abood & Black, 2000; Marcello et al., 1989; Perna et al., 2003), indicating that results should be interpreted with caution given the identification of several sources of bias (e.g., random sequence generation, allocation concealment) that may invalidate the studies' findings (i.e., results may not represent a true treatment effect).

Among the 14 studies that used non-randomized designs (Table 4), one study (Smith & Petrie, 2008) exhibited strong study quality, indicating that findings are considered valid (i.e., evidence of a true treatment effect). Five studies (Becker et al., 2012; LaBrie et al., 2009; Stewart et al., 2014; Vidic et al., 2017; Yang et al., 2014) demonstrated moderate study quality, indicating that no study flaw was likely to cause major bias (i.e., some confidence that results may represent a true treatment effect). The remaining eight studies (Baltzell & Akhtar, 2014; Cimini et al., 2015; Cogan & Petrie, 1995; Curry & Maniar, 2003; Garza & Ford, 2009; Goodman et al., 2014; Savoy & Beitel, 1997; Wolanin & Schwanhausser, 2010) were found to

have weak study quality, suggesting that the studies contained significant flaws (e.g., selection bias, study design) that may invalidate study results.

[*Insert Table 2 around here*]

Intervention Effectiveness on Biological Health/Performance Outcomes

Six research teams reported outcomes related to biological health and/or performance variables. Perna and colleagues (2003) found that student-athletes who participated in a seven-session cognitive-behavioral stress management program experienced significant reductions in number of illness and injury days (η^2 = .199, d = .99), and reported half the number of health service visits (η^2 = .131, d = .78), compared to student-athletes in the control group. Holm and colleagues (1996) discovered that student-athletes experienced improvements in athletic performance (i.e., increased strength, faster swim times), increased concentration, and decreased anxiety, following seven weekly cognitive-behavior-based interventions. Wolanin and Schwanhausser (2010) found that student-athletes who participated in a seven-week mindfulness-acceptance-commitment intervention received higher ratings on athletic performance by their coaches. Garza and Ford (2009) found that student-athletes who were taught (and engaged in) a diaphragmatic breathing technique experienced a decrease in their average heart rate during the three-week program phase of the study, though not significantly. Finally, Buffington and colleagues (2016) reported that student-athletes in both intervention groups (a 10-week educational and/or cognitive-behavioral skills building program) experienced significant reductions in body fat percentage.

Intervention Effectiveness on Psychosocial Health Outcomes

Next, we assessed the effectiveness of the included studies' interventions targeting psychosocial health outcomes of student-athletes. We organized our findings based on the

psychological health (i.e., eating disorders, substance use and abuse, depressive symptoms, anxiety/stress) and social health (i.e., social support) outcome variables the researchers targeted in their respective studies.

Eating disorders. Four studies reported outcomes specific to eating disorders among student-athletes. Abood and Black (2000) found that an eight-week health education intervention designed to promote health attitudes and behaviors (e.g., self-esteem, nutrition knowledge, stress management) resulted in decreases in drive for thinness and body dissatisfaction in a sample of female student-athletes. Moreover, Smith and Petrie (2008) found that female student-athletes who participated in a cognitive-dissonance intervention designed to enhance their understanding of body image problems experienced an increase in body satisfaction from baseline to three-week follow-up (Cohen's d = -0.63). Becker et al. (2012) found that a peer-led dissonance-based program (student-athletes spoke and acted against the thin-ideal standard of female beauty through various interactive activities) and peer-led healthy weight intervention (student-athletes encouraged to make small lifestyle changes in eating and exercise to maintain a healthy weight) reduced eating disorder risk factors (i.e., thin-ideal internalization, dietary restraint, weight concern) for a group of female student-athletes at six-week and one-year follow-up (η^2 range= .03 - .05). To expand upon this study, Stewart et al. (2014) conducted a secondary data analysis to determine if sport type moderated the effectiveness of the peer-led dissonance-based and health weight programs. They found that although both interventions may have reduced bulimic pathology, sport type did not appear to moderate the relationship between intervention and eating disorder risk factors.

Substance use and abuse. Four studies reported outcomes related to substance use and abuse in student-athlete samples. Cimini and colleagues (2015) found that student-athletes who

received in-person interventions (i.e., motivational interviewing techniques and cognitive behavioral content related to alcohol use and athletic performance) experienced significant reductions in alcohol use frequency and quantity, alcohol-related negative consequences, and increased use of protective behaviors (e.g., limiting alcohol intake). Similarly, Martens and colleagues (2010) found that student-athletes who received an athlete-specific personalized drinking feedback intervention (e.g., sport-specific alcohol-related problems, impact of alcohol on performance and injury) exhibited lower peak blood alcohol concentration levels at 1-month (η^2 = .152) and 6-month follow-up (η^2 = .040), as well as fewer drinks per week than control group athletes (η^2 = .112). Further, LaBrie, Hummer, Huchting, and Neighbors (2009) found that student-athletes who participated in a brief live interactive group intervention—designed to highlight discrepancies about actual vs. perceived drinking norms among student-athletes—reported reductions in individual drinking behavior (r = .35) and negative consequences (r = .13) at one- and two-month post-intervention. However, the researchers did not include a control group, precluding any inferences about causal effects specific to the intervention. Last, although few differences were found between the intervention group (substance abuse awareness and prevention program) and control group (delayed intervention), Marcello et al. (1989) found that social-environmental factors (e.g., parental modeling, cultural/religious beliefs) and pro-usage attitudes predicted greater alcohol, drug, and tobacco usage patterns, and a decrease in the use of adaptive coping skills between pre- and post-intervention predicted an increase in alcohol use.

Depressive symptoms. Seven studies reported findings related to depressive symptoms. Abood and Black (2000) found that student-athletes assigned to an eight-week health education program experienced an increase in self-esteem, which lead to a decrease in drive for thinness, though no effect sizes were reported. Conversely, student-athletes assigned to the control group

(i.e., regular study hall sessions) experienced a decrease in self-esteem. Curry and Maniar (2003) found that student-athletes participating in a 15-week psychological and life skills course experienced post-intervention enhancements in self-esteem (Cohen's $d = 0.17$), hope (Cohen's $d = 0.50$), and sport confidence (Cohen's $d = 0.80$) compared to control-group athletes. Similarly, Savoy and Beitel (1997) discovered that student-athletes who participated in a 10-week group/individualized psychological training program—consisting of relaxation techniques (e.g., diaphragmatic breathing), positive self-talk, and imagery exercise—experienced a positive change in self-confidence compared to athletes in the group program (no effect sizes reported). Smith and Petrie (2008) found that, compared to the healthy weight and control groups, student-athletes in a cognitive-dissonance intervention experienced a decrease in sadness/depression between baseline and follow-up (Cohen's $d = 0.66$). Similarly, Becker et al. (2012) found that student-athletes in both interventions experienced a reduction in negative affect at six-week and one-year follow-up ($\eta^2 = 0.05$). Expanding on these findings, Stewart et al. (2014) found that student-athletes in similar sport types experienced greater improvement in negative affect in dissonance-based intervention compared to athletes in the healthy weight intervention (Cohen's $d = 0.64$). Finally, Baltzell and Akhtar (2014) found that negative emotions of female student-athletes who participated in a 12-session mindfulness training program remained stable (i.e., did not significantly increase or decrease), while student-athletes in the non-treatment comparison group experienced significant increases in negative emotions.

Anxiety and stress. Several studies reported on outcomes related to anxiety and stress (i.e., psychological health). Buffington and colleagues (2016) found that female student-athletes who participated in a 10-week educational and/or cognitive-behavioral skills-building program experienced significant reductions in anxiety symptoms, and improvements in their ability to

cope with anxiety and stress, though not significantly. Conversely, student-athletes in the control group experienced significantly greater perceived stress and non-significant increases in anxiety. Similarly, Marcello et al. (1989) found that student-athletes who participated in a substance abuse awareness and prevention program experienced a reduction in trait anxiety scores between the end of treatment and 8-week follow-up. Both Cogan and Petrie (1995) and Savoy and Beitel (1997) found that student-athletes receiving interventions experienced a reduction in cognitive and somatic anxiety symptoms throughout the course of the respective interventions, though no effect sizes were reported. Holm and colleagues (1996) discovered that, compared to those in the control group, student-athletes who participated in a seven-week stress management course reported decreased anxiety, increased academic performance, and increased psychological skills associated with successful athletic performance (i.e., anxiety, concentration, confidence, mental preparation, motivation, team emphasis), though no effect sizes were reported. In a study conducted by Vidic et al. (2017), female student-athletes experienced a progressive decrease in stress and an increase in athletic coping skills over the course of a ten-session mindfulness-based intervention (η^2 range = 0.21 - 0.68); however, the lack of a control group precludes inferences about causal effects specific to the intervention. Likewise, Goodman and colleagues (2014) found that male student-athletes who participated in a five-week mindfulness-acceptance-commitment program, in addition to 60-minute yoga sessions, reported less perceived stress (Cohen's d = 0.26), though no significant between-group differences emerged. Finally, Abood and Black (2000) found that student-athletes in the intervention group who experienced increased sport anxiety reported a decrease in drive for thinness.

Social support. Two reviewed studies reported findings related to social health outcomes. Cogan and Petrie (1995) found that female gymnasts who participated in a season-

long, multidimensional intervention program (geared toward team building and anxiety management strategies) experienced higher levels of social cohesion during the initial part of the competitive season compared to gymnasts in the control group, though no effect size was reported. Yang and colleagues (2014) found that injured student-athletes who were either very satisfied or satisfied with social support received from athletic trainers (ATs) were less likely to report symptoms of depression or anxiety at return to play compared to injured student-athletes who were dissatisfied with the social support received from ATs (odds ratio range = 0.22 - 0.30). Although there was no specific intervention being tested by Yang et al. (2014), given that the purpose of their study was to examine the effect of social support received from ATs during injury recovery, we conceptualized social support as the intervention delivered.

Intervention Effectiveness on Spiritual Health Outcomes

Two studies reported outcomes related to spiritual health variables of student-athletes (i.e., mindfulness). Baltzell and Akhtar (2014) found that female student-athletes who participated in a six-week (12 sessions) mindfulness meditation intervention experienced significant increases in mindfulness (e.g., increased awareness, becoming more present-focused). Similarly, Goodman and colleagues (2014) found that student-athletes reported greater mindfulness (Cohen's $d = 0.48$) and goal-directed energy (Cohen's $d = 0.98$) following a five-week mindfulness program. The authors also noted that, although not significant, student-athletes in the intervention group reported greater importance of valued life domains at follow-up ($p = .09$, Cohen's $d = 0.76$).

Qualitative Findings

In addition to the quantitative findings related to intervention effectiveness on BPSS health outcomes among student-athletes, five studies contained qualitative data regarding the

perceived effectiveness of the respective interventions. For example, gymnasts in the Cogan and Petrie (1995) study indicated that a team campout, team meetings and discussions, initiatives course, and leadership workshop were more helpful than a cue-controlled relaxation practice, an introductory stress management session, individual practice of relaxation skill. Additionally, qualitative results (i.e., informal reports from peer-leaders, participants, and coaches) from the Becker et al. (2012) study revealed that a nutrition-oriented intervention was more strongly preferred than a body image focused intervention, particularly for student-athletes who participated in more individual sports (e.g., cross country, swimming).

Garza and Ford (2009) reported that student-athletes' reported lower levels of, and increased control over, anxiety and fewer feelings of apprehension or nervousness as a result of implementing a breathing technique strategy. Additionally, all four players' anxiety logs indicated that a newfound awareness of somatic responses to anxiety made the experience of anxiety less intimidating. Mindfulness intervention was beneficial in various aspects of student-athlete lives in the form of improved awareness, control, focus, presence, and relaxation (Vidic et al., 2017). Lastly, coaches rated course-taking athletes higher in achievement-to-date, leadership skills, confidence, peaking under pressure, and coping compared to those in the control group (Curry & Maniar, 2003).

Discussion

NCAA student-athletes are faced with many unique challenges and pressures that may contribute to the development and/or maintenance of poor BPSS health outcomes (Cox, 2015; Hootman, Dick, & Agel, 2007; Wilson & Pritchard, 2005). Given the growing number of participants in NCAA sports, it is essential that NCAA athletics personnel, healthcare providers, researchers, and policy makers attend to the unique biological, psychological, social, and

spiritual health concerns and needs of student-athletes. NCAA student-athletes receive, and have routine access to, support for their academic success (e.g., academic advisors, hired tutors; Armstrong & Oomen-Early, 2009) and physical health needs (e.g., on-site athletic trainers and medical doctors). However, despite mental health being recognized as the number one health concern facing today's student-athletes (NCAA, 2013), they have traditionally received less support and resources for managing their psychological, social, and spiritual health needs (Moore, 2016). Although a number of research groups have explored potential interventions to address and treat the various psychosocial concerns faced by NCAA student-athletes, it remains unclear what interventions are most effective with this population. Thus, in this systematic review, we sought to examine the effectiveness of interventions that were tailored specifically to address NCAA student-athletes' BPSS health outcomes. We conducted a quality assessment of the included studies ($N = 20$), highlighting opportunities for future interventional studies designed to improve the overall health and well-being of NCAA student-athletes.

Effects of Interventions on BPSS Outcomes

To assess the effectiveness of interventions designed to improve aspects of student-athletes' overall health, we examined outcomes related to biological (e.g., physical health, athletic performance), psychological (e.g., depression, anxiety), social (social support), and/or spiritual (e.g., mindfulness) health variables. Results revealed that biological health markers (e.g., BMI, heart rate) and performance outcomes were improved in six studies (Buffington, Melnyk, Morales, Lords, & Zupan., 2016; Garza & Ford, 2009; Holm et al., 1996; Perna et al., 2003; Wolanin & Schwanhausser, 2010). With respect to psychosocial-spiritual health outcomes, four studies (Abood & Black, 2000; Becker, McDaniel, Bull, Powell, & McIntyre, 2012; Smith & Petrie, 2008; Stewart, Plasencia, Han, Jackson, & Becker, 2014) reported improvements in

eating disorder symptoms/risk factors (e.g., increased body satisfaction, decreased drive for thinness), and four studies (Cimini et al., 2015; LaBrie, Hummer, Huchting, & Neighbors, 2009; Marcello et al., 1989; Martens et al., 2010) noted improvements in substance use behavior (e.g., reduced alcohol frequency and quantity). Seven studies (Abood & Black, 2000; Baltzell & Akhtar, 2014; Becker et al., 2012; Curry & Maynar, 2003; Savoy & Beitel, 1997; Smith & Petrie, 2008; Stewart et al., 2014) found improvements in depressive symptoms (e.g., enhanced self-esteem/self-confidence, decreased sadness/depression/negative affect), and eight studies (Abood & Black, 2000; Buffington et al., 2016; Cogan & Petrie, 1995; Goodman et al., 2014; Holm et al., 1996; Macello et al., 1989; Savoy & Beitel, 1997; Vidic et al., 2017) reported improvements in symptoms of anxiety and/or perceived stress. Lastly, two reviewed studies (Cogan & Petrie, 1995; Yang et al., 2014) reported findings related to social health outcomes (e.g., greater levels of social cohesion), and two studies (Baltzell & Akhtar, 2014; Goodman et al., 2014) indicated improvements in spiritual health variables (i.e., mindfulness).

Looking at the results holistically, it is evident that certain aspects are common among interventions that improved various BPSS health outcomes among student-athletes. For example, 75% (n = 15) of the reviewed studies employed interventions that incorporated various mindfulness (e.g., diaphragmatic breathing, progressive muscle relaxation, guided imagery) and/or cognitive-behavioral-based techniques (e.g., skills building, cognitive restructuring). Thus, it appears that both mindfulness- and CBT-based interventions may be effective at improving athletic performance and reducing symptoms of anxiety, depression, and stress among student-athletes. However, these results must be interpreted with caution due to the poor methodological quality of the included studies.

Methodological Quality of Studies

Close examination of the included studies revealed several concerning design limitations that need to be addressed in future research. For example, nearly half (n = 8) of the reviewed studies did not include a control group. Therefore, it is difficult to determine whether significant outcomes resulted from the intervention itself or other factors. Of the six studies that employed a randomized design, none demonstrated a low risk of bias, three had an unclear risk of bias, and three had a high risk of bias. In general, several common methodological concerns were identified across the studies that used a randomized design, including insufficient information about the sequence generation process, allocation concealment, and blinding of participants, personnel, and outcome assessments.

Among the 14 studies that used non-randomized procedures, only one demonstrated strong study quality, whereas eight studies had weak ratings, and the remaining five were deemed to have moderate study quality. Additionally, of the 12 studies that did include a control group, only three (Martens et al., 2010; Perna et al., 2003; Smith & Petrie, 2008) reported effect sizes. As a result, the validity, clinical significance, and long-term effectiveness of the existing interventions targeting the BPSS health outcomes of student-athletes remains inconclusive. Researchers looking to study the effectiveness of interventions aimed at improving the BPSS health of student-athletes should adhere to more rigorous study designs and methodological protocols, such as those outlined by the 2010 Consolidated Standards of Reporting Trials (CONSORT; Schulz, Altman, & Moher, 2010), a well-established, evidence-based, set of recommendations designed by a group of experts to ensure complete and transparent reporting from study inception to conclusion. Conducting future interventional studies in accordance with

the guidelines offered in the CONSORT (2010) statement will help researchers reduce potential biases and maximize the interpretability, validity, and overall study quality (Schulz et al., 2010).

Of the nearly 500,000 NCAA student-athletes participating in sports across all divisions (i.e., I, II, III), more than half (56.6%) identify as male (NCAA, 2015). Regarding race and ethnicity statistics across all divisions, the highest percentage of male (70.4%) and female (77.2%) student-athletes identify as White, with the next highest percentage identifying as African American (male = 18.7%, female = 11.6%; NCAA, 2010). However, the percentage of student-athletes who identify as African American across Division I sports is much higher (male = 25.0%, female = 16.0%). Therefore, we examined the gender and race/ethnicity characteristics of the included studies to determine if findings are generalizable to the diverse nature of NCAA student-athletes across all divisions. The sample sizes included in the 20 studies reviewed were relatively small. Only seven studies had sample sizes greater than 100, and nine studies had sample sizes less than 50. Moreover, a little more than half of the studies reviewed (n = 11) consisted of female-only student-athletes (n = 669), and one study included only male student-athletes (n = 26). Among the 13 studies that reported race/ethnicity statistics, Caucasian student-athletes represented a majority of the sample (i.e., > 75%). However, seven studies did not report race/ethnicity information, raising concerns about the studies' generalizability to the student-athlete population. Future researchers should examine the effectiveness of interventions aimed at improving the BPSS health of student-athletes in larger, more diverse samples that more accurately represent the NCAA student-athlete population (e.g., minority races, male athletes).

Lastly, although several research teams have explored the prevalence and incidence of various biological (e.g., sport-related injury) and psychological (e.g., depression, eating disorders, substance abuse) health outcomes in the student-athlete population, few researchers

have explored the social and spiritual domains of student-athlete health and well-being. Moreover, no researchers have explored the interconnectedness between and among various BPSS health variables. Therefore, researchers should employ study designs that account for variables from each BPSS domain to identify unique effects on the overall health and well-being of student-athletes. Developing a more comprehensive understanding of the unique BPSS health experiences of student-athletes is essential for the development of future intervention programs.

Limitations

This systematic review contains two salient limitations. First, we only included articles that were peer-reviewed and published in the English language. Therefore, articles examining the effect of interventions on various BPSS health outcomes in the NCAA student-athlete population that have not yet been catalogued into research databases, or work categorized as grey literature, were not accessed by our search strategy. Second, although we employed various combinations of relevant search terms in several research databases to maximize our search results, we potentially may have missed or overlooked articles that could have been admitted into this review.

Conclusion

Participation in NCAA sports is at an all-time high and continues to grow each year. Student-athletes are faced with many biological, psychological, social, and spiritual concerns as they navigate the demands of being a full-time student and athlete. As a result, student-athletes are recognized as a high-risk population for mental health issues such as depression, anxiety, and disordered eating, in addition to maladaptive health behaviors (e.g., substance use and abuse). Therefore, in order to address the overall health and well-being of student-athletes, interventions designed to improve biological, psychological, social, and spiritual health concerns are essential.

Due to the scant research examining the effectiveness of interventions to improve BPSS health outcomes among student-athletes, we systematically examined the available literature in an effort to shed light in this arena. While some support was found regarding the effectiveness of current interventions (e.g., mindfulness, cognitive-behavioral) being employed with NCAA student-athletes, few studies had acceptable methodological quality, and many demonstrated a high risk of bias. Moreover, due to the homogeneity of the included studies' samples (i.e., mostly White, female, student-athletes), generalizability to the diverse NCAA student-athlete population is limited. We encourage future researchers to incorporate findings and limitations from this review to assist in the quality and rigorous designing and implementation of interventions geared toward improving the overall health and well-being of NCAA student-athletes.

REFERENCES

Abood, D. A., & Black, D. R. (2000). Health education prevention for eating disorders among college female athletes. *American Journal of Health Behavior, 24*(3), 209-219.

American College Health Association. American College Health Association-National College Health Assessment II: Undergraduate Reference Group Executive Summary Spring 2012. Hanover, MD: American College Health Association; 2012.

Anchin, J. C. (2008). Pursuing a unifying paradigm for psychotherapy: Tasks, dialectical considerations, and biopsychosocial systems metatheory. *Journal of Psychotherapy Integration, 18*(3), 310-349.

Armstrong, S. N., Burcin, M. M., Bjerke, W. S., & Early, J. (2015). Depression in student athletes: A particularly at-risk group? A systematic review of the literature. *Athletic Insight, 7*(2), 177.

Armstrong, S., & Oomen-Early, J. (2009). Social connectedness, self-esteem, and depression symptomatology among collegiate athletes versus nonathletes. *Journal of American College Health*, *57,* 521–526.

Baltzell, A., & Akhtar, V. L. (2014). Mindfulness meditation training for sport (MMTS) intervention: Impact of MMTS with division I female athletes. *The Journal of Happiness & Well-Being*, *2*(2), 160-173. Retrieved from http://www.journalofhappiness.net/frontend/articles/pdf/v02i02/6.pdf

Becker, C. B., McDaniel, L., Bull, S., Powell, M., & McIntyre, K. (2012). Can we reduce eating disorder risk factors in female college athletes? A randomized exploratory investigation of two peer-led interventions. *Body Image, 9*(1), 31-42.

Buffington, B. C., Melnyk, B. M., Morales, S., Lords, A., & Zupan, M. R. (2016). Effects of an energy balance educational intervention and the COPE cognitive behavioral therapy intervention for division I U.S. air force academy female athletes. *Journal of the American Association of Nurse Practitioners, 28*(4), 181-187.

Chen, S., Snyder, S., & Magner, M. (2010). The effects of sport participation on student-athletes' and non-athlete students' social life and identity. *Journal of Issues in Intercollegiate Athletics, 3,* 176-193.

Cimini, M. D., Monserrat, J. M., Sokolowski, K. L., Dewitt-Parker, J., Rivero, E. M., & McElroy, L. A. (2015). Reducing high-risk drinking among student-athletes: The effects of a targeted athlete-specific brief intervention. *Journal of American College Health, 63*(6), 343-352.

Cogan, K. D., & Petrie, T. A. (1995). Sport consultation: An evaluation of a season-long intervention with female collegiate gymnasts. *The Sport Psychologist, 9*(3), 282-296.

Cooper, H. (2010). *Research synthesis and meta-analysis: A step-by-step approach (4th edition)*. Los Angeles: Sage.

Cox, C. (2015). *Investigating the prevalence and risk-factors of depression symptoms among NCAA Division I collegiate athletes.* Retrieved from Proquest Digital Dissertations. (1592018)

Curry, L. A., & Maniar, S. D. (2003). Academic course combining psychological skills training and life skills education for university students and student-athletes. *Journal of Applied Sport Psychology, 15*(3), 270-277.

DeFreese, J. D., & Smith, A. L. (2013). Teammate social support, burnout, and self-determined motivation in collegiate athletes. *Psychology of Sport and Exercise,14*(2), 258-265.

Dillon, K. M., & Tait, J. L. (2000). Spirituality and being in the zone in team sports: A relationship? *Journal of Sport Behavior, 23*, 91-100. Retrieved from Academic Search Premier database.

Effective Public Health Practice Project. (1998). *Quality Assessment Tool For Quantitative Studies*. Hamilton, ON: Effective Public Health Practice Project. Retrieved from: https://merst.ca/ephpp/

Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science, 196,* 129-136.

Engel, G. L. (1980). The clinical application of the biopsychosocial model. *The American Journal of Psychiatry, 137*, 535–544.

Etzel, E. F., Watson, J. C., Visek, A. J., & Maniar, S. D. (2006). Understanding and promoting college student-athlete health: Essential issues for student affairs professionals. *NASPA Journal, 43*(3), 518-546.

Garza, L., & Ford, S. J. (2009). Implementing a breathing technique to manage performance anxiety in softball. *Sport Journal, 12*(2), 1-1. Retrieved from http://jproxy.lib.ecu.edu/login?url=http://search.ebscohost.com.jproxy.lib.ecu.edu/login.aspx?direct=true&db=s3h&AN=57096235&site=ehost-live&scope=site

Goodman, F. R., Kashdan, T. B., Mallard, T. T., & Schumann, M. (2014). A brief mindfulness and yoga intervention with an entire NCAA division I athletic team: An initial investigation. *Psychology of Consciousness: Theory, Research, and Practice, 1*(4), 339-356.

Gulliver, A., Griffiths, K. M., & Christensen, H. (2012). Barriers and facilitators to mental health help-seeking for young elite athletes: A qualitative study. *BMC Psychiatry, 12*, 157.

Higgins, J. P., & Altman, D. G. (2008). *Assessing Risk of Bias in Included Studies*. In Cochrane Handbook for Systematic Reviews of Interventions (eds J. P. Higgins and S. Green).

Higgins J. P., Altman, D. G., Gøtzsche, P. C., Jüni, P., Moher, D., Oxman, A. D., . . . Cochrane Bias Methods Group. (2011). The Cochrane collaboration's tool for assessing risk of bias in randomised trials. *British Medical Journal*, *343*(7829), 889-893.

Holm, J. E., Beckwith, B. E., Ehde, D. M., & Tinius, T. P. (1996). Cognitive-behavioral interventions for improving performance in competitive athletes: A controlled treatment outcome study. *International Journal of Sport Psychology, 27*(4), 463-475. Retrieved from http://jproxy.lib.ecu.edu/login?url=http://search.ebscohost.com.jproxy.lib.ecu.edu/login.aspx?direct=true&db=psyh&AN=1997-03413-006&site=ehost-live&scope=site

Hootman, J. M., Dick, R., & Agel, J. (2007). Epidemiology of collegiate injuries for 15 sports: Summary and recommendations for injury prevention initiatives. *Journal of Athletic Training, 42*(2), 311-319.

Houston, M. N., Hoch, M. C., & Hoch, J. M. (2016). Health-related quality of life in athletes: A systematic review with meta-analysis. *Journal of Athletic Training, 51*(6), 442-453.

Kimball, A., & Freysinger, V. J. (2003). Leisure, stress, and coping: The sport participation of collegiate student-athletes. *Leisure Sciences, 25*(2-3), 115-141.

LaBrie, J. W., Hummer, J. F., Huchting, K. K., & Neighbors, C. (2009). A brief live interactive normative group intervention using wireless keypads to reduce drinking and alcohol consequences in college student athletes. *Drug and Alcohol Review, 28*(1), 40-47.

Malinauskas, R. (2010). The association among social support, stress, and life satisfaction as perceived by injured college athletes. *Journal of Social Behavior and Personality, 38,* 741-752.

Marcello, R. J., Danish, S. J., & Stolberg, A. L. (1989). An evaluation of strategies developed to prevent substance abuse among student-athletes. *Sport Psychologist, 3*(3), 196-211. Retrieved from http://jproxy.lib.ecu.edu/login?url=http://search.ebscohost.com.jproxy.lib.ecu.edu/login.aspx?direct=true&db=s3h&AN=20735270&site=ehost-live&scope=site

Maron, B. J., Haas, T. S., Murphy, C. J., Ahluwalia, A., & Rutten-Ramos, S. (2014). Incidence and causes of sudden death in U.S. college athletes. *Journal of the American College of Cardiology, 63*(16), 1636-1643.

Martens, M. P., Dams-O'Connor, K., & Beck, N. C. (2006). A systematic review of college student-athlete drinking: Prevalence rates, sport-related factors, and interventions. *Journal of Substance Abuse Treatment, 31*(3), 305-316.

Martens, M. P., Kilmer, J. R., Beck, N. C., & Zamboanga, B. L. (2010). The efficacy of a targeted personalized drinking feedback intervention among intercollegiate athletes: A randomized controlled trial. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors, 24*(4), 660-669.

Mastroleo, N. R., Scaglione, N., Mallett, K. A., & Turrisi, R. (2013). Can personality account for differences in drinking between college athletes and non-athletes? explaining the role of sensation seeking, risk-taking, and impulsivity. *Journal of Drug Education, 43*(1), 81-95.

McDaniel, S. H. (1995). Collaboration between psychologists and family physicians: Implementing the biopsychosocial model. *Professional Psychology: Research and Practice, 26*(2), 117-122.

McKnight, C. M., & Juillerat, S. (2011). Perceptions of clinical athletic trainers on the spiritual care of injured athletes. *Journal of Athletic Training, 46*(3), 303.

Miller, K. E., & Hoffman, J. H. (2009). Mental well-being and sport-related identities in college students. *Sociology of Sport Journal, 26*(2), 335-356.

Moore, M. (2016). Do psychosocial services make the starting lineup? Providing services to student-athletes. *Journal of Amateur Sport, 2*(2), 50-74.

National Collegiate Athletic Association (2010). *Student-athlete ethnicity* [Data file]. Retrieved from: http://www.ncaapublications.com/productdownloads/SAEREP11.pdf

National Collegiate Athletic Association. (2013). *NATA, NCAA and others announce mental health recommendation*. Retrieved from http://www.ncaa.org/about/resourc es/media-center/news/nata-ncaa- and-others-announce-mental-health- recommendations.

National Collegiate Athletic Association (2015). *Student-athlete participation* [Data file]. Retrieved from https://www.ncaa.org/sites/default/files/Participation%20Rates%20Final.pdf

National Collegiate Athletic Association (2016). "Results from the 2015 GOALS study of the student-athlete experience." Presented at the NCAA Convention, 2016, San Antonio, TX.

National Collegiate Athletic Association Sport Science Institute, NCAA. Mental Health Best Practices: Inter-Association Consensus Document: Best Practices for Understanding and Supporting Student-Athlete Mental Wellness. Indianapolis, IN: NCAA; 2016.

National Collegiate Athletic Association (2018). NCAA Demographics Database [Data visualization dashboard]. Retrieved from http://www.ncaa.org/about/resources/research/ncaa-demographics-database

Neal, T. L., Diamond, A. B., Goldman, S., Klossner, D., Morse, E. D., Pajak, D. E., …Welzant, V. (2013). Mental health and the college student athlete: Developing a plan to recognize and refer student athletes with psychological concerns at the collegiate level. *Journal of Athletic Training, 50*(3), 231-249.

Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan — a web and mobile app for systematic reviews. *Systematic Reviews, 5*:210.

Perna, F. M., Antoni, M. H., Baum, A., Gordon, P., & Schneiderman, N. (2003). Cognitive behavioral stress management effects on injury and illness among competitive athletes: A randomized clinical trial. *Annals of Behavioral Medicine: A Publication of the Society of Behavioral Medicine, 25*(1), 66-73.

Proctor, S. L., & Boan-Lenzo, C. (2010). Prevalence of depressive symptoms in male intercollegiate student-athletes and nonathletes. *Journal of Clinical Sport Psychology, 4,* 204–220.

Reardon, C. L., & Factor, R. M. (2010). Sport psychiatry: a systematic review of diagnosis and medical treatment of mental illness in athletes. *Sports Medicine, 40*(11), 961-980.

Savoy, C., & Beitel, P. (1997). The relative effect of a group and group/individualized program on state anxiety and state self-confidence. *Journal of Sport Behavior, 20*(3), 364-376. Retrieved from http://www.biomedsearch.com/article/relative-effect-group-program-state/20139674.html

Schulz, K. F., Altman, D. G., & Moher, D. (2010). CONSORT 2010 Statement: updated guidelines for reporting parallel group randomized trials. *Open Med, 4*(1), 60-68.

Smith, R. C., Fortin, A. H., Dwamena, F., & Frankel, R. M. (2013). An evidence-based patient centered method makes the biopsychosocial model scientific. *Patient Education and Counseling, 91*(3), 265-270.

Smith, A., & Petrie, T. (2008). Reducing the risk of disordered eating among female athletes: A test of alternative interventions. *Journal of Applied Sport Psychology, 20*(4), 392-407.

Stewart, T. M., Plasencia, M., Han, H., Jackson, H., & Becker, C. B. (2014). Moderators and predictors of response to eating disorder risk factor reduction programs in collegiate female athletes. *Psychology of Sport & Exercise, 15*(6), 713-720.

Sudano, L. E., & Miles, C. M. (2016). Mental health services in NCAA division I athletics: A survey of head ATCs. *Sports Health: A Multidisciplinary Approach, 9*(3), 262-267.

Thomas, B. H., Ciliska, D., Dobbins, M., & Micucci, S. (2004). A process for systematically reviewing the literature: Providing the research evidence for public health nursing interventions. *Worldviews on Evidence-Based Nursing, 1*(3), 176-184.

Underwood, L. G., & Teresi, J. A. (2002). The daily spiritual experience scale: Development, theoretical description, reliability, exploratory factor analysis, and preliminary construct validity using health-related data. *Annals of Behavioral Medicine, 24*(1), 22-33.

Varnes, J. R., Stellefson, M. L., Janelle, C. M., Dorman, S. M., Dodd, V., & Miller, M. D. (2013). A systematic review of studies comparing body image concerns among female college athletes and non-athletes, 1997–2012. *Body Image, 10*(4), 421-432.

Vidic, Z., Martin, M. S., & Oxhandler, R. (2017). Mindfulness intervention with a U.S. women's NCAA division I basketball team: Impact on stress, athletic coping skills and perceptions of intervention. *Sport Psychologist, 31*(2), 147-159.

Watson, J. C. (2005). College student-athletes attitudes toward help-seeking behavior and expectations of counseling. *Journal of College Student Development, 46*(4), 442-449.

Watson, J. C., & Kissinger, D. B. (2007). Athletic participation and wellness: Implications for counseling college student-athletes. *Journal of College Counseling, 10*(2), 153-162.

Wilson, G., & Pritchard, M. (2005). Comparing sources of stress in college student athletes and non-athletes. *The Online Journal of Sport Psychology. 7*(1), 1 – 8.

Wolanin, A., Hong, E., Marks, D., Panchoo, K., & Gross, M. (2016). Prevalence of clinically elevated depressive symptoms in college athletes and differences by gender and sport. *British Journal of Sports Medicine, 50*(3), 167–171.

Wolanin, A. T., & Schwanhausser, L. A. (2010). Psychological functioning as a moderator of the MAC approach to performance enhancement. *Journal of Clinical Sport Psychology, 4*(4), 312 – 322.

Wright, L. M., Watson, W. L., & Bell, J. M. (1996). *Belief: The heart of healing in families and illness.* New York: Basic Books.

Yang, J., Peek-Asa, C., Corlette, J. D., Cheng, G., Foster, D. T., & Albright, J. (2007). Prevalence of and risk factors associated with symptoms of depression in competitive collegiate student athletes. *Clinical Journal of Sport Medicine, 17*, 481–487.

Yang, J., Schaefer, J. T., Zhang, N., Covassin, T., Ding, K., & Heiden, E. (2014). Social support from the athletic trainer and symptoms of depression and anxiety at return to play. *Journal of Athletic Training, 49*(6), 773-779.

Yang, J., Tibbetts, A. S., Covassin, T., Cheng, G., Nayar, S., & Heiden, E. (2012). Epidemiology of overuse and acute injuries among competitive collegiate athletes. *Journal of Athletic Training, 47*(2), 198–204.

Yusko, D., Buckman, J., White, H., & Pandina, R. (2008). Alcohol, tobacco, illicit drugs, and performance enhancers: A comparison of use by college student athletes and nonathletes. *Journal of American College Health, 57*(3), 281-290.

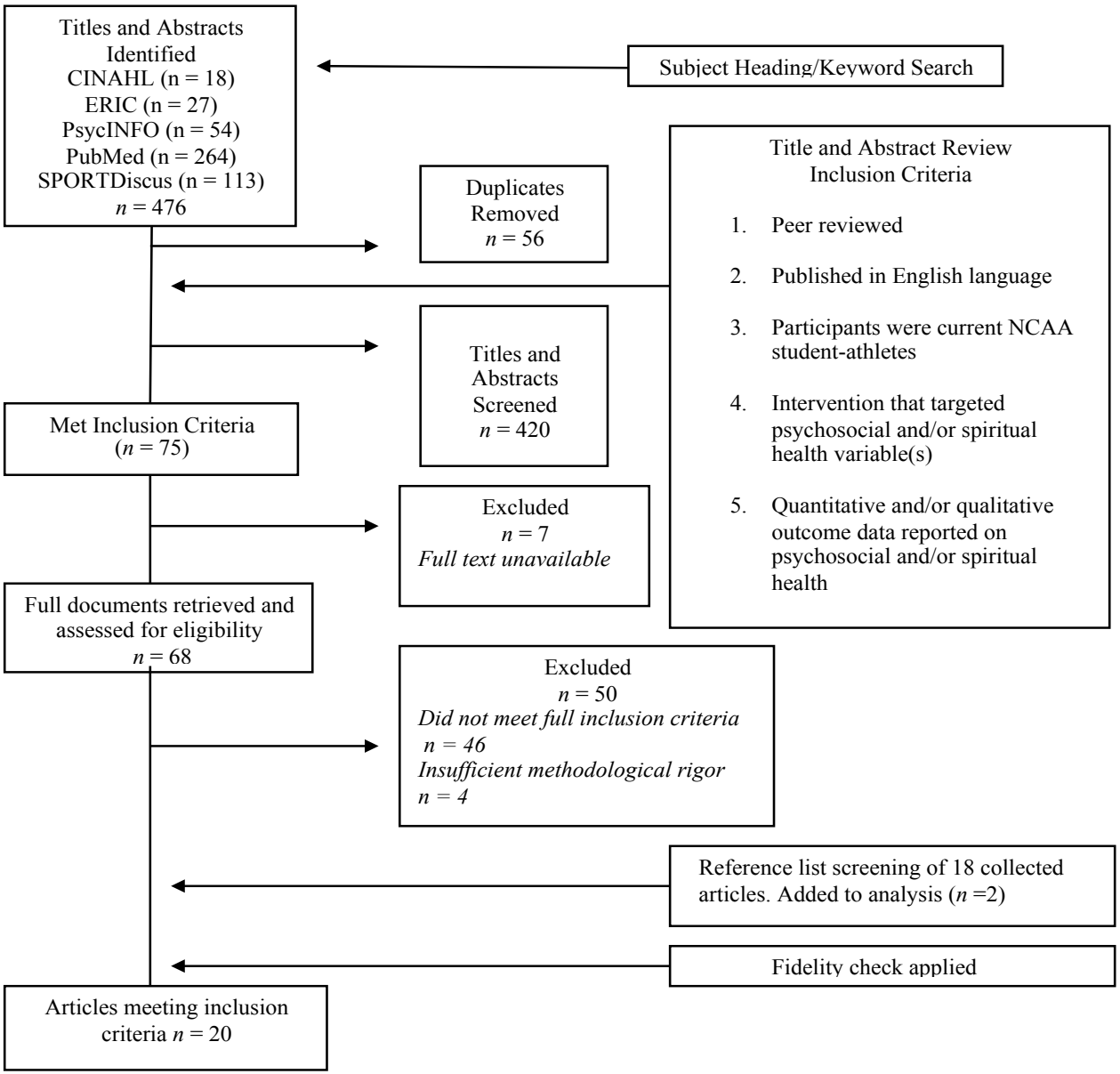

Figure 1. Flow Chart of Included Articles for Review

Table 1. Sample Characteristics of Articles Included in the Review ($N = 20$).

First Author Year	*N* (Male-Female)	Race/Ethnicity (% of Sample)	Sport Played
Abood et al. 2000	70 (0-70)	Caucasian (85.7%), Hispanic (7.1%), African American (5.7%), Asian: (1.4%)	Diving, X-Country, Track, Swimming, Softball, B-ball, V-ball
Baltzell et al. 2014	42 (0-42)	Caucasian (100%)	Soccer, Rowing
Becker et al. 2012	157 (0-157)	Hispanic (7%), Non-Hispanic (93%), Caucasian (74.4%), American Indian/Alaskan native (2.4%), Asian (2.4%), African American (1.2%), > one race (4.8%), did not answer (14.8%)	B-ball, Swimming & Diving, Softball, Tennis, X-Country, Soccer, V-ball, Golf, Track & Field, Cheerleading
Buffington et al. 2016	153 (0-153)	Caucasian (75%), African American (19%), Hispanic (5.9%), Asian (3.2%), Native American (1.3%)	B-ball, Swimming & Diving, V-ball, Soccer, Tennis, Cheering, X-Country, Track, Fencing
Cimini et al. 2015	141 (60-81)	IG: Caucasian (88.4%), Black/African American (7.0%), Latino/a (2.3%), Mixed race/ethnicity (2.3%) CG: Caucasian (75.3%), Black/African American (15.5%), Latino/a (4.1%), Asian/Pacific Islander (3.1%), mixed race/ethnicity (2.1%)	Not Reported
Cogan et al. 1995	14 (0-14)	IG: Caucasian (100%) CG: Caucasian (85.7%), African American (14.3%)	Gymnastics
Curry et al. 2003	Pre-Post Data: (n = 62); CB Homework Data: (n = 291); Coach Rating Data: (n = 168)	Pre-Post Data: Caucasian (90%), African American (8%), Hawaiian or Native American (>2%) CB Homework Data: Caucasian (85%), African American (12%), Hawaiian or Native American (> 3%) Coach Rating Data: Caucasian (88%), African American (8%), Hawaiian or Native American (>4%)	All university varsity sports teams
Garza et al. 2009	4 (0-4)	Not Reported	Softball
Goodman et al.	26 (26-0)	IG: African American (84.6%), Caucasian (7.7%), other (7.7%)	Not Reported

2014		CG: Caucasian (46.2%), Asian (30.8%), Hispanic (15.4%), African American (7.7%)	
Holm et al. 1996	62	Not Reported	Football, Swimming
LaBrie et al. 2009	660 (290-370)	Caucasian (72.1%), no other race/ethnicity reported	All university varsity sports teams
Marcello et al. 1989	58 (29-29)	Not Reported	Not Reported
Martens et al. 2010	263 (63-200)	Caucasian (85.5%), Asian/Pacific Islander (5.0%), Hispanic/Latino (1.9%), Black/African American (1.9%), other (5.7%)	Not Reported
Perna et al. 2003	34 (14-20)	Not Reported	Rowing
Savoy et al. 1997	10 (0-10)	Not Reported	B-ball
Smith et al. 2008	29 (0-29)	Caucasian (82%), African American (4%), Hispanic (7%), Native American (7%)	Golf, Swimming, Softball, Soccer, V-ball, Tennis, Track & Field, B-ball
Stewart et al. 2014	157 (0-157)	Caucasian (75.8%), no other race/ethnicity reported	B-ball, Swimming & Diving, Softball, Tennis, X-Country, Soccer, V-ball, Golf, Track & Field, Cheerleading
Vidic et al. 2017	13 (0-13)	Not Reported	B-ball
Wolanin et al. 2010	20 (0-20)	Not Reported	V-ball, Field Hockey
Yang et al. 2014	387 (256-131)	Caucasian (74.9%), non-Caucasian (24.9%)	Baseball, B-ball, Football, Wrestling, Field Hockey, Soccer, Softball, V-ball
Note. IG = intervention group; CG = control group; CB = cognitive-behavioral; B-ball = basketball; V-ball = volleyball; X-Country = cross country			

Table 2. Summary of Interventions and Findings of Included Studies ($N = 20$).

First Author, Year	Intervention	Summary of Findings
Abood et al., 2000	IG: 8-week health education intervention. CG: Regularly scheduled study hall sessions.	IG: experienced ↓ body dissatisfaction and drive for thinness. SAs who experienced ↑ self-esteem and sport anxiety experienced ↓ in drive for thinness. CG experienced ↓ in self-esteem.
Baltzell et al., 2014	IG: 14 mindfulness meditation for sport trainings. CG: Regularly scheduled sport training.	IG: experienced ↑ in mindfulness scores. No differences in positive or negative emotions, psychological well-being, or satisfaction with life. CG: reported ↑ levels of negative emotions and no change in mindfulness
Becker et al., 2012	IG-1: athlete-modified dissonance prevention (AM-DPB) IG-2: athlete-modified healthy weight intervention (AM-HWI).	Both IGs: reported ↓ thin-ideal internalization, dietary restraint, bulimic pathology, shape and weight concern, and negative affect at 6 weeks, and ↓ bulimic pathology, shape concern, and negative affect at 1 year. Qualitative results suggested AM-HWI may be more preferred by SAs.
Buffington et al., 2016	IG-1: Combined energy balance and CBT-based intervention IG-2: CBT-based intervention only CG: No intervention	Both IGs: experienced ↓ in body fat % and anxiety symptoms. SAs reported ↑ ability to cope with anxiety/stress (not significant). CG: reported ↑ perceived stress and ↑ anxiety (not significant).
Cimini et al., 2015	In-person, individual-level prevention strategies incorporating motivational interviewing and cognitive-behavioral content.	SAs experienced ↓ in alcohol use frequency and quantity, ↓ alcohol-related negative consequences, and ↑ use of protective behaviors (e.g., drinking in a controlled manner). SAs exhibited a ↓ in perceptions of typical students' weekly drinking that approached actual campus norms.
Cogan et al., 1995	Season-long, multidimensional sport psychology intervention	SAs had ↑ levels of social cohesion during initial part of competitive season. SAs reported ↓ in cognitive and somatic levels of anxiety from end of preseason through middle of competitive season.
Curry et al., 2003	Academic course combining psychological skills training and life skills education for SAs	SAs demonstrated post-intervention ↑ in hope, self-esteem, and sport confidence. Coaches rated SAs ↑ in achievement-to-date, leadership skills, confidence, peaking under pressure, and coping.
Garza et al., 2009	3-stage intervention: (1) overview of relationship between performance and anxiety; (2) breathing technique implemented by mental health clinician; (3) measuring program effects	Breathing technique ↑ SAs control over/being less intimidated by anxiety and ↓ SAs heart rate during the implementation and program phases. SAs reported ↓ anxiety and feelings of apprehension/nervousness.

Goodman et al., 2014	8, 90-min mindfulness-based sessions, followed by 60-min Hatha yoga sessions.	Sas reported ↑ mindfulness and goal-directed energy, and ↓ perceived stress. SAs reported ↑ importance of valued life domains post intervention (not sig.)
Holm et al., 1996	IG: 7 weekly 2-hour group sessions implementing a variety of cognitive-behavioral interventions. CG: Wait-list (no intervention)	IG: showed ↓ in anxiety, and ↑ in academic performance and psychological skills associated with successful athletic performance compared to CG. Both IG and CG showed similar improvements in athletic performance.
LaBrie et al., 2009	A brief live interactive normative group intervention using wireless keypads.	SAs reported ↓ in perceived group norms, behavior, attitudes, and consequences related to alcohol use at 1- and 2-month follow-up, resulting in ↓ drinking behavior and negative consequences.
Marcello et al., 1989	IG: Substance abuse awareness and prevention program consisting of 3 components: (1) education, (2) skill training for prevention, and (3) skills to deal with peer pressure. CG: Delayed intervention	IG reported ↓ in trait anxiety and CG reported ↑ in trait anxiety. All other change scores yielded non-significant results.
Martens et al., 2010	IG-1: Electronically delivered personalized drinking feedback (PDF) specific to SAs. IG-2: Standard PDF intervention (not specific to SAs) IG-3: Education-only that included information targeted to SAs	IG-1: SAs reported ↓ peak blood alcohol concentration (BAC) at 6-month follow-up compared to other conditions. SAs reported ↓ peak BAC than those in other conditions at 1-month follow-up and ↓ peak BAC than those in EO condition at the 6-month follow-up. In-season SAs in IG-1 reported ↓ drinks/week than SAs in IG-2 at 1-month follow-up.
Perna et al., 2003	IG: 7-session cognitive-behavioral stress management program with stress-inoculation training. CG: 2-hour stress management education session.	IG: experienced ↓ in number of illness/injury days and reported half the number of health service visits compared to CG.
Savoy et al., 1997	IG-1: 10-week program using centering, focusing, and imagery. IG-2: 10-week program using positive self-talk and energizing (psyching up).	SAs experienced ↓ in state cognitive and somatic anxiety in both groups. Only SAs in IG-2 showed positive change in state self-confidence.
Smith et al., 2008	IG-1: Cognitive-dissonance based intervention IG-2: Healthy weight psychoeducation program CG: Wait-list (no intervention)	IG-1: SAs experienced ↓ in sadness/depression and internalization of a physically fit and in-shape body type, and ↑ in body satisfaction.

Stewart et al., 2014	IG-1: Athlete-modified cognitive dissonance-based program IG-2: Athlete-modified healthy weight intervention program	IG-1: SAs showed ↑ in negative affect compared to SAs in IG-2. SAs with ↑ dietary restraint/negative affect at baseline showed ↓ response to both interventions at 6-weeks.
Vidic et al., 2017	10-session mindfulness-based intervention	SAs showed ↓ in stress and ↑ in athletic coping skills. Qualitative results revealed SAs reported ↑ awareness, control, focus, presence, and relaxation.
Wolanin et al., 2010	IG-1: 7-week Mindfulness-Acceptance-Commitment performance enhancement intervention. CG: No intervention	IG experienced greater ↑ in coaches' ratings of athletic performance, and smaller ↓ in performance over the course of a long season compared to CG.
Yang et al., 2014	Social support (SS) received from Athletic Trainers (ATs) during recovery from injury	SAs who were satisfied/very satisfied with SS from ATs were ↓ likely to report symptoms of depression/anxiety at return to play compared to athletes who were dissatisfied with the SS received from ATs.
Note. Authors in bold font indicate randomized controlled trials; IG = intervention group; CG = control group; SA = student-athlete		

Table 3. Risk of Bias for Randomized Controlled Trials (*n* = 6).

Author, Year	Random Sequence Generation	Allocation Concealment	Blinding of Participants and Personnel	Blinding of Outcome Assessment	Incomplete Outcome Data	Selective Reporting	Overall Rating
Abood et al., 2000	[2] Insufficient information about the sequence generation process	[2] Insufficient information to permit judgment of "High Risk" or "Low Risk"	[2] Insufficient blinding information to permit judgment of "High Risk" or "Low Risk"	[3] Pretests and posttests were administered to participants by researchers	[1] Low level of attrition (Four percent)	[1] Results related to all outcome measures were reported	High Risk
Buffington et al., 2016	[2] Insufficient information about the sequence generation process	[2] Insufficient information to permit judgment of "High Risk" or "Low Risk"	[2] Insufficient blinding information to permit judgment of "High Risk" or "Low Risk"	[2] Insufficient blinding information to permit judgment of "High Risk" or "Low Risk"	[1] Low level of attrition (Eight percent)	[1] Results related to all outcome measures were reported	Unclear Risk
Holm et al., 1996	[2] Insufficient information about the sequence generation process	[2] Insufficient information to permit judgment of "High Risk" or "Low Risk"	[2] Insufficient blinding information to permit judgment of "High Risk" or "Low Risk"	[2] Insufficient blinding information to permit judgment of "High Risk" or "Low Risk	[1] Low level of attrition (13 percent)	[1] Results related to all outcome measures were reported	Unclear Risk
Marcello et al., 1989	[2] Insufficient information about the sequence	[2] Insufficient information to permit judgment of "High Risk" or "Low Risk"	[3] The first author either attended or presented all sessions of the	[3] The first author either attended or presented all sessions of the	[3] 70 percent of study participants did not complete the research requirements	[1] Results related to all outcome measures were reported	High Risk

	generation process		intervention program	intervention program	from start to finish		
Martens et al., 2010	[1] Randomization occurred through a random number table	[2] Insufficient information to permit judgment of "High Risk" or "Low Risk"	[2] Insufficient blinding information to permit judgment of "High Risk" or "Low Risk"	[2] Unclear whether researchers had knowledge of treatment groups when assessing effects	[1] Procedures were used to address instances of missing data. All effects remained statistically significant, and effect sizes were almost identical regardless of whether data were analyzed with complete cases only or with the last observation carried forward.	[1] Results related to all outcome measures were reported	Unclear Risk
Perna et al., 2003	[1] Randomization occurred through a random number table	[3] Randomization allocation was managed by the primary investigator	[2] Insufficient blinding information to permit judgment of "High Risk" or "Low Risk"	[1] Medical personnel assigned to document number of health center and training room visits and the number of days	[1] All 34 participants were included in analyses	[1] Results related to all outcome measures were reported	High Risk

				each participant was ill or injured were blinded			
Note. [1]Low Risk of Bias; [2]Unclear Risk of Bias; [3]High Risk of Bias.							

Table 4. Quality Assessment for Non-Randomized Studies (*n* = 14)

Author, Year	Selection Bias	Study Design	Confounders	Blinding	Data Collection Method	Withdrawals and Dropouts	Global Rating
Baltzell et al., 2014	3	1	1	3	1	3	3 (WEAK)
Becker et al., 2012	2	1	1	1	3	2	2 (MODERATE)
Cimini et al., 2015	3	2	3	2	1	3	3 (WEAK)
Cogan et al., 1995	3	1	3	2	1	1	3 (WEAK)
Curry et al., 2003	3	3	3	2	1	2	3 (WEAK)
Garza et al., 2009	3	2	1	2	3	1	3 (WEAK)
Goodman et al., 2014	3	1	3	2	1	2	3 (WEAK)
LaBrie et al., 2009	1	2	1	2	3	2	2 (MODERATE)
Savoy et al., 1997	3	2	1	2	1	3	3 (WEAK)
Smith et al., 2008	2	1	1	2	1	1	1 (STRONG)
Stewart et al., 2014	2	2	3	2	1	1	2 (MODERATE)
Vidic et al., 2017	3	2	1	2	1	1	2 (MODERATE)
Wolanin et al., 2010	3	1	3	2	3	1	3 (WEAK)
Yang et al., 2014	1	2	1	2	3	2	2 (MODERATE)
Note. 1 = Strong Rating; 2 = Moderate Rating; 3 = Weak Rating							

Table 5. Description of Outcome Measures Used in Studies Reviewed.

Abbreviation	Measure (Reference)	Measure Description	Study
AAQ-II	Acceptance and Action Questionnaire Version–II (Bond et al., 2011)	17-item measure used to assess psychological inflexibility (i.e., experiential avoidance). The AAQ-II assesses the degree to which one is able and likely to tolerate unwanted internal experiences (e.g., "My painful memories prevent me from having a fulfilling life")	Goodman et al. (2014)
ACSI-28	Athletic Skills Coping Inventory-28 (Smith, Schutz, Smoll, & Ptacek, 1995)	28-item measure comprised of the following seven subscales: (1) coping with adversity, (2) peaking under pressure, (3) goal setting/mental preparation, (4) concentration, (5) freedom from worry, (6) self-confidence/achievement motivation, and (7) coachability, which can be totaled to yield a Personal Coping Resource score reflecting a multifaceted psychological coping construct.	Vidic et al. (2017)
AHS	Adult Hope Scale (Snyder et al., 1991)	12-item measure used to assess hope, defined as a positive motivational state oriented toward achieving goals. The AHS consists of two four-item subscales: Agency, or goal-directed energy (e.g., "I energetically pursue my goals") and Pathway, or goal planning (e.g., "I can think of many ways to get the things in life that are important to me")	Curry et al. (2003); Goodman et al. (2014)
AI	Assertion Inventory (Gambrill & Richey, 1975)	40-item Likert scale that requires participants to rate both the degree of discomfort they feel in a series of situations and their probability of behaving assertively in each situation.	Marcello et al. (1989)
AUDIT	Alcohol Use Disorders Identification Test (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993)	A 10-item self-report measure that assesses a range of alcohol-related experiences	Cimini et al. (2015)
BAA-R	Beliefs About Attractiveness Scale-Revised (Petrie, Rogers, Johnson, & Diehl, 1996)	19-item scale that assesses societal values concerning attractiveness: Importance of Being Physically Fit and In Shape, and Importance of Being Thin and Attractive	Smith et al. (2008)

BAM	Brief Assessment of Mood (Dean, Whelan, & Meyers, 1989)	A 6-item version of the 65-item Profile of Mood States (POMS), which assessed the severity of six mood states experienced within the last week.	Perna et al. (2003)
BIPS	Brief Inventory of Perceived Stress (Lehman, Burns, Gagen, & Mohr, 2012)	A self-report measure of perceived stress that provided a quantitative measurement of an individual's perceived stress	Buffington et al. (2016)
BPSS-R	Body Parts Satisfaction Scale-Revised (Petrie, Tripp, & Harvey, 2002)	11-item scale that measures one's satisfaction with body. For each body part listed, individuals rate their level of satisfaction using a 6-point Likert scale	Smith et al. (2008)
BSQ-10-R	Body Shape Questionnaire-Revised (Mazzeo, 1999)	10-item questionnaire that assesses one's degree of body satisfaction or preoccupation	Smith et al. (2008)
BULIT-R	Bulimia Test-Revised (Thelen, Mintz, & Van der Wal, 1996)	36-item measure that assesses the symptoms of bulimia nervosa as defined in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (APA, 1994)	Smith et al. (2008)
BYAACQ	Brief Young Adult Alcohol Consequences Questionnaire (Kahler, Strong, & Read, 2005)	24 'yes' or 'no' items assessing past month consequences of alcohol consumption (e.g. 'I have woken up in an unexpected place after heavy drinking')	LaBrie et al. (2009); Martens et al. (2010)
CES-D	Center for Epidemiological Studies Depression Scale (Radloff, 1977)	A 20-item self-report scale intended to assess depression in the general population. It consists of statements that may reflect individuals' feelings throughout the week.	Yang et al. (2014)
CRP	Coaches' Ratings of Performance (Wolanin & Schwanhausser, 2010)	The coach of each participant was asked to complete a measure rating the player's performance on a scale ranging from 1 to 10. Additionally, coaches rated athletes on variables that may mediate performance improvements, including concentration, strength, competitiveness, motivation, quickness, tness, endurance, mechanics, aggressiveness, and agility.	Wolanin et al. (2010)

CSAI-2	Competitive State Anxiety Inventory-2 (Martens, Burton, Vealey, Bump, & Smith, 1990)	A 27-item sport specific, self-report inventory that measures cognitive anxiety (CSAI-cog), somatic anxiety (CSAI-som), and self-confidence (CSAI-sc) in competitive situations	Cogan et al. (1995); Garza et al. (2009); Savoy et al. (1997)
CSAQ	Cognitive-Somatic Anxiety Questionnaire (Schwartz, Davidson & Coleman, 1978)	14-item self-report questionnaire, purports to measure both cognitive and somatic components of anxiety. Considered to be a measure of trait anxiety, developed to assess relatively enduring aspects of anxiety.	Holm et al. (1996)
DAKS	Drug and Alcohol Knowledge Scale (Marcello, Danish, & Stolberg, 1989)	12-item multiple-choice questionnaire developed by the first author to assess the student-athlete's general and sports-specific knowledge about alcohol and drugs and their use and abuse.	Marcello et al. (1989)
DASS-21	Depression Anxiety Stress Scale (Henry & Crawford, 2005)	21-item measure used to assess baseline psychological distress on three dimensions: depression, anxiety, and stress	Goodman et al. (2014)
DDQ	Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985)	A self-report measure requesting estimation of the individual's "typical" alcohol consumption per day over the last 30 days. The instrument also assesses drinking frequency, peak number of drinks, frequency of heavy episodic drinking, and the age at which drinking began.	Cimini et al. (2015); Martens et al. (2010)
DDS	Drexel Defusion Scale (Forman et al., 2012)	10-item measure used to assess the ability to achieve psychological distance (i.e., defuse) from thoughts and feelings	Goodman et al. (2014)
DNRF	Drinking Norms Rating Form (Baer, Stacy, & Larimer, 1991)	Asks participants to estimate how many drinks an individual from a given reference group consumed in a typical week over the last month by giving daily estimates. The instrument also assesses perceptions of drinking frequency, peak number of drinks, and frequency of heavy episodic drinking	Cimini et al. (2015); Martens et al. (2010)
DRES	Dutch Restrained Eating Scale (Van Strien, Frijters, Van Staveren, & Defares, 1986)	A 10-item measure that assesses the extent of current dieting behaviors	Becker et al. (2012); Smith et al. (2008);

			Stewart et al. (2014)
EDE-Q (Shape and Weight subscales)	Eating Disorder Examination-Questionnaire (Fairburn & Bèglin, 1994)	10-item measure that assess to what degree participants engaged in bulimic behaviors over the past 28 days. The shape concern subscale is an eight-item subscale assessing how frequently participants were concerned about their shape over the past 28 days. The five-item weight concern subscale assessed how often participants were concerned about their weight over the past 28 days.	Becker et al. (2012); Stewart et al. (2014)
EDI-2	Eating Disorder Inventory-2 (Garner, Olmsted, & Polivy, 1983)	91-item measure consisting of three scales specific to eating disorders (i.e., drive for thinness, bulimia, body dissatisfaction), and eight general psychological scales (e.g., social insecurity, interpersonal distrust, perfectionism)	Abood et al. (2000)
GAD-7	General Anxiety Disorder Scale (Spitzer, Kroenke, Williams, & Lowe, 2006)	A seven-item questionnaire used as a screening tool and severity measure for anxiety levels	Buffington et al. (2016)
GADS	Generalized Anxiety Disorder Scale (Wells, 1997)	30-item self-report measure, which assesses the degree to which individuals avoid situations, attempt to control their worries, and believe in their thoughts. Some items on this measure were altered to pertain to athletic situations	Wolanin et al. (2010)
GEQ	Group Environment Questionnaire (Carron, Widmeyer, & Brawley, 1985)	An 18-item questionnaire that assesses athletes' perceptions of team cohesiveness on four dimensions: (a) individual attractions to group-task (ATG-T), (b) individual attractions to group-social (ATG-S); (c) group integration-task (GI-T); and (d) group integration-social (GI-S).	Cogan et al. (1995)

Grit-S	Short Grit Scale (Duckworth & Quinn, 2009)	Eight-item measure used to assess psychological grit, a trait-like perseverance and passion for long-term goals. (e.g., "New ideas and projects sometimes distract me from previous ones").	Goodman et al. (2014)
HAQ	House Acceptability Questionnaire (Larimer, 1992)	Two items were adapted from the House Acceptability Questionnaire (e.g. 'becoming intoxicated at a party' and 'missing a class because you are intoxicated or hung-over'). Three additional items were created for this study (i.e. 'getting drunk during in-season', 'drinking within 3 days of a match/game' and 'initiating new members of the team with activities involving alcohol').	LaBrie et al. (2009)
IBSS–R	Ideal Body Stereotype Scale—Revised (Stice & Agras, 1998)	On this measure, participants indicate how much they agree or disagree with certain statements promoting the thin-ideal standard of female beauty (e.g., "slender women are more attractive").	Becker et al. (2012); Stewart et al. (2014)
LESCA	Life-Event Scale for College Athletes (Petrie, 1992)	A 69-item measure specifically developed for an athlete population to assess the impact, from –4 (extremely negative) to +4 (extremely positive), of 69 possible life events experienced within the last year.	Perna et al. (2003)
MAAS	Mindful Attention Awareness Scale (Brown & Ryan, 2003)	A 15-item self-report measure that assesses the individual's tendency of awareness and attention to every day internal and external experiences: higher scores reflect higher levels of mindfulness	Baltzell et al. (2014); Goodman et al. (2014)
MCQ	Metacognitions Questionnaire (Cartwright-Hatton & Wells, 1997)	65-item self-report questionnaire, which assesses positive and negative beliefs regarding worry and intrusive thoughts, as well as metacognitive ability.	Wolanin et al. (2010)
PANAS	Positive Affect and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988)	A 20-item scale that assesses ten negative moods and ten positive moods	Baltzell et al. (2014)

PANAS–X	Positive Affect and Negative Affect Schedule—Revised (Watson & Clark, 1992)	A 17-item measure that assesses to what degree participants are feeling various emotions (e.g., nervous, guilty, scared) over the past few weeks	Becker et al. (2012); Smith et al. (2008); Stewart et al. (2014)
PBSS	Protective Behaviors Strategies Scale (Martens et al., 2005)	15-item self-report measure that addresses protective alcohol use behaviors across 3 domains: limiting consumption, manner of drinking, and harm reduction	Cimini et al. (2015)
PSIS	Psychological Skills Inventory for Sport (Mahoney, Gabriel, & Perkins, 1987)	45-item questionnaire that identifies several types of psychological skills relevant to athletic training and performance. The six subscales making up the inventory include: Anxiety, Concentration, Confidence, Mental Preparation, Motivation, and Team Emphasis.	Holm et al. (1996)
PSS	Perceived Stress Scale (Cohen, Kamarck, and Mermelstein, 1983)	14-item measure used to assess the amount of perceived stress an individual has felt in the past month.	Goodman et al. (2014)
PSS-10	Perceived Stress Scale-10 (Cohen & Williamson, 1988)	10-item scale used to determine an individual's perceived stress asking how overloaded, uncontrollable and unpredictable a participant perceives their life to be	Vidic et al. (2017)
PWBS	Psychological Well-Being Scale (Ryff, 1995)	A 54-item self-report measure with six subscales assessing psychological well-being: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance	Baltzell et al. (2014)
RAPI	Rutgers Alcohol Problem Index (Neal, Corbin, & Fromme, 2006)	23-item self-report measure that assesses alcohol-related consequences across a single factor	Cimini et al. (2015)
RAPI-A	Rutgers Alcohol Problem Index Athlete Version	32-item Athlete Version of the RAPI developed by constructing survey items focused on student-athletes and their experiences with alcohol	Cimini et al. (2015)

RSES	Rosenberg Self-Esteem Scale (Rosenberg, 1965)	10-item scale used to assess self-esteem	Abood et al. (2000); Curry et al. (2003); Marcello et al. (1989)
SACS	Self-Assessment of Coping Skills (Marcello, Danish, & Stolberg, (1989)	27-item questionnaire developed by the first author to measure the participant's self-perceived level of coping and decision-making skills.	Marcello et al. (1989)
SAS	Sport Anxiety Scale (Smith, Smoll, & Schutz, 1990)	21-item measure of multidimensional trait anxiety that assesses somatic anxiety (9 items), worry (7 items), and concentration disruption (5 items)	Abood et al. (2000)
SCAT	Sport Competition Anxiety Test (Martens, Vealey, & Burton, 1990)	15-item measure used as a self-report, sport performance-anxiety measure. Sport competition anxiety indicates how an individual generally feels during sport/game competition.	Abood et al. (2000); Garza et al. (2009)
SCI	Sport Confidence Inventory (Vealey, 1986)	13-item unidimensional measure of overall sport confidence designed to measure a person's trait confidence in sport performance settings	Curry et al. (2003); Goodman et al. (2014)
SSQ	Social Support Questionnaire (Sarason, Levine, Basham, & Sarason, 1983)	Each item in the six-item Social Support Questionnaire assesses 2 dimensions. The first dimension measures the number of individuals who provided the injured athlete with help or support in various situations during the recovery. The second dimension of each item assesses the athlete's degree of satisfaction with the social support received from each individual.	Yang et al. (2014)
STAI	State-Trait Anxiety Inventory (Spielberger et al., 1968)	40-item self-report scale designed to measure a relatively stable predisposition to experience anxiety (A-trait) as well as situation-specific changes in anxiety level (A-state). This instrument was used to indicate level of adjustment in the current study.	Marcello et al. (1989)

STAI	State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970)	40-item measure that includes 20 items to measure state anxiety and 20 items to measure trait anxiety.	Yang et al. (2014)
SWLS	Satisfaction with Life Scale (Diener, Emmons, Larson, & Griffin, 1985)	A 5-item scale that assesses the individual's general satisfaction with life	Baltzell et al. (2014)
TNASS	Tolerance of Negative Affect States Scale (Bernstein and Brantz, 2012)	25-item measure used to assess the capacity to experience and withstand specific negative psychological states. The TNASS contains 6 state-specific subscales: tolerance of fear/distress, tolerance of sadness/depression, tolerance of anger, tolerance of disgust, tolerance of anxiety/apprehension, and tolerance of negative social emotional emotions	Goodman et al. (2014)
UPAS	Usage Pattern and Attitude Scale (Adapted from the Life Skills Training Questionnaire developed by Botvin (1983))	42-item questionnaire that was adapted from the Life Skills Training Questionnaire developed by Botvin (1983). Part I of this instrument measures the amount and frequency of an individual's alcohol, drug, and tobacco use as well as the usage patterns of one's friends and family ("social/environmental risk factors"). Part II assesses an individual's attitude toward alcohol, drugs, and tobacco use.	Marcello et al. (1989)
VLQ	Valued Living Questionnaire (Wilson, Sandoz, Kitchens, & Roberts, 2011)	20-item measure used to assess commitment to values across 10 life domains (e.g., family, friendships, recreation, employment, spirituality). The VLQ consists of two 10-item subscales that measure the importance and consistency an individual places on each life domain.	Goodman et al. (2014)

CHAPTER 4: METHODOLOGY

Hundreds of thousands of student-athletes participate in National Collegiate Athletic Association (NCAA) varsity sports each year. Participation in intercollegiate sports can be an uplifting experience that helps student-athletes develop life skills such as work ethic, teamwork, and learning how to overcome failure and adversity (Chen, Snyder, & Manger, 2010; Watson & Kissinger, 2007). However, balancing the dual role of being a full-time student and elite athlete can be a demanding task—one that poses challenges to the physical, mental, social, and spiritual health and well-being of student-athlete participants.

Research teams have highlighted that, when compared to their non-athlete counterparts, student-athletes experience psychosocial concerns (e.g., depression, perceived stress, substance abuse) at similar or higher rates (Cox, 2015; Mastroleo et al., 2013; Reardon & Factor, 2010). Results from the National College Health Assessment (American College Health Association, 2012) highlighted the prevalence of mental health concerns among student athletes. For example, 21% of male student-athletes and 28% of female student-athletes reported feeling so depressed that it was difficult to function in the last 12 months. Additionally, nearly half of female student-athletes and one-third of male student-athletes reported experiencing overwhelming anxiety in the last year.

Recent literature has highlighted the impact of adverse childhood experiences—defined broadly as child maltreatment and household dysfunction (Felitti et al., 2008)—on biopsychosocial (BPS) health outcomes. For example, researchers have found that adults who reported ACEs were three times more likely to suffer from depression (Chapman et al., 2004) and engage in risky behaviors such as illicit drug use (Schilling et al., 2007) and problematic alcohol use (Rothman et al., 2008). Additionally, ACEs have been linked to various cancers

(Brown et al., 2010), diseases (Dong et al., 2003; Dube et al., 2009), premature mortality (Brown et al., 2009; Kelly-Irving et al., 2013), attempted suicide (Brockie et al., 2015; Dube et al., 2001), and psychotic symptoms (Whitfield et al., 2005) in adulthood.

Given that NCAA student-athletes are faced with unique biological, psychological, social, and spiritual health demands (Kimball & Freysinger, 2003; Mastroleo, Scaglione, Mallett, & Turris, 2013; Proctor & Boan-Lenzo, 2010; Reardon & Factor, 2010), and respecting the link between adverse childhood experiences (ACEs) and various physical and psychosocial health outcomes (Anda et al., 2010; Chapman et al., 2004) across different populations, our primary aim for this exploratory study is twofold: (a) to gain a more comprehensive understanding of the biopsychosocial-spiritual (BPSS) health and well-being of NCAA student-athletes, and (b) to explore the impact of ACEs on student-athlete BPSS health. To our knowledge, there is a dearth of research examining the interconnectedness and relationships among biological, psychological, social, and spiritual health variables among NCAA student-athletes. Further, there is scant research exploring the impact of childhood-traumas (e.g., ACEs) on the biological, psychological, social, and spiritual health in the student-athlete population (Kaier, Cromer, Davis, & Strunk, 2015). Results from this study will provide a more comprehensive understanding of NCAA student-athlete health and offer valuable insight into how ACEs and spirituality impact student-athletes' physical and mental health. As a result, researchers, coaches, athletic trainers, and other athletics department personnel may better develop treatments and interventions that address the biological, psychological, social, and spiritual domains of student-athlete wellness.

Research Questions and Hypotheses

The purpose of this exploratory study was to examine the interplay among ACEs, biological health variables, psychological health variables, social health variables, and spirituality among NCAA student-athletes. Our primary aim was to determine if there were significant relationships within and between various BPSS health domains among student-athletes. Additionally, we were interested in exploring if ACEs influence the different biological, psychological, and social health variables of student-athletes. Last, we wanted to test if spirituality moderated the relationship between ACEs and the biopsychosocial (BPS) health of student-athletes. Specifically, we were interested in answering the following research questions: (a) What is the relationship among ACEs, biological health, psychological health, social health, and spirituality among student-athletes? and (b) Do ACEs predict biological, psychological, and social health outcomes in student-athletes, and (c) does spirituality moderate the relationship between ACEs and BPS health outcomes? In doing so, we sought to test the following hypotheses:

1. Consistent with prior research linking injury to psychosocial challenges (e.g., Putukian, 2016), we hypothesized that there would be a positive relationship between biological health variables (e.g., athletic injury, physical health related concerns) and psychological health variables (e.g., depression, perceived stress, anxiety, substance use).
2. Based on findings that social support is associated with psychological concerns (Armstrong & Oomen-Early, 2009), we hypothesized that there would be a negative relationship between social support and depression, perceived stress, and anxiety.
3. Consistent with work linking spirituality to physical and mental health outcomes (Bryant & Astin, 2008; Wong, Rew, & Slaikeu, 2006), we hypothesized that there would be a

negative relationship between spirituality and both biological (e.g., injury/health problems) and psychological (e.g., depression, anxiety, stress) health variables.

4. In line with findings from prior research highlighting the impact of ACEs on BPS health outcomes (e.g., Mersky et al., 2013), we hypothesized that ACEs would positively predict injury/physical health problems, depression, anxiety, perceived stress, and substance use and negatively predict social support while controlling for sex, race, college, and division.
5. Based upon prior findings that spirituality may buffer the impact between stressful life events and psychological health (Young, Cashwell, & Shcherbakova, 2000), we hypothesized that spirituality will moderate the relationship between ACEs and BPS health outcomes (controlling for sex, race, college, and division), such that at higher levels of spirituality, the impact of ACEs on BPS health outcomes will be weaker (negatively associated), and at lower levels of spirituality, the impact of ACEs on BPS health outcomes will be stronger (positively associated).

Study Design

To address our aforementioned research questions and hypotheses, we will employ a cross-sectional, web-based, quantitative survey using research electronic data capture (REDCap; Harris et al., 2009) hosted at East Carolina University to recruit a diverse NCAA student-athlete sample from institutions of higher education throughout the country. Researchers recommend using web-based, quantitative, surveys in social science research due to their convenience, cost-effectiveness, and accessibility (Connelly, 2016). The survey (Appendix B) will include approximately 151 questions using Likert-type scales, open-ended questions, and dichotomous (e.g., yes/no) responses. The questions included in the survey were selected to capture biological,

psychological, social, and spiritual health variables relevant to student-athletes, in addition to adverse and protective/compensatory experiences during childhood.

Participants

Inclusion criteria for participants in this study included the following: (a) is a current NCAA student-athlete (Division I, II, or III), (b) is over 18 years old, (c) is fluent in the English language, and (d) has access to the Internet.

Procedure

Prior to data collection, we will receive approval from the Institutional Review Board of East Carolina University (Appendix A). Next, we will recruit student-athletes via social media platforms (e.g., Facebook, Twitter, Instagram; Appendix C) and through snowball sampling procedures (Creswell, 2009). On the various social media platforms, the principal investigator (PI) will provide a general description of the study's purpose and a hyperlink to the online consent and REDCap survey documents. Also, to promote the inclusion of a diverse sample of student-athletes from different sports throughout the country, the PI will reach out to coaches and athletic directors at various NCAA institutions via email (Appendix D) and phone call solicitation (Appendix E). Student-athletes who express interest in the study will be emailed a link to an online REDCap survey that will include the informed consent, demographic questionnaire, ACEs questionnaire, and various biological, psychological, social, and spiritual health measures detailed below. Prior to IRB approval, the survey was piloted with a group of former NCAA student-athletes ($N = 14$) and took an average of 14.1 minutes ($SD = 3.54$) to complete.

Measures

The measures selected for this study were intended to capture common BPSS health outcomes in the college student-athlete population. Additionally, we included measures intended to capture various negative childhood experiences (i.e., ACEs) of student-athletes. Specifically, participants of various NCAA varsity sports teams will be asked to complete self-report measures in the following areas: (a) demographics, (b) biological health, (c) psychological health, (d) social health, (e) spirituality, and (f) adverse childhood experiences.

Demographic Questionnaire

We will collect the following demographic information (k = 16): age, sex, race/ethnicity, sexual orientation, sport team (along with name of institution), year of eligibility (i.e., [medical] redshirt, freshman, sophomore, junior, senior), role on the team (e.g., starter, 2nd string), athletic scholarship (yes/no), history of any clinically diagnosed mental health (e.g., depression, anxiety, ADHD) and/or medical health (e.g., asthma, diabetes, hypertension) conditions, relationship status (including duration of relationship if not single), and number of children. Additionally, this questionnaire included a subsection of questions related to participants' perceptions about access to, availability of, and attitudes toward mental health resources (k = 16).

Biological Health Variables

The assessment of biological health variables in the context of overall health is critical (Engel, 1977, 1980). Biological health variables generally capture physical/physiological symptoms related to overall health and functioning. The following measure will be administered to more comprehensively understand the physical health of the student-athlete population examined in this study.

Athletic injury and health concerns. Athletic injury and physical health-related concerns will be measured using the Oslo Sports Trauma Research Center (OSTRC) Questionnaire on Health Problems (QHP: Clarsen, Ronsen, Myklebust, Florenes, & Bahr, 2014). The QHP is a 4-item questionnaire used to assess the history of an athlete's illness/injury and the impact on athletic performance during the past week (e.g., "To what extent have you reduced training volume due to injury, illness or other health problems during the past week?"). Additional questions instruct participants to specify whether the health problem is an injury or illness and to indicate the number of training/competition days (0 to 7) missed due to the injury/illness. In a previous study of male and female athletes (N = 142) preparing for the Olympic and Paralympic Games, the QHP was found to be a reliable (Chronbach's alpha = 0.97) and valid measure (Clarsen et al., 2014).

Psychological Health Variables

When conceptualizing health through a BPSS framework, it is likewise essential to assess psychological health variables that contribute to one's overall health and well-being (Engel, 1977, 1980). In general, psychological health variables encompass one's mental, emotional, and behavioral functioning. The following measures will be administered in order to more comprehensively understand the psychological health of the student-athlete participants in this study.

Depression. Depressive symptoms will be measured using the 9-item Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001). The PHQ-9 a widely used self-report measure for depression designed to assess symptoms of depression in nine different categories (e.g., anhedonia, feeling down, poor appetite) as defined by the American Psychiatric Association Diagnostic and Statistical Manual, fifth edition (DSM-5; APA, 2013). Participants

are instructed to indicate how often they have been bothered by various depressive symptoms (e.g., "Feeling down, depressed, or hopeless") during the past two weeks. Response options for each item include 0 (*not at all*), 1 (*several days*), 2 (*more than half the days*), and 3 (*nearly every day*). Scores are summed and range from 0 to 27, with higher scores indicating greater depressive symptoms (note: cut points of 5, 10, 15, and 20 represent mild, moderate, moderately severe, and severe levels of depressive symptoms). In a racially diverse sample of male and female college students ($N = 857$), the PHQ-9 was found to be a valid and accurate (Chronbach's alpha = 0.89) measure of depression (Keum, Miller, & Inkelas, 2018).

Anxiety. Student-athletes will complete the 7-item Generalized Anxiety Disorder Scale (GAD-7; Spitzer, Kroenke, Williams, & Lowe, 2006). The GAD-7 is a self-report questionnaire that assesses the presence and severity of anxiety symptoms. This measure scores seven of the core criteria for generalized anxiety disorder (e.g., feeling nervous, anxious, or on edge; not being able to stop or control worrying; trouble relaxing) on a scale from 0 (*not at all*) to 3 (*nearly every day*) as experienced during the past two weeks. Scores of 5, 10, and 15 are used as cut-off points for mild, moderate, and severe anxiety symptoms, respectively. Scores of 8 or higher are indicative of a possible clinical anxiety condition and require further evaluation by a licensed mental health counselor (Spitzer et al., 2006). Evidence supports the high internal consistency (Chronbach's alpha = 0.89) and validity of the GAD-7 in the general population (Löwe et al., 2008).

Stress. Student-athletes' perceived stress will be measured using the 10-item Perceived Stress Scale (PSS-10; Cohen, Kamarck, & Mermelstein, 1983). The PSS-10 measures the degree to which respondents find their lives to be unpredictable, uncontrollable, and overloading—three components that have been found to be central components of perceived stress. Respondents rate

each item (e.g., “In the last month, how often have you found that you could not cope with all the things that you had to do?”) on a 5-point Likert-type scale ranging from 0 (*never*) to 4 (*very often*). After reverse scoring four items, scores are summed to produce an overall score ranging from 0-40 (0-13 = *low stress*, 14-26 = *moderate stress*, 27-40 = *high stress*). Predictive validity of the PSS-10 has been demonstrated with depression, engagement in healthy behavior, and use of health services (Cohen & Williamson, 1988). Lee (2012) found that the PSS demonstrates acceptable test-retest reliability and internal consistency (i.e., Chronbach’s alpha > 0.70) across 12 different studies with adult populations. In a sample of male and female university athletes (N = 123), the PSS was deemed reliable with a Chronbach’s alpha of .90 (Malinauskas, 2010).

Substance use and abuse. Student-athlete substance use/abuse will be assessed using survey items that were adapted from previous surveys inquiring about NCAA student-athlete substance use (NCAA Study of Substance Use of College Student-Athletes, 2006). The survey items (k = 30) instructed participants to respond to questions about the following substances: (a) tobacco products, (b) alcohol, (c) amphetamines, and (d) marijuana. Recency of substance use was surveyed with an item that asked, “Have you recently used any [name of substance]?” Response options include, “Yes, in the last month,” “Yes, in the last 12 months,” and “No.” Frequency of substance use was assessed with an item that asked, “How often do you use [name of substance]?” Participants were also asked to identify the reason they use the various substances (e.g., “What is the ONE MAIN REASON you use [name of substance]?”). Responses include answers such as, “Recreational or social purposes,” and “Improves my athletic performance.” Additionally, respondents were asked to indicate what effect (i.e., harmful, no effect, helpful) the various substances had on their athletic performance. Finally, the student-athletes were asked to estimate how many of their teammates had used any of the various

substances in the last 12 months. Responses included: (a) none, (b) almost none, (c) less than half, and (d) more than half.

Social Support

Perceptions of social support will be measured using the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988). The MSPSS is a 12-item scale comprised of three distinct subscales with four items each: family support, friend support, and significant other support. Respondents rate each item (e.g., "I get the emotional help and support I need from my family") on a 7-point Likert-type scale ranging from 1 (*very strongly disagree*) to 7 (*very strongly agree*). Scoring is based on the mean scores of the three subscales and is broken down into the following categories: *low* support (scores = 1-2.9); *moderate* support (scores = 3-5); and *high* support (score = 5.1-7). The MSPSS has been found to be a valid measure of social support, having a strong correlation with the Social Support Behaviors Scale (Kazarian & McCabe, 1991). Reliability of the MSPSS has been shown to be satisfactory in prior research with Chronbach's alpha ranging from .81 to .98 (Wongpakaran, Wongpakaran, & Ruktrakul, 2011; Zimet et al., 1988). In a sample of university athletes (N = 412), Malinauskas and Malinauskiene (2018) found the MSPSS to be a reliable measure of social support (Chronbach's alpha = .78).

Spirituality

Spirituality will be assessed using items (k = 12) from three subscales (i.e., spiritual connection, meaning of life, and spiritual strength) from the Spirituality, Religion and Personal Beliefs (SRPB) component of the World Health Organization's Quality of Life Instrument (WHOQOL; WHOQOL SRPB Group, 2006). Facets of the SRPB were first suggested by an international consultation of health professionals representing various religions (e.g., Buddhists,

Muslims, Christians, Jews) and were subsequently reviewed, and confirmed to be relevant by 92 focus groups (N = 701) in 15 countries across 4 religions. The subscales used in the current study assessed participants' spirituality in the following areas: (a) spiritual connection (e.g., "To what extent does any connection to a spiritual being help you get through hard times?"), (b) meaning of life (e.g., "To what extent do you feel your life has purpose?"), and (c) spiritual strength (e.g., "To what extent can you find spiritual strength in difficult times?"). All items are rated on a 5-point Likert-type scale (1 = *not at all;* 2 = *a little;* 3 = *a moderate amount;* 4 = *very much;* 5 = *an extreme amount*) and higher scores endorse greater spirituality. In a worldwide sample (N = 5087) with male and female participants ranging in age from 16 to 90 (M = 41.3, SD = 15.3), reliability for the three subscales was strong with Chronbach's alpha ranging from .77 to .91 (WHOQOL SRPB Group, 2006).

Adverse Childhood Experiences

To assess student-athletes' experiences with childhood trauma, we will use the Childhood Experiences Survey (CES; Mersky, Janczewski, & Topitzes, 2017). The CES is a 17-item questionnaire that expands upon the original 10-item Adverse Childhood Experience Questionnaire (Felitti et al., 1998) that measured three types of child abuse (i.e., physical, sexual, and emotional), and five types of household dysfunction (i.e., substance abuse, mental illness, domestic violence, incarceration/jail, and divorce/separation). In addition to the original 10 items, the CES includes seven additional items related to childhood trauma: five forms of household adversity (i.e., frequent family financial problems, food insecurity, homelessness, prolonged parental absence, and death of a parent or sibling), and two forms of adversity that occur outside the household (i.e., frequent peer victimization, violent crime victimization; Mersky et al., 2017). Item responses are dichotomous (yes = 1, no = 0), and all 17 items are

summed to create a composite score. Mersky and colleagues (2017) found that the CES demonstrated excellent test-retest reliability (ICC = 0.91) and acceptable internal consistency (Cronbach's $\alpha = .82$).

Data Analysis Plan

The researchers will employ structural equation modeling (SEM) as the primary method of data analysis for this study. SEM is recommended by Tabachnick and Fidell (2007) as a useful analytical strategy to examine relationships between measured variables and latent constructs, allowing researchers to estimate multiple and interrelated dependence in a single analysis. Moreover, SEM allows researchers to simultaneously examine systemic relationships among complex, multi-faceted constructs. Missing data will be handled using full information maximum likelihood (FIML), which researchers have found to be an unbiased method for the handling of missing data (Enders & Bandalos, 2009). All data analyses will performed in R (R Core Team, 2016) using the *lavaan* package (Rosseel, 2012).

To assess the relationship between childhood experiences, biological, psychological, social, and spiritual health variables (RQ1), we will first examine descriptive statistics and fit a confirmatory factor analysis (CFA) to investigate bivariate correlations for all measured variables. Next, after accounting for missing data, outliers, multicollinearity, and normality, the data will be fit into a structural equation model to examine the relationships between and among the various BPSS variables and childhood experiences. Latent regression analysis will be conducted to determine if ACEs predict the biological (e.g., injury/health problems), psychological (e.g., depression, anxiety), and social health (e.g., social support) variables (RQ2). Last, we will test the potential moderating effect of spirituality on the relationship between ACEs and BPS health variables (RQ3). The goodness of fit of the proposed model will be assessed

using the following recommended fit indices (Hu & Bentler, 1999): (a) Standardized Root Mean Square Residuals (SRMR); (b) Root Mean Square of Approximation (RMSEA); (c) Tucker Lewis Index (TLI); and (d) Comparative Fit Index (CFI).

Ethical Considerations

The researchers were mindful of the sensitive nature of many of the survey questions, particularly those pertaining to ACEs, substance use, and mental health symptoms/concerns. Therefore, to ensure participant comfort and safety, we will take the following steps: (a) construct a survey using REDCap (Harris et al., 2009), which is a secure, web-based, HIPAA (2010) compliant modality, (b) create informed consent materials that will clearly state that no identifiable information will be shared in any publications, and that all results will be shared via aggregate, non-identifiable statistics, (c) identify ourselves as researchers from East Carolina University and state that we have no affiliation with the NCAA or law enforcement, and (d) provide participants with national resources (e.g., National Suicide Prevention Lifeline)—and encourage the seeking out of local resources (e.g., on-campus mental health services)—to assist with any behavioral health concerns that may arise.

REFERENCES

American College Health Association. American College Health Association-National College Health Assessment II: Undergraduate Reference Group Executive Summary Spring 2012. Hanover, MD: American College Health Association; 2012.

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Anda, R. F., Butchart, A., Felitti, V. J., & Brown, D. W. (2010). Building a framework for global surveillance of the public health implications of adverse childhood experiences. *American Journal of Preventive Medicine, 39*(1), 93-98. doi:10.1016/j.amepre.2010.03.015

Armstrong, S., & Oomen-Early, J. (2009). Social connectedness, self-esteem, and depression symptomatology among collegiate athletes versus nonathletes. Journal of American College Health, 57(5). 521-526.

Brockie, T.N., Dana-Sacco, G., Wallen, G.R., Wilcox, H.C., & Campbell, J.C. (2015). The relationship of adverse childhood experiences to PTSD, depression, poly-drug use and suicide attempt in reservation-based Native American adolescents and young adults. *American Journal of Community Psychology, 55,* 411-421. doi: 10.1007/s10464-015-9721-3

Brown, D., Anda, R., Felitti, V., Edwards, V., Malarcher, A. M., Croft, J., & Giles, W. (2010). Adverse childhood experiences are associated with the risk of lung cancer: A prospective cohort study. *BMC Public Health, 10*(1), 20-20. doi:10.1186/1471-2458-10-20

Brown, D. W., Anda, R. F., Tiemeier, H., Felitti, V. J., Edwards, V. J., Croft, J. B., Giles, W. H. (2009). Adverse childhood experiences and the risk of premature mortality. *American Journal of Preventive Medicine*, *37*(5):389 –96.

Chapman, D. P., Whitfield, C. L., Felitti, V. J., Dube, S. R., Edwards, V. J., & Anda, R. F. (2004). Adverse childhood experiences and the risk of depressive disorders in adulthood.*Journal of Affective Disorders, 82*(2), 217-225. doi:10.1016/j.jad.2003.12.013

Chen, S., Snyder, S., & Magner, M. (2010). The effects of sport participation on student-athletes' and non-athlete students' social life and identity. *Journal of Issues in Intercollegiate Athletics, 3,* 176-193.

Clarsen, B., Rønsen, O., Myklebust, G., Flørenes, T. W., & Bahr, R. (2014). The oslo sports trauma research center questionnaire on health problems: A new approach to prospective monitoring of illness and injury in elite athletes. *British Journal of Sports Medicine*, *48*(9), 754-760. doi:10.1136/bjsports-2012-092087

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*(4), 385-396. doi:10.2307/2136404

Cohen, S., & Williamson, G. (1988). Perceived stress in a probability sample of the United States. In S. Spacapan, & S. Oskamp (Eds.), The social psychology of health: Claremont symposium on applied social psychology. Newbury Park, CA: Sage.

Connelly, R., Playford, C. J., Gayle, V., & Dibben, C. (2016). The role of administrative data in the big data revolution in social science research. *Social Science Research*, 59, 1-12. doi:10.1016/j.ssresearch.2016.04.015

Cox, C. (2015). *Investigating the prevalence and risk-factors of depression symptoms among NCAA Division I collegiate athletes.* Retrieved from Proquest Digital Dissertations. (1592018)

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Los Angeles: Sage.

Dong, M., Dube, S. R., Felitti, V. J., Giles, W. H., & Anda, R. F. (2003). Adverse childhood experiences and self-reported liver disease: New insights into the causal pathway. Archives of Internal Medicine, 163, 1949–1956.

Dube, S. R., Fairweather, D., Pearson, W. S., Felitti, V. J., Anda, R. F., & Croft, J. B. (2009). Cumulative childhood stress and autoimmune diseases in adults. *Psychosomatic Medicine, 71*(2), 243-250. doi:10.1097/PSY.0b013e3181907888

Dube, S. R., Anda, R. F., Felitti, V. J., Chapman, D. P., Williamson, D. F., & Giles, W. H. (2001). Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: Findings from the adverse childhood experiences study. *Jama, 286*(24), 3089-3096. doi:10.1001/jama.286.24.3089

Enders, C. K., & Bandalos, D. L. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling: A Multidisciplinary Journal, 8*(3), 430-457. doi:10.1207/S15328007SEM0803_5

Engel, G.L. (1980). The clinical application of the biopsychosocial model. *The American Journal of Psychiatry, 137*, 535–544.

Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science, 196,* 129-136. doi:10.1126/science.847460

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41,* 1149-1160. doi:10.3758/BRM.41.4.1149

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39,* 175-191. doi:10.3758/BF03193146

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . . Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ACE) study. *American Journal of Preventive Medicine, 14*(4), 245-258. doi:10.1016/S0749-3797(98)00017-8

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, *42*(2), 377-381. doi:10.1016/j.jbi.2008.08.010

Health Insurance Portability and Accountability Act of 1996. (HIPAA, 2010). 42 U.S. C. 1320d-9.

Hu, L.-H., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*, 1-55. doi:10.1080/10705519909540118

Kazarian, S. S., & McCabe, S. B. (1991). Dimensions of social support in the MSPSS: Factorial structure, reliability, and theoretical implications. *Journal of Community Psychology, 19*(2), 150-160. doi:10.1002/1520-6629(199104)19:2<150::AID-JCOP2290190206>3.0.CO;2-J

Kelly-Irving, M., Lepage, B., Dedieu, D., Bartley, M., Blane, D., Grosclaude, P., . . . Delpierre, C. (2013). Adverse childhood experiences and premature all-cause mortality. *European Journal of Epidemiology, 28*(9), 721-734. doi:10.1007/s10654-013-9832-9

Keum, B. T., Miller, M. J., & Inkelas, K. K. (2018). Testing the factor structure and measurement invariance of the PHQ-9 across racially diverse U.S. college students. *Psychological Assessment, 30*(8), 1096-1106. doi:10.1037/pas0000550

Kimball, A., & Freysinger, V. J. (2003). Leisure, stress, and coping: The sport participation of collegiate student-athletes. *Leisure Sciences, 25*(2-3), 115-141. doi:10.1080/01490400306569

Kroenke, K., M.D., Spitzer, R. L., M.D., Williams, J. B. W., D.S.W., & Löwe, Bernd, M.D., Ph.D. (2010). The patient health questionnaire somatic, anxiety, and depressive symptom scales: A systematic review. *General Hospital Psychiatry, 32*(4), 345-359. doi:10.1016/j.genhosppsych.2010.03.006

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2002). The PHQ-15: Validity of a new measure for evaluating the severity of somatic symptoms. *Psychosomatic Medicine*, *64*(2), 258-266. doi:10.1097/00006842-200203000-00008

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine, 16*(9), 606-613. doi:10.1046/j.1525-1497.2001.016009606.x

Lee, E. (2012). Review of the psychometric evidence of the perceived stress scale. *Asian Nursing Research, 6*(4), 121-127. doi:10.1016/j.anr.2012.08.004

Löwe, B., Decker, O., Müller, S., Brähler, E., Schellberg, D., Herzog, W., & Herzberg, P. Y. (2008). Validation and standardization of the generalized anxiety disorder screener (GAD-7) in the general population. *Medical Care, 46*(3), 266-274. doi:10.1097/MLR.0b013e318160d093

MacCallum, R. C., Browne, M. W., & Cai, L. (2006). Testing differences between nested covariance structure models: Power analysis and null hypotheses. *Psychological Methods, 11*, 19-35. doi:10.1037/1082-989X.11.1.19

Malinauskas, R. (2010). The associations among social support, stress, and life satisfaction as perceived by injured college athletes. *Social Behavior and Personality: An International Journal, 38*(6), 741-752. doi:10.2224/sbp.2010.38.6.741

Mastroleo, N. R., Scaglione, N., Mallett, K. A., & Turrisi, R. (2013). Can personality account for differences in drinking between college athletes and non-athletes? explaining the role of sensation seeking, risk-taking, and impulsivity. *Journal of Drug Education, 43*(1), 81-95. doi:10.2190/DE.43.1.f

Mersky, J. P., Janczewski, C. E., & Topitzes, J. (2017). Rethinking the measurement of adversity: Moving toward second-generation research on adverse childhood experiences. *Child Maltreatment, 22*(1), 58-68. doi:10.1177/1077559516679513

Mersky, J.P., Topitzes, J., & Reynolds, A.J. (2013). Impacts of adverse childhood experiences on health, mental health, and substance use in early adulthood: A cohort study of an urban, minority sample in the U.S. Child Abuse & Neglect, 37(11), 917-925. doi:10.1016/j.chiabu.2013.07.011

Morris, A. S., Hays-Grudo, J., Treat. A., Williamson, A., Roblyer, M. A., & Staton, J. (November, 2014). Protecting parents and children from adverse childhood experiences (ACEs): Preliminary evidence for the validity of the PACEs. Paper presented at the Society for Research in Child Development Special Topic Meeting: New Conceptualizations in the Study of Parenting- At-Risk, San Diego, CA.

Morris, A. S., Hays-Grudo, J., Williamson, Treat, A., Huffer, A., & Slocum, R. (2016). ACEs and PACEs: The development of the protective and compensatory experiences survey.

Paper presented at the World Association of Infant Mental Health, Prague, Czech Republic.

NCAA Study of Substance Use of College Student-Athletes, 2006.

Proctor, S. L., & Boan-Lenzo, C. (2010). Prevalence of depressive symptoms in male intercollegiate student-athletes and nonathletes. *Journal of Clinical Sport Psychology, 4,* 204–220. http://dx.doi .org/10.1123/jcsp.4.3.204

Putukian, M (2016). The psychological response to injury in student athletes: A narrative review with a focus on mental health. British Journal of Sports Medicine, 50, 145-148.

Reardon, C.L., & Factor, R.M. (2010). Sport psychiatry: a systematic review of diagnosis and medical treatment of mental illness in athletes. *Sports Medicine, 40*(11), 961-980. doi: 10.2165/11536580-000000000-00000.

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, *48*(2), 1–36.

Rothman, E. F., Dejong, W., Palfai, T., & Saitz, R. (2008). Relationship of age of first drink to alcohol-related consequences among college students with unhealthy alcohol use. *Substance Abuse, 29*(1), 33-41. doi:10.1300/J465v29n01_05

Schilling, E., Aseltine, R., Jr., & Gore, S. (2007). Adverse childhood experiences and mental health in young adults: A longitudinal survey. *BMC Public Health*, 7, 30. https://doi.org/10.1186/1471-2458-7-30

Schilling, E. A., Aseltine, J., Robert, H., & Gore, S. (2007). Adverse childhood experiences and mental health in young adults: A longitudinal survey. BMC Public Health, 7(1), 30-30. doi:10.1186/1471-2458-7-30

Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine, 166*(10), 1092-1097. doi:10.1001/archinte.166.10.1092

Spitzer, R. L., Kroenke, K., Williams, J. B. W., & and the Patient Health Questionnaire Primary Care Study Group. (1999). Validation and utility of a self-report version of PRIME-MD: The PHQ primary care study. *Jama, 282*(18), 1737-1744. doi:10.1001/jama.282.18.1737

Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics* (5th ed.). New York: Allyn and Bacon.

Watson, J.C., & Kissinger, D.B. (2007). Athletic participation and wellness: Implications for counseling college student-athletes. *Journal of College Counseling, 10*(2), 153-162. doi: 10.1002/j.2161-1882.2007.tb00015.x

Whitfield, C. L., Dube, S. R., Felitti, V. J., & Anda, R. F. (2005). Adverse childhood experiences and hallucinations. *Child Abuse & Neglect, 29*(7), 797-810. doi:10.1016/j.chiabu.2005.01.004

WHOQOL-SRPB Group (2006). A cross-cultural study of spirituality, religion, and personal beliefs as components of quality of life. *Social Science and Medicine*, *62*(6), 1486–1497.

Wong, Y.J., Rew, L., & Slaikeu, K.D. (2006). A systematic review of recent research on adolescent religiosity/spirituality and mental health. *Issues in Mental Health Nursing*, *27*(2), 161-183. doi:10.1080/01612840500436941

Wongpakaran, T., Wongpakaran, N., & Ruktrakul, R. (2011). Reliability and validity of the multidimensional scale of perceived social support (MSPSS): Thai version. *Clinical Practice and Epidemiology in Mental Health : CP & EMH, 7*(1), 161-166. doi:10.2174/1745017901107010161

Young, J. S., Cashwell, C. S., & Shcherbakova, J. (2000). The moderating relationship of spirituality on negative life events and psychological adjustment. *Counseling and Values*, *45*(1), 49. Retrieved from http://search.proquest.com.jproxy.lib.ecu.edu/docview/207566909?accountid=1063

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment, 52*(1), 30-41. http://dx.doi.org/10.1207/s15327752jpa5201_2

CHAPTER 5: BEYOND THE LINES: EXPLORING THE IMPACT OF ADVERSE CHILDHOOD EXPERIENCES ON NCAA STUDENT-ATHLETE HEALTH

Introduction

Nearly 500,000 student-athletes represent 24 National Collegiate Athletic Association (NCAA) sports teams throughout the country each year (NCAA, 2018). Although participation in sports can be a valuable and rewarding experience, balancing the dual role of full-time student and elite athlete is a demanding task that may predispose student-athletes to, and/or exacerbate, various biological (e.g., injury), psychological (e.g., depression, anxiety), social (e.g., diminished social life), and spiritual (e.g., sense of purpose) health concerns and challenges (Bryant, Choi, & Yasuno, 2003; Chen, Snyder, & Magner, 2010; Reardon & Factor, 2010; Wolanin, Hong, Marks, Panchoo, & Gross, 2016; Yang et al., 2012). As a result, student-athletes have been identified as a distinct sub-population across university and college campuses (Fletcher, Benshoff, & Richburg, 2003) and researchers, clinicians, and NCAA athletics' personnel have prioritized conducting research and developing interventions designed to improve their psychosocial health and well-being (e.g., Mental Health Best Practices; Rahman, 2016).

In addition to present-day biopsychosocial-spiritual (BPSS) stressors encountered by student-athletes, many may also be dealing with challenges related to adverse childhood experiences (ACEs). Since Felitti and colleagues' landmark study in 1998, a substantial body of research has linked ACEs (e.g., abuse, neglect, familial stressors) to adverse BPS health outcomes in various populations across the lifespan (see Hughes et al., 2017 for a review). Given that nearly 60% of adults have experienced at least one ACE (Monnat & Chandler, 2015), exposure to ACEs is recognized as a global health issue (Anda, Butchart, Felitti, & Brown, 2010). Although researchers continue to examine the impact of ACEs on subsequent BPS health

outcomes across various populations, research exploring the prevalence and impact of ACEs on BPSS health outcomes among NCAA student-athletes is scant.

The Biopsychosocial-Spiritual Health of NCAA Student-Athletes

In addition to common struggles experienced by their non-athlete university peers (e.g., moving away from home, meeting the demands of college coursework), student-athletes are faced with additional stressors that increase their risk for various BPSS health concerns such as chronic pain, symptoms of burnout, and injury (Hootman et al., 2007; Neal et al., 2013; Yang et al., 2007). Vetter and Symonds (2010) found that a majority of student-athletes experienced chronic injuries and frequent physical/mental exhaustion—both in-season and off-season. In fact, is has been estimated that over half of college athletes sustain at least one sport-related injury during their college career (Hootman et al., 2007), resulting in hundreds of thousands of injuries of varying degrees each year (Kerr et al., 2015). With the year-round demands of sport participation, pressure to perform, and risk of injury, mental health concerns such as depression, anxiety, and substance abuse are disproportionately high among student-athletes (Mastroleo, Scaglione, Mallett, & Turris, 2013; Proctor & Boan-Lenzo, 2010; Reardon & Factor, 2010).

While results from a systematic review indicated rates of depression between 15.6% and 21.0% in this population (Wolanin et al., 2016), Cox, Ross-Stewart, and Foltz (2017) discovered that one-third (33.2%) of student-athletes endorsed clinically relevant depressive symptoms, which is consistent with findings from other recent literature (Li, Moreland, Peek-Asa, & Yang, 2017). Moreover, Sudano and Miles (2017) found that 98.4% of athletic trainers reported depression as a common concern for their student-athletes. Even more alarming is the link between depression and mortality in this population, with 69.3% of athletic trainers reporting

suicidality as a concern for their athletes (Sudano & Miles, 2017) and suicide accounting for nearly 30% of all deaths (Maron, Haas, Murphy, Ahluwalia, & Rutten-Ramos, 2014).

Although the occurrence of specific anxiety disorders (e.g., generalized anxiety disorder) has been minimally studied in this population (Reardon & Factor, 2010), 97.6% of Division I athletic trainers stated that anxiety was a notable concern for student-athletes (Sudano, & Miles, 2017). Li and colleagues (2017) found that nearly one-third of student-athletes endorsed symptoms of anxiety (e.g., excessive worry, feeling tense) and highlighted a link between pre-season anxiety and injury occurrence. Further, a large 2015 NCAA study revealed that 30% of student-athletes felt "inextricably overwhelmed" during the past month. These findings are concerning given the positive link between anxiety, life stress, and sport-related injury (Mann, Bryant, Johnstone, Ivey, & Sayers, 2016). In an effort to discover the main sources of anxiety and stress among student-athletes, researchers found that academics, physical well-being, and diminished social life were among the greatest concerns (Hwang & Choi, 2016).

In addition to negatively impacting student-athletes' physical health, academic performance, and social lives, unmanaged stress may also contribute to their use/abuse of alcohol and/or other substances as potential coping mechanisms (Martens et al., 2006; Reardon & Creado, 2014). Compared to their age-related peers, student-athletes consume more alcohol, engage in more frequent binge-drinking episodes, and experience more negative consequences (e.g., getting injured) related to alcohol use (Martens et al., 2006). Moreover, an NCAA (2013) survey of nearly 21,000 student-athletes showed an increase in reported prescription/non-prescription stimulant and narcotic pain medication use and nearly 25% of participants endorsed marijuana use in the past year. Consequently, substance abuse is recognized as major health concern in this population (Martens et al., 2006).

Along with the above-mentioned physical and psychological health concerns, student-athletes are faced with various social challenges. While student-athletes experience many of the academic, emotional, and social concerns as their non-athlete peers (Wilson & Pritchard, 2005), they are also expected to manage several unique challenges, such as mandatory practice, training, film study, physical therapy, study hall, and other sport-related activities (Martens et al., 2006). Notably, data from the NCAA (2015) revealed that student-athletes spent upwards of 40 hours per week on athletic activities and nearly 80 hours per week on academics and athletics combined. Thus, it is not surprising that student-athletes reported higher rates of academic and relationship stress compared to their non-athlete counterparts (Wilson & Pritchard, 2005). For example, Sudano and Miles (2017) found that about 90% of athletic trainers have student-athletes experiencing family/relationship issues. Minority student-athletes may face even greater social challenges. Data from the NCAA (2015) highlighted that many athletes of color found their university campus and team environments to be non-inclusive and unaccepting, which is consistent with prior work indicating that minority athletes encounter a various stereotypical and discriminatory behaviors ("dumb jock") due to their race/ethnicity (Coakley, 2009).

Although there remains limited information about the role of spirituality in the student-athlete population, researchers have discovered a strong link between spirituality and better physical health (e.g., lower cancer risk), mental health (e.g., decreased depression and anxiety), greater life satisfaction, increased social support, and decreased suicide and alcohol/drug use/abuse (see Koenig, 2012 for a review). The few research teams that have explored the role of spirituality among student-athletes discovered notable findings. For example, McKnight and Juillerat (2011) found that a large majority of university athletic trainers agreed that incorporating spiritual views of student-athletes resulted in faster return to play following an

injury. Additionally, Dillon and Tait (2000) discovered that student-athletes with higher levels of spirituality (i.e., experiencing the presence of a power, an energy, or a God) had improved sport performance. These findings indicate a potential connection between spirituality, athletic performance, and various BPS domains of student-athlete health.

Adverse Childhood Experiences and Health Outcomes

Exposure to trauma, abuse, or neglect during childhood is recognized as a major global health issue (Anda et al., 2010). Consequently, research on the impact of ACEs—defined broadly as repeated exposure to child maltreatment (e.g., abuse, neglect) and/or household dysfunction (e.g., domestic violence; Felitti et al., 1998)—on BPS health outcomes has received increased attention over the past two decades. Specifically, researchers have established a connection between ACEs and several chronic diseases that account for the leading causes of death among U.S. adults such as cancer (Brown, Thacker, & Cohen, 2013) cardiovascular disease (Monnat & Chandler, 2015), chronic obstructive pulmonary disease (Cunningham et al., 2014), diabetes (Monnat & Chandler, 2015), obesity (Williamson et al., 2002), and hypertension (Riley et al., 2010). Strikingly, Brown and colleagues (2009) discovered that individuals who endorsed six or more ACEs died an average of 25 years earlier than those with no ACEs.

In addition to the established negative impact on physical health conditions, exposure to ACEs has been linked to a number of psychosocial health concerns such as depression (Campbell, Walker, & Egede, 2016; Karatekin, 2018; Lee & Chen, 2017; Mersky, Topitzes, & Reynolds, 2013), anxiety disorders (Karatekin, 2018; Mersky et al., 2013), social isolation (Schilling et al., 2007), decreased life satisfaction (Mersky et al., 2013), and suicide (Dube et al., 2001; Karatekin, 2018; Merrick et al., 2017). Of note, Chapman and colleagues (2004) found that individuals who experienced ACEs were almost three times more likely to suffer from

depression in adulthood compared to those with no history of ACEs. Disturbingly, Merrick and colleagues (2017) found that individuals who reported more than five ACEs were nearly 25 times more likely to attempt suicide. Finally, a large body of research has demonstrated strong links between ACEs and alcohol (Brady & Back, 2012; Lee & Chen, 2017; Merrick et al., 2017; Mersky et al., 2013), tobacco (Mersky et al., 2013; Spratt et al., 2009), illicit drug (Merrick et al., 2017; Schilling et al., 2007), and prescription drug use/abuse (Forster et al., 2017) later in life.

ACEs and Student-Athlete Health

Despite a robust body of evidence linking ACEs to subsequent deleterious health outcomes, research exploring the prevalence and impact of ACEs on BPS health outcomes in the student-athlete population is limited. In one study, 30.8% of Division I NCAA student-athletes ($N = 304$) endorsed at least one ACE (Kaier, Cromer, Davis, & Strunk, 2015). Consistent with findings from research with other populations, the authors found that ACEs were positively associated with somatization disorder, problematic alcohol use, and prescription medication use. In the only other known study exploring the prevalence and impact of ACEs on student-athlete health outcomes (Barnard, Athey, Killgore, Alfonso-Miller, & Grandner, 2018), ACEs were negatively linked to self-reported insomnia, sleep quality, and sleep duration.

Taken together, these findings highlight the profound impact of ACEs on a myriad of BPSS health concerns, many of which are faced by today's NCAA student-athletes. However, research exploring this relationship in the student-athlete population is sparse. Given that psychosocial health problems are considered the number one health and safety concern for student-athletes (NCAA, 2013), and likelihood that many student-athletes have experienced at least one ACE (McCormick, Carroll, Sims, & Currier, 2017), research investigating the prevalence and impact of ACEs on BPSS health outcomes in this population necessary.

BPS Systems Metatheory and Toxic Stress

The research design for the current study was informed by a theoretical framework that incorporates both the BPS systems metatheory (Anchin, 2008) and the theory of toxic stress (National Scientific Council on the Developing Child, 2005; 2014; Shern et al., 2016). The BPS framework (Engel 1977, 1980) posits that the *whole* person is comprised of biological, psychological, and sociocultural domains that are inextricably linked and systemically connected (i.e., "…each biological problem has psychosocial consequences and each psychosocial problem has biological correlates"; McDaniel, 1995, p. 117). The BPS systems metatheory provides a broad framework for conceptualizing health phenomena by acknowledging the interplay among the biological, psychological, *and* social domains of human functioning with equal importance. However, Anchin's (2008) metatheory lacks an essential domain of overall health and well-being. Wright and colleagues (1996) avowed that spirituality—broadly defined as one's search for purpose, meaning, and connection with a higher power—must also be considered when examining whole-person health.

In lieu of recent advances in neuroscience, genetics, and social and behavioral sciences, the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016) has emerged as a general theory to conceptualize the relationship between toxic stress (i.e., the effects of excessive activation of the stress response systems on a child's biophysiological development) and negative health outcomes. Indeed, researchers have recently discovered that experiencing ACEs—defined broadly as prolonged exposure to adversity (e.g., physical/emotional abuse, neglect, exposure to violence)—can cause structural remodeling of one's neural, endocrine, and immune systems, resulting in subsequent BPS health concerns

(Shern et al., 2016). Thus, the theory of toxic stress was selected as a supplementary theoretical framework to more fully explain the specific impact of ACEs on BPSS health outcomes.

NCAA student-athletes are faced with the demanding task of balancing the role of full-time student and elite-level athlete. Consequently, student-athletes have an increased risk for various BPSS health concerns that not only impact their athletic performance, but also their overall well-being (Mastroleo et al., 2013; Proctor & Boan-Lenzo, 2010; Reardon & Factor, 2010). Furthermore, despite robust evidence linking ACEs to adverse BPS health outcomes in the general population (e.g., Hughes et al., 2017), there remains scant literature examining the effects of ACEs and spirituality on student-athletes' overall health. Using the BPSS systems metatheory (Anchin, 2008; Engel, 1977, 1980; Wright et al., 1996) and the theory of toxic stress (National Scientific Council on the Developing Child, 2005, 2014; Shern et al., 2016) as the conceptual framework, this study seeks to fill these gaps and provide further insight into the interplay among ACEs and BPSS health outcomes among NCAA student-athletes.

Method

The purpose of this exploratory cross-sectional study was to examine the prevalence of, and interplay among, ACEs and BPSS health outcomes in a sample of NCAA student-athletes. Specifically, we addressed the following research questions: (a) What is the association among ACEs and BPSS health outcomes?, (b) Do ACEs predict BPS health outcomes?, and (c) Does spirituality moderate these relationships? Building upon prior work highlighting links among ACEs and BPSS health outcomes (e.g., Armstrong & Oomen-Early, 2009; Bryant & Astin, 2008; Mersky et al., 2013; Putukian, 2016; Young, Cashwell, & Shcherbakova, 2000), we tested the following hypotheses: (a) biological health (e.g., injury/physical health concerns) would be positively associated with psychological health (e.g., depression, perceived stress, anxiety,

substance use), (b) social support would be negatively associated with depression, perceived stress, and anxiety, (c) spirituality would be negatively associated with biological (e.g., injury/health problems) and psychological (e.g., depression, anxiety, stress) health, (d) ACEs would positively predict injury/physical health concerns, depression, anxiety, perceived stress, and substance use and negatively impact social support, and (e) spirituality would moderate the relationship between ACEs and BPS health outcomes, i.e., the impact of ACEs on BPS health would be weaker at high levels of spirituality and stronger at low levels of spirituality.

Participants

Eligibility requirements for participation included the following: (a) must be over 18 years old, (b), must be a current NCAA student-athlete (Division I, II, or III), (c) must be fluent in the English language, and (d) must have Internet access. This sample consisted of 477 NCAA male (n = 290, 60.8%) and female (n = 184, 38.6%) student-athletes who represented 20 different sports teams from 55 different colleges/universities. Participants ranged in age from 18 to 27 years old (M = 20.29, SD = 1.61) and identified predominantly as White (n = 342, 71.7%). The remaining sample identified as Black/African American (n = 62, 13.0%), multiracial (n = 41, 8.6%), Polynesian (n = 12, 2.5%), Asian (n = 9, 1.9%), other (n = 5, 1.0%), American Indian/Alaska Native (n = 1, 0.2%), and five participants (1.0%) preferred not to answer. Most student-athletes identified as Christian (n = 315, 66.0%), straight (n = 451, 94.5%), and single (n = 274, 57.4%). See Table 1 for sport-specific demographic information.

Procedures

Following Institutional Review Board approval, the principal investigator (PI) disseminated a general description of the study and survey link via social media outlets (i.e., Instagram, Facebook, Twitter), and to various professional resources (e.g., Society for Sport,

Exercise & Performance Psychology). Additionally, the PI made phone calls and sent an email with the study description and survey link to NCAA athletic directors and coaches at various colleges/universities across each division throughout the country. Of note, in addition to efforts made to recruit participants from various geographical areas, the PI emailed athletics personnel at over 20 historically black colleges/universities to maximize the racial diversity of the sample. Those who expressed interest in the study were emailed a link to the online survey. Per NCAA regulations, participants were unable to be compensated for their participation. Survey data were collected and managed using Research Electronic Data Capture (REDCap; Harris et al., 2009). REDCap is a secure, web-based application designed to support data captured for research studies. Given the sensitive nature of the data collected in this study, and the desire to recruit a diverse range of NCAA student-athletes, this HIPAA (2010)-compliant modality was deemed optimal.

Measures

The following demographic information was collected: (a) age, (b) sex, (c) race/ethnicity, (d) sexual orientation, (e) religious affiliation, (f) residence, (g) relationship status, (h) grade point average, and (i) mental/medical health history. Additionally, because of the study's focus, we captured the following information: (a) school name, (b) NCAA division, (c) sport team (including whether participants were in-season or off-season), (d) year of eligibility, (e) role on the team (e.g., starter, 2nd string), and (f) if they were receiving an athletic scholarship. School name and sport team information was collected only to account for nested data and to ensure we had data that was generalizable. All data were deidentified to protect the confidentiality of student-athlete participants. Next, student-athletes completed a total of seven measures used to capture the following BPSS health constructs: (a) injury/health problems, (b) depression, (c)

anxiety, (d) perceived stress, (e) substance use, (f) social support, and (g) spirituality. Finally, participants responded to questions inquiring about exposure to various ACEs such as childhood abuse, neglect, and family dysfunction. The survey contained of a total of 133 items and took an average of 14.1 minutes (*SD* = 3.54) to complete. See Table 2 for a more detailed description of the BPSS health and ACEs measures used in this study.

Data Analysis Plan

Data were cleaned in SPSS (Version 24) and analyzed using R statistical software (R Core Team, 2018). Confirmatory Factor Analyses (CFAs) and Structural Equation Models (SEMs) were conducted in R (R Core Team, 2018) using the *lavaan* package (Roseel, 2012). Prior to any analyses, data were screened for missingness and normality. CES scores were calculated in accordance with recommended guidelines (e.g., a response of "often" or "very often" was coded as 1; Mersky, Janczewski, & Topizes, 2017). Total scores were then calculated to create composite scores for conventional ACEs ($k = 10$), expanded ACEs ($k = 7$), and total combined ACEs ($k = 17$). Due to the positive skew of indicators for depression and anxiety constructs, the PHQ-9 and GAD-7 were treated as ordinal variables in all models. As a result, weighted least-squares estimation with pairwise deletion was incorporated for all analyses.

To assess the correlations among ACEs and the BPSS health variables (RQ1), a CFA was conducted using a fixed factor method of identification. SEMs were conducted to determine the impact of ACEs on biological (i.e., athletic injury/health problems), psychological (i.e., depression, anxiety, stress), and social (i.e., social support) health outcomes (RQ2). We then conducted a latent moderation analysis using the recommended double mean centering strategy (Lin, Wen, March, & Lin, 2010) to test whether or not spirituality moderated the relationships between ACEs and BPS health variables (RQ3). Model fit was assessed using recommended cut-

offs for the following fit indices: (a) Standardized Root Mean Square Residuals (SRMR < 0.08); (b) Root Mean Square of Approximation (RMSEA < 0.08); (c) Tucker Lewis Index (TLI ≥ .95); and (d) Comparative Fit Index (CFI ≥ .90; Hu & Bentler, 1999).

Results

A total of 539 participants completed some portion of the online survey. Some of the incomplete surveys (N = 62) did not contain relevant data (i.e., the participant opened the survey but did not answer any questions) and were removed. Of the remaining 477 cases, over one-third (n = 181, 37.9%) contained incomplete data, ranging from 0.2% to 19.9% across all study variables. Among the study variables used in inferential analyses (e.g., ACEs, BPSS health), the GAD-7 (7.1%) and PHQ-9 (9.9%) had the least amount of missing data whereas substance use (19.9%) and injury/health problems (17.0%) contained the largest percentage of missing data.

ACEs and BPSS Health Variables

For descriptive statistics of ACEs and BPSS health variables, see Tables 3 and 4. Nearly two-thirds (n = 272, 64.5%) of respondents endorsed at least one ACE, and over one-third (n = 163, 38.7%) and one-fourth (n = 106, 25.1%) reported at least two and three total ACEs, respectively. Most student-athletes denied a diagnostic history of any of the ten mental health (n = 356, 74.8%) or eight physical health (n = 377, 79.2%) conditions inquired about in the survey. The most frequently reported mental health diagnoses were anxiety (n = 60, 12.6%), ADHD (n = 43, 9.0%), and depression (n = 43, 9.0%). The most commonly reported physical health diagnoses were asthma (n = 62, 13.0%) and hypertension (n = 12, 2.5%). Of note, 10.4% (n = 45) of student-athletes reported suicidal ideation (i.e., thoughts they would be better off dead or hurting their self in some way) on at least several days during the past two weeks. Of those who endorsed alcohol use in the past year, 29.9% (n = 115) reported drinking on one to two occasions

per week, and over one-third (n = 133, 35.5%) consumed between three and six drinks in one sitting. When asked about the primary reason for alcohol, marijuana, and tobacco use, "recreational or social purposes" accounted for 86.5% (n = 173), 46.5% (n = 27), and 55.3% (n = 31) of responses, respectively. "Coping with the stresses of being a student-athlete" was the next most frequent reason for alcohol, marijuana, and tobacco use, accounting for 6.0% (n = 12), 32.8% (n = 19), and 19.6% (n = 11) of responses, respectively.

What is the Relationship Among ACEs and BPSS Health?

To answer our first research question, bivariate correlations were computed to examine the relationship among ACEs and BPSS health constructs. As shown in Table 5, student-athletes who reported higher total ACEs were more likely to endorse greater mental and physical health diagnoses, symptoms of anxiety, depression, perceived stress, injury/health problems, alcohol use, and total substance use. Conversely, those who endorsed greater total ACEs were more likely to report lower levels of spirituality and social support. Of note, those with higher levels of spiritualty reported greater social support and were less likely to endorse mental health diagnoses, symptoms of anxiety, depressive symptoms, perceived stress, injury/health problems, alcohol use, marijuana use, and total substance use. These findings support our hypotheses regarding the significant relationships and interplay among BPSS health variables and ACEs.

Do ACEs Influence BPS Health Outcomes?

To answer the second research question, a structural equation model was fit using anxiety, depression, perceived stress, social support, injury/health problems, and substance use as dependent variables and ACEs, sex, race, school attended, and NCAA division as independent variables (see Figure 1 for conceptual model). Due to non-normality of the data, robust test statistics were used for model evaluation and parameter estimates (Enders, 2001). This model

demonstrated a good fit, $\chi^2(856) = 1347.33$, $p < .001$, *CFI* = .933, *TLI* = .939, *SRMR* = .057, *RMSEA* = .041, *90% CI* [.037, .045]. As detailed in Table 6, results indicated that those who reported greater ACEs reported lower levels of social support and were more likely to endorse higher symptoms of anxiety, depression, perceived stress, injury/health problems, and total substance use, while controlling for the effects of sex, race, school attended, and division. These findings support our hypotheses that exposure to ACEs would positively influence anxiety, depression, perceived stress, and physical health problems, and negatively impact social support.

Does Spirituality Moderate the Relationship Between ACEs and BPS Health?

To answer the final research question, we explored whether spirituality moderated the relationship between ACEs and anxiety, depression, perceived stress, social support, injury/health concerns, and substance use while controlling for sex, race, college, and division (Figure 2). We first tested the main effects of ACEs and spirituality on BPS health outcomes by modifying the previous model to include spirituality as a predictor variable. Following these changes, model fit remained good, $\chi^2(981) = 1551.17$, $p < .001$, *CFI* = .922, *TLI* = .928, *SRMR* = .062, *RMSEA* = .042, *90% CI* [.038, .046]. As seen in Table 7, latent regression results indicated that spirituality was negatively related to anxiety, depression, perceived stress, injury/health problems, and substance use while controlling for ACEs and all control variables. Conversely, student-athletes with greater spirituality endorsed higher levels of social support, holding constant the number of ACEs and all control variables. With the addition of spirituality as an independent variable, the relationship between ACEs and anxiety, depression, perceived stress, and social support remained significant (Table 7). However, after controlling for the effect of spirituality, ACEs no longer had an effect on injury/health problems or substance use.

Next, an interaction term was created (ACEs X Spirituality) to test the moderating effect of spirituality on ACEs and BPS health outcomes. As shown in Table 8, spirituality did not moderate the relationships between ACEs and anxiety, depression, stress, or social support. However, spirituality did moderate the effect of ACEs on substance use. The interaction was probed to examine the conditional effects of ACEs on substance use at each level of spirituality (i.e., one standard deviation below the mean, at the mean, one standard deviation above the mean). Results showed no relationship between ACEs and substance use at low levels of spirituality (b = .03, SE = .11, p = .754). However, at average (b = .25, SE = .07, p < .001) and high (b = .46, SE = .11, p < .001) levels of spirituality, those who endorsed greater ACEs reported increased substance use. These findings did not support our hypothesis that spirituality would buffer the effect of ACEs on BPS health outcomes in the expected direction.

Of note, a post-hoc exploratory analysis was employed to examine the moderating effect of ACEs on spirituality and substance use. After probing the interaction, it was found that at low (b = -.53, SE = .09, p < .001) and mean (b = -.32, SE = .09, p < .001) levels of ACEs, student-athletes with greater levels of spirituality were less likely to report substance use. However, when ACEs were one standard deviation above the mean, there was no relationship between spirituality and substance use (b = -.10, SE = .15, p = .486).

Discussion

A substantial body of research has highlighted a strong link between ACEs and poor BPS health outcomes later in life (see Hughes et al., 2017). However, a thorough understanding of the cumulative effects of ACEs on the BPS health among college-age students—much less NCAA student-athletes—is lacking. Though researchers have highlighted a potential buffering effect of spirituality on negative life events and psychosocial outcomes in adult populations (Young et al.,

2000), less is known about the role of spirituality in the context of overall student-athlete health. Given that psychosocial health problems have been recognized as the number one concern for today's NCAA student-athletes (NCAA, 2013), it is imperative to examine what factors influence these concerns—for better or worse. Building upon limited but growing work, this study examined the impact of ACEs on BPSS health outcomes among NCAA student-athletes.

Prevalence of ACEs Among NCAA Student-Athletes

Exposure to one or more conventional (e.g., abuse, neglect, household dysfunction), expanded (e.g., peer and violent crime victimization, poverty), or total ACEs was reported by 57.4%, 30.3%, and 64.5% of student-athletes in the current study, respectively. This exposure rate was similar to prevalence of ACEs reported by young adults in prior studies (e.g., McCormick et al., 2017). However, the prevalence of ACEs in this study was much higher compared to previous studies of NCAA student-athletes. For example, in one of only two prior known studies exploring exposure to ACEs among student-athletes, Kaier and colleagues (2015) found that 30.8% of their sample endorsed at least one conventional ACE compared to 57.4% of the current sample. Additionally, 32.4% and 17.3% of the current sample reported at least two and three conventional ACEs, respectively, nearly doubling the rates of conventional ACEs ($\geq 2 = 16.8\%$; $\geq 3 = 9.0\%$) reported by student-athletes in Kaier et al.'s study. These discrepancies may be attributed to methodological differences and sample characteristics.

Specifically, given that student-athletes in Kaier and colleagues' study completed the ACE measure in the same room as their teammates, exposure to ACEs may have been underreported due to concerns about privacy and anonymity (i.e., impression management; Leary & Kowalski, 1990). Moreover, the current study reached a larger, more diverse sample ($N = 477$), consisting of Division I, II, and III student-athletes from 53 different colleges/universities throughout the

country compared to Kaier et al.'s sample of Division I athletes ($N = 304$) from a single university. Additionally, the current sample had nearly 40% more student-athletes of color, supporting evidence that children of different races may not experience ACEs equally (Sacks & Murphey, 2018). Another potential reason is the variability in how ACEs were scored and defined. For example, the current study assessed for both conventional and expanded ACEs (17 total), using a combination of dichotomous (yes/no) and scale (e.g., never to very often) responses, whereas Kaier and colleagues measured only ten conventional ACEs using dichotomous scoring. Although researchers have advocated for the use of expanded ACEs to be more inclusive of cultural, ethnic, and socioeconomic diversity (Cronholm et al., 2015; Mersky et al., 2017), differences in how ACEs are measured make it difficult to compare prevalence rates across studies and translate findings into potential policy or standard of care protocols.

Relationship Among ACEs and BPSS Health Outcomes

Consistent with findings from prior studies with student-athlete samples (Armstrong & Oomen-Early, 2009; Bryant & Astin, 2008; Putukian, 2016), results from the current study revealed significant links between and among biological health (e.g., injury, physical health conditions), psychological health (e.g., anxiety, depression, stress), social health (e.g., social support, and spirituality (e.g., spiritual strength). These findings highlight the interconnectedness among the biological, psychological, social, and spiritual domains of overall health and support the utility of the BPSS systems metatheory (Anchin, 2008; Engel, 1977, 1980; Wright et al., 1996) when conceptualizing whole-person health. Furthermore, the findings that exposure to ACEs was associated with greater anxiety, depression, perceived stress, physical health problems, and substance use, in addition to lower levels of social support, align with a robust body of literature linking ACEs to deleterious BPS health outcomes (Mersky et al., 2013). Lastly, the finding that

ACE exposure was negatively correlated with aspects of spirituality supports a large body of work highlighting associations between childhood trauma and difficulties with meaning/purpose and a decline in spirituality later in life (e.g., Walker, Reid, O'Neill, & Brown, 2009).

Impact of ACEs on BPS Health Outcomes

In conducting a more robust analysis exploring the specific impact of ACEs on BPS health outcomes, latent regression results indicated that exposure to ACEs positively influenced anxiety, depression, perceived stress, and substance use. These findings support emerging literature highlighting the detrimental impact of ACEs on subsequent psychosocial health outcomes and risky behaviors among college-age (e.g., McCormick et al., 2017) and NCAA student-athlete samples (e.g., Kaier et al., 2015). In line with Kaier and colleagues' discovery that student-athletes with a history of ACEs had greater health complaints (e.g., somatization), we found that exposure to ACEs was associated with a greater prevalence of injury and/or physical health problems. This finding supports toxic stress theorists' supposition that exposure to ACEs may exacerbate physiological wear and tear (allostatic load) and influence anatomical/biological processes (biological embedding), resulting in deleterious BPS health outcomes later in life (Danese & McEwen, 2012).

The Role of Spirituality

When exploring the impact of spirituality on BPS health outcomes, we discovered that spirituality had a negative effect on anxiety, depression, stress, injury/health problems, and substance use, and a positive effective on social support. These findings are consistent with a large volume of research highlighting a link between greater levels of spirituality and better BPS health (see Koenig, 2012 for a review) and add to the limited research exploring the role of spirituality in the context of overall student-athlete health. Results from latent moderation analyses yielded several interesting findings. First, contradictory to prior work highlighting a

potential protective effect of spirituality against the psychosocial health consequences of traumatic life events (Staton-Tindall, Duvall, Stevens-Watkins, & Oser, 2013; Young et al., 2000), we discovered that spirituality did not significantly moderate the relationship between ACEs and anxiety, depression, stress, injury/health problems, or social support.

Conversely, we discovered a significant interaction for spirituality, ACEs, and substance use. Specifically, results indicated that the relationship between ACEs and substance use was significantly strengthened among student-athletes who endorsed average and high levels of spirituality. This finding did not support our hypothesis and contradicts Staton-Tindall and colleagues' (2013) discovery that spirituality (i.e., existential well-being) reduced the effect of traumatic life experiences on cocaine use in a sample of African American women. Interestingly, our post-hoc analysis revealed a negative relationship between spirituality and substance use at low and average levels of ACEs; however, the relationship no longer remained at high levels of ACEs. These findings indicate that, at a certain point, the number of ACEs one experiences may overwhelm the positive influence of spirituality. Additionally, given that student-athletes may use alcohol and/or other drugs to cope with the myriad stressors related to academics and athletics (Martens et al., 2006; Reardon & Creado, 2014), it is possible that the current sample used alcohol and/or other drugs, as opposed to spiritual coping mechanisms, to manage the negative BPS health consequences (e.g., injury, depression) resulting from ACE exposure.

Implications

Findings from this study provide a number of implications for NCAA athletics personnel and mental health practitioners working with student-athletes. First, results highlight the need to screen student-athletes for ACEs to identify those who may be at risk for greater psychosocial concerns such as anxiety, depression, and substance use. Specifically, in addition to assessing for

potential biological problems that may impact student-athletes' ability to participate in their sport, athletic trainers and team physicians can administer brief assessments for past trauma (CES-17) and psychosocial health concerns (e.g., PHQ-9, GAD-7) during routine preparticipation physical exams. However, there are various ethical challenges to consider in doing so, such as determining who would have access to the information, and how to follow-up with those who endorse ACEs and/or clinically relevant mental health symptoms. One way to address this concern is to adopt an integrated care model where medical and mental health providers document assessments and treatment plans in the same electronic medical chart (Sudano, Collins, & Miles, 2017). This would allow all members of student-athletes' primary care team to collaborate efficiently and effectively while providing comprehensive care that addresses all domains (i.e., BPSS) of student-athlete health with equal importance.

Furthermore, findings from this study support the need for NCAA institutions to employ mental health clinicians who: (a) are competent in assessing, diagnosing, and treating psychosocial health concerns, (b) understand the systemic interplay among the biological, psychological, social, and spiritual domains of student-athlete health, and (c) are familiar with the culture of college athletics. Given the intergenerational/relational transmission of effects related to ACEs, clinicians who have training in relational, intergenerational, and trauma-based interventions/modalities would be especially suited for this role. Moreover, clinicians working with student-athletes should incorporate mindfulness- and cognitive behavioral-based interventions given their effectiveness at treating both trauma-related disorders (Vujanovic, Niles, Pietrefesa, Schmertz, & Potter, 2013) and various psychosocial health concerns (e.g., depression, anxiety) in this population (Brown et al., 2019).

Despite the NCAA's recent requirement for autonomy conferences to provide mental health services to student-athletes (Hosick, 2019), significant barriers remain. For example, student-athletes may be less likely to acknowledge mental health problems and seek out behavioral health services (Wolanin, Gross, & Hong, 2015). Thus, it is essential for coaches, athletic trainers, and team physicians to encourage the utilization of available resources. Further, availability of psychosocial services should be equal across NCAA divisions because of the similar rates of mental health concerns experienced by Division I, II, and III student-athletes (NCAA, 2013). Finally, having readily available mental health services in athletic departments, and support from key stakeholders (e.g., coaches, athletic trainers), may reduce the stigma surrounding mental health/treatment-seeking in the world of college sports (Baumann, 2016).

Strengths and Limitations

The current study contains several notable strengths beginning with its sample. This is one of only three known studies to explore the prevalence of ACEs in a sample of NCAA student-athletes, and the first study to examine the relationship among ACEs and BPSS health outcomes in this population. Additionally, the current sample represented 20 NCAA sports teams from all three divisions across 53 different colleges/universities, increasing the generalizability of findings. Lastly, the relatively young age of the current sample (M = 20.3 years, *Rng* = 18-27) is an important strength given previous concerns about retrospective reporting of ACEs (i.e., young adults recall childhood events more readily and accurately; Balota, Dolan, & Duchek, 2000; Hardt & Rutter, 2004). Moreover, given that additional childhood adversities, such as bullying and community violence, may impact functioning in adulthood above and beyond the influence of conventional ACEs (Finkelhor, Shattuck, Turner, & Hamby, 2015), researchers have

encouraged the inclusion of expanded ACEs, such as those captured in this study, to improve the ecological and predictive validity of ACE measurement (Mersky et al., 2017).

Despite such strengths, this study has several notable limitations. First, the current study was cross-sectional and, therefore, correlational in nature. Consequently, conclusions about the causal and directional relationships between ACEs and BPSS health outcomes are limited. However, given that ACEs by definition are events that occurred during childhood (i.e., before age 18), one might expect that ACEs endorsed by student-athletes in the current sample preceded and impacted their present-day BPSS health. Additionally, the current study relied on self-reporting for all measures. Although we used a Web-based approach to reduce under-reporting of sensitive information (e.g., ACEs, mental health symptoms, substance use), survey responses were susceptible to a range of influences. For example, participants may have under-endorsed (i.e., reporting bias) exposure to ACEs, mental health symptoms (e.g., depression, anxiety), and substance use behaviors due to a variety of factors such as denial, shame, and/or stigma (Watson, 2005). Nevertheless, self-report measures, such as those used in the current study, have been found to be valid and reliable, and remain widely used in empirical studies. In particular, Dube et al. (2003) discovered good to substantial test-retest reliability for retrospective self-reported ACEs. Another notable limitation was the lack of a comparison sample, precluding inferences to be drawn regarding various protective factors that may be associated with being an elite athlete (e.g., greater resiliency to adversity, protection against allostatic load; Kaier et al., 2015: McEwen & Seeman, 1999). Moreover, though we examined the potential buffering effect of spirituality, future research should examine the mediating/moderating role of additional factors (e.g., social support from teammates, coaches, family) that may serve as protective factors against BPSS health concerns in this population (Armstrong & Oomen-Early, 2009;

Malinauskas, 2010). Finally, given that the current study was conducted with NCAA student-athletes, results may not be generalizable to other populations.

Conclusion

This study emphasizes the significant effects of childhood adversity and spirituality on the physical (injury/health problems), psychological (anxiety, depression, stress, substance use), and social (social support) health of NCAA student-athletes. Taken together, our findings support a clear connection among physical, psychological, social, *and* spiritual domains of health. However, more research is needed to further our understanding of the multifaceted interplay between ACEs, potential protective factors (e.g., social support from teammates, coaches, family), and the BPSS health outcomes of student-athletes. Given the high prevalence of ACEs and the resulting negative impact on various health outcomes in this population, NCAA institutions must continue their efforts to implement standard of care protocols that utilize a comprehensive and collaborative approach (e.g., integrated care) to assess and treat all aspects of student-athlete health with equal importance.

REFERENCES

Anchin, J. C. (2008). Pursuing a unifying paradigm for psychotherapy: Tasks, dialectical considerations, and biopsychosocial systems metatheory. *Journal of Psychotherapy Integration, 18*(3), 310-349. doi:10.1037/a0013557

Anda, R. F., Butchart, A., Felitti, V. J., & Brown, D. W. (2010). Building a framework for global surveillance of the public health implications of adverse childhood experiences. *American Journal of Preventive Medicine, 39*(1), 93-98. doi:10.1016/j.amepre.2010.03.015

Armstrong, S., & Oomen-Early, J. (2009). Social connectedness, self-esteem, and depression symptomatology among collegiate athletes versus nonathletes. Journal of American College Health, 57(5). 521-526.

Balota, D. A., Dolan, P. O., & Duchek, J. M. (2000). Memory changes in healthy young and older adults. In Endel Tulving (ed.), *The Oxford Handbook of Memory*. Oxford University Press. pp. 395--410.

Barnard, S., Athey, A., Killgore, W. D., Alfonso-Miller, P., & Grandner, M. A. (2018). Adverse childhood experiences among student athletes are associated with sleep disturbances: Evaluating the mediating roles of depression and anxiety. *Sleep, 41*(suppl_1), A357-A357. doi:10.1093/sleep/zsy061.961

Baumann, J. N. (2016). The stigma of mental health in athletes: Are mental toughness and mental health seen as contradictory in elite sports. *British Journal of Sports Medicine, 50*(3), 135-136.

Brady, K. T., & Back, S. E. (2012). Childhood trauma, posttraumatic stress disorder, and alcohol dependence. *Alcohol Research, 34*(4), 408.

Brown, B. J., Jensen, J. F., Hodgson, J. L., Brown, R. E., Rappleyea, D. L., & Schoemann, A. M. (2019). *Mind, body, spirit, and sport: A systematic review examining the effectiveness of interventions targeting the biopsychosocial-spiritual health of NCAA student-athletes.* Manuscript submitted for publication

Brown, M. J., Thacker, L. R., & Cohen, S. A. (2013). Association between adverse childhood experiences and diagnosis of cancer. *PloS One, 8*(6), e65524. doi:10.1371/journal.pone.0065524

Bryant, A. N., & Astin, H. S. (2008). The correlates of spiritual struggle during the college years. *The Journal of Higher Education, 79*(1), 1-27. doi:10.1080/00221546.2008.11772084

Bryant, A. N., Choi, J. Y., & Yasuno, M. (2003). Understanding the religious and spiritual dimensions of students‘ lives in the first year of college. *Journal of College Student Development, 44*, 723-745. doi:10.1353/csd.2003.0063

Campbell, J. A., Walker, R. J., & Egede, L. E. (2016). Associations between adverse childhood experiences, high-risk behaviors, and morbidity in adulthood. *American Journal of Preventive Medicine, 50*(3), 344-352. doi:10.1016/j.amepre.2015.07.022

Chapman, D. P., Whitfield, C. L., Felitti, V. J., Dube, S. R., Edwards, V. J., & Anda, R. F. (2004). Adverse childhood experiences and the risk of depressive disorders in adulthood.*Journal of Affective Disorders, 82*(2), 217-225. doi:10.1016/j.jad.2003.12.013

Chen, S., Snyder, S., & Magner, M. (2010). The effects of sport participation on student-athletes' and non-athlete students' social life and identity. *Journal of Issues in Intercollegiate Athletics, 3,* 176-193.

Coakley, J. (2009). *Sports in society: Issues and controversies* (10th ed.). New York, NY: McGraw-Hill.

Cox, C., Ross-Stewart, L., & Foltz, B. (2017). Investigating the prevalence and risk factors of depression symptoms among NCAA division I collegiate athletes. *Journal of Sports Science*, *5,* 14-28. doi:10.17265/2332-7839/2017.01.002.

Cunningham, T. J., Ford, E. S., Croft, J. B., Merrick, M. T., Rolle, I. V., & Giles, W. H. (2014). Sex-specific relationships between adverse childhood experiences and chronic obstructive pulmonary disease in five states. *International Journal of Chronic Obstructive Pulmonary Disease, 9*(default), 1033-1043. doi:10.2147/COPD.S68226

Danese, A., & McEwen, B. S. (2012). Adverse childhood experiences, allostasis, allostatic load, and age-related disease. *Physiology & Behavior, 106*(1), 29-39. doi:10.1016/j.physbeh.2011.08.019

Dillon, K. M., & Tait, J. L. (2000). Spirituality and being in the zone in team sports: A relationship? *Journal of Sport Behavior, 23*, 91-100. Retrieved from Academic Search Premier database.

Dube, S. R., Anda, R. F., Felitti, V. J., Chapman, D. P., Williamson, D. F., & Giles, W. H. (2001). Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: Findings from the adverse childhood experiences study. *Jama, 286*(24), 3089-3096. doi:10.1001/jama.286.24.3089

Dube, S. R., Felitti, V. J., Dong, M., Giles, W. H., & Anda, R. F. (2003). The impact of adverse childhood experiences on health problems: Evidence from four birth cohorts dating back to 1900. *Preventive Medicine, 37*(3), 268-277. doi:10.1016/S0091-7435(03)00123-3

Eisenberg, D., Hunt, J., & Speer, N. (2013). Mental health in american colleges and universities: Variation across student subgroups and across campuses. *The Journal of Nervous and Mental Disease, 201*(1), 60-67. doi:10.1097/NMD.0b013e31827ab077

Enders, C. K. (2001). The impact of nonnormality on full information maximum-likelihood estimation for structural equation models with missing data. *Psychological Methods, 6*(4), 352-370. doi:10.1037//1082-989X.6.4.352

Engel, G.L. (1980). The clinical application of the biopsychosocial model. *The American Journal of Psychiatry, 137*, 535–544.

Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science, 196,* 129-136. doi:10.1126/science.847460

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . . Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ACE) study. *American Journal of Preventive Medicine, 14*(4), 245-258. doi:10.1016/S0749-3797(98)00017-8

Finkelhor, D., Turner, H. A., Shattuck, A., & Hamby, S. L. (2015). Prevalence of childhood exposure to violence, crime, and abuse: Results from the national survey of children's exposure to violence. *JAMA Pediatrics, 169*(8), 746-754. doi:10.1001/jamapediatrics.2015.0676

Fletcher, T. B., Benshoff, J. M., & Richburg, M. J. (2003). A systems approach to understanding and counseling college student-athletes. *Journal of College Counseling*, *6*: 35-45. doi:10.1002/j.2161-1882.2003.tb00225.x

Forster, M., Gower, A. L., Borowsky, I. W., & McMorris, B. J. (2017). Associations between adverse childhood experiences, student-teacher relationships, and non-medical use of prescription medications among adolescents. *Addictive Behaviors, 68,* 30-34. doi:10.1016/j.addbeh.2017.01.004

Hardt, J. & Rutter, M. (2004). Validity of adult retrospective reports of adverse childhood experiences: Review of the evidence. *Journal of Child Psychology and Psychiatry*, *45*, 260-273. http://dx.doi.org/10.1111/j.1469-7610.2004.00218.x

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics, 42*(2), 377-381. doi:10.1016/j.jbi.2008.08.010

Health Insurance Portability and Accountability Act of 1996. (HIPAA, 2010). 42 U.S. C. 1320d-9.

Hootman, J.M., Dick, R., & Agel, J. (2007). Epidemiology of collegiate injuries for 15 sports: Summary and recommendations for injury prevention initiatives. *Journal of Athletic Training, 42*(2), 311-319.

Hosick, B. H. (2019). *Access to mental health services guaranteed by autonomy conferences.* Retrieved from http://www.ncaa.org/about/resources/media-center/news/access-mental-health-services-guaranteed-autonomy-conferences

Hu, L.-H., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*, 1-55. doi:10.1080/10705519909540118

Hughes, K., Bellis, M. A., Hardcastle, K. A., Sethi, D., Butchart, A., Mikton, C., . . . Dunne, M. P. (2017). The effect of multiple adverse childhood experiences on health: A systematic review and meta-analysis. *The Lancet Public Health, 2*(8), e356-e366. doi:10.1016/S2468-2667(17)30118-4

Hwang, S., & Choi, Y. (2016). Data mining in the exploration of stressors among NCAA student athletes. *Psychological Reports, 119*(3), 787-803. doi:10.1177/0033294116674776

Kaier, E., Cromer, L., Davis, J., & Strunk, K. (2015). The relationship between adverse childhood experiences and subsequent health complaints in elite athletes. *Journal of Child & Adolescent Trauma. 8*. doi:10.1007/s40653-015-0041-4.

Karatekin, C. (2018). Adverse childhood experiences (ACEs), stress and mental health in college students. *Stress and Health : Journal of the International Society for the Investigation of Stress, 34*(1), 36-45. doi:10.1002/smi.2761

Kern, A., Heininger, W., Klueh, E., Salazar, S., Hansen, B., Meyer, T., & Eisenberg, D. (2017). Athletes Connected: Results from a pilot project to address knowledge and attitudes about mental health among college student-athletes. *Journal of Clinical Sport Psychology*, 11, 324–336.

Kerr, Z. Y., Marshall, S. W., Dompier, T. P., Corlette, J., Klossner, D. A., & Gilchrist, J. (2015). College Sports–Related injuries — united states, 2009–10 through 2013–14 academic years. *Morbidity and Mortality Weekly Report, 64*(48), 1330-1336. doi:10.15585/mmwr.mm6448a2

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (4th ed.). New York, NY: Guilford Press.

Koenig, H. G. (2012). Religion, spirituality, and health: The research and clinical implications. .*ISRN Psychiatry, 2012*, 278730-33. doi:10.5402/2012/278730

Lee, R. D., & Chen, J. (2017). Adverse childhood experiences, mental health, and excessive alcohol use: Examination of race/ethnicity and sex differences. *Child Abuse & Neglect*, *69*, 40-48. doi:10.1016/j.chiabu.2017.04.004

Li, H., Moreland, J. J., Peek-Asa, C., & Yang, J. (2017). Preseason anxiety and depressive symptoms and prospective injury risk in collegiate athletes. *The American Journal of Sports Medicine, 45*(9), 2148-2155. doi:10.1177/0363546517702847

Lin, G. C., Wen, Z., Marsh, H. W., & Lin, H. S. (2010). Structural equation models of latent interactions: Clarification of orthogonalizing and double-mean-centering strategies. *Structural Equation Modeling, 17*(3), 374-391. doi:10.1080/10705511.2010.488999

Mann, J. B., Bryant, K. R., Johnstone, B., Ivey, P. A., & Sayers, S. P. (2016). Effect of physical and academic stress on illness and injury in division 1 college football players. *Journal of Strength and Conditioning Research, 30*(1), 20-25. doi:10.1519/JSC.0000000000001055

Maron, B.J., Haas, T.S., Murphy, C.J., Ahluwalia, A., & Rutten-Ramos, S. (2014). Incidence and causes of sudden death in U.S. college athletes. *Journal of the American College of Cardiology, 63*(16), 1636-1643. doi: 10.1016/j.jacc.2014.01.041

Martens, M. P., Dams-O'Connor, K., & Beck, N. C. (2006). A systematic review of college student-athlete drinking: Prevalence rates, sport-related factors, and interventions. *Journal of Substance Abuse Treatment, 31*(3), 305-316. doi:10.1016/j.jsat.2006.05.004

Mastroleo, N. R., Scaglione, N., Mallett, K. A., & Turrisi, R. (2013). Can personality account for differences in drinking between college athletes and non-athletes? explaining the role of sensation seeking, risk-taking, and impulsivity. *Journal of Drug Education, 43*(1), 81-95.

McCormick, W. H., Carroll, T. D., Sims, B. M., & Currier, J. (2017). Adverse childhood experiences, religious/spiritual struggles, and mental health symptoms: Examination of mediation models. *Mental Health, Religion & Culture, 20*(10), 1042-1054.

McDaniel, S. H. (1995). Collaboration between psychologists and family physicians: Implementing the biopsychosocial model. *Professional Psychology: Research and Practice, 26*(2), 117-122.

McEwen, B. S., & Seeman, T. (1999). Protective and damaging effects of mediators of stress: Elaborating and testing the concepts of allostasis and allostatic load. *Annals of the New York Academy of Sciences, 896*(1), 30-47. doi:10.1111/j.1749-6632.1999.tb08103.x

McKnight, C. M., & Juillerat, S. (2011). Perceptions of clinical athletic trainers on the spiritual care of injured athletes. *Journal of Athletic Training, 46*(3), 303.

Merrick, M. T., Ports, K. A., Ford, D. C., Afifi, T. O., Gershoff, E. T., & Grogan-Kaylor, A. (2017). Unpacking the impact of adverse childhood experiences on adult mental health. *Child Abuse & Neglect, 69*, 10-19. doi:10.1016/j.chiabu.2017.03.016

Mersky, J. P., Janczewski, C. E., & Topizes, J. (2017). Rethinking the measurement of adversity: Moving toward second-generation research on adverse childhood experiences. *Child Maltreatment, 22*, 58-68. doi:10.1177/1077559516679513

Mersky, J.P., Topitzes, J., & Reynolds, A.J. (2013). Impacts of adverse childhood experiences on health, mental health, and substance use in early adulthood: A cohort study of an urban, minority sample in the U.S. Child Abuse & Neglect, 37(11), 917-925. doi:10.1016/j.chiabu.2013.07.011

Monnat, S. M., & Chandler, R. F. (2015). Long-Term physical health consequences of adverse childhood experiences. *The Sociological Quarterly, 56*(4), 723-752. doi:10.1111/tsq.12107

National Collegiate Athletic Association. (2018). *NCAA Demographics Database* [Data visualization dashboard]. Retrieved from http://www.ncaa.org/about/resources/research/ncaa-demographics-database

National Collegiate Athletic Association. (2013). *NATA, NCAA and others announce mental health recommendation*. Retrieved from http://www.ncaa.org/about/resources/media-center/news/nata-ncaa- and-others-announce-mental-health- recommendations.

National Collegiate Athletic Association. (2013). *NCAA national study of substance use habits of college student- athletes.* Retrieved from http://www.ncaa.org/sites/default/files/Substance%20Use%20Final20Report_FINAL.pdf.

National Collegiate Athletic Association (2015). *Student-athlete participation* [Data file]. Retrieved from https://www.ncaa.org/sites/default/files/Participation%20Rates%20Final.pdf

NCAA.org. "Results from the 2015 GOALS study of the student-athlete experience." Presented at the NCAA Convention, 2016, San Antonio, TX.

National Scientific Council on the Developing Child. (2005/2014). *Excessive stress disrupts the architecture of the developing brain: Working paper 3*. Updated Edition. Retrieved from http://www.developingchild.harvard.edu

Neal, T.L., Diamond, A.B., Goldman, S., Klossner, D., Morse, E.D., Pajak, D.E., …Welzant, V. (2013). Mental health and the college student athlete: Developing a plan to recognize and refer student athletes with psychological concerns at the collegiate level. *Journal of Athletic Training, 50*(3), 231-249. doi: 10.4085/1062-6050-50.3.03

Proctor, S. L., & Boan-Lenzo, C. (2010). Prevalence of depressive symptoms in male intercollegiate student-athletes and nonathletes. *Journal of Clinical Sport Psychology, 4,* 204–220.

Putukian, M. (2016). The psychological response to injury in student athletes: A narrative review with a focus on mental health. *British Journal of Sports Medicine, 50*(3), 145-148. doi:10.1136/bjsports-2015-095586

R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/.

Rahman, A. NCAA develops initiative on student athlete mental health. The Triangle. http://thetriangle.org/news/ncaa-develops-initiative-on-student-athlete-mental-health/. Accessed February 4, 2016.

Reardon, C.L., & Creado, S. (2014). Drug abuse in athletes. *Substance Abuse and Rehabilitation, 2014*(default), 95-105.

Reardon, C.L., & Factor, R.M. (2010). Sport psychiatry: a systematic review of diagnosis and medical treatment of mental illness in athletes. *Sports Medicine, 40*(11), 961-980. doi: 10.2165/11536580-000000000-00000.

Riley, E. H., Wright, R. J., Jun, H. J., Hibert, E. N., & Rich-Edwards, J. W. (2010). Hypertension in adult survivors of child abuse: Observations from the nurses' health study II.*Journal of Epidemiology and Community Health (1979-), 64*(5), 413-418. doi:10.1136/jech.2009.095109

Roseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software, 48*(2), 1-36. Retrieved from https://www.jstatsoft.org/article/view/v048i02

Sacks, V., & Murphey, D. (2018) The prevalence of adverse childhood experiences, nationally, by state, and by race or ethnicity. Retrieved from https://www.childtrends.org/publications/prevalence-adverse-childhood-experiences-nationally-state-race-ethnicity

Schilling, E., Aseltine, R., Jr., & Gore, S. (2007). Adverse childhood experiences and mental health in young adults: A longitudinal survey. *BMC Public Health*, 7, 30. https://doi.org/10.1186/1471-2458-7-30

Shern, D. L., Blanch, A. K., & Steverman, S. M. (2016). Toxic stress, behavioral health, and the next major era in public health. *American Journal of Orthopsychiatry, 86*(2), 109-123. doi:10.1037/ort0000120

Spratt, E. G., Back, S. E., Yeatts, S. D., Simpson, A. N., McRae-Clark, A., Maria, M. M. M., . . . Brady, K. T. (2009). Relationship between child abuse and adult smoking. *The International Journal of Psychiatry in Medicine, 39*(4), 417-426. doi:10.2190/PM.39.4.f

Sudano, L. E., Collins, G., & Miles, C. M. (2017). Reducing barriers to mental health care for student-athletes: An integrated care model. *Families, Systems & Health : The Journal of Collaborative Family Healthcare, 35*(1), 77-84. doi:10.1037/fsh0000242

Sudano, L. E., & Miles, C. M. (2017). Mental health services in NCAA division I athletics: A survey of head ATCs. *Sports Health: A Multidisciplinary Approach, 9*(3), 262-267. doi:10.1177/1941738116679127

Vetter, R. E., & Symonds, M. L. (2010). Correlations between injury, training intensity, and physical and mental exhaustion among college athletes. *Journal of Strength & Conditioning Research, 24*(3), 587-596.

Vujanovic, A. A., Niles, B., Pietrefesa, A., Schmertz, S. K., & Potter, C. M. (2013). Mindfulness in the treatment of posttraumatic stress disorder among military veterans. *Spirituality in Clinical Practice, 1*(S), 15-25. doi:10.1037/2326-4500.1.S.15

Walker, D., Reid, H. W., O'Neill, T., & Brown, L. (2009). Changes in personal religion/spirituality during and after childhood abuse: A review and synthesis. *Psychological Trauma: Theory, Research, Practice, and Policy, 1*(2), 130–145. doi:10.1037/a0016211

Watson, J. C. (2005). College student-athletes' attitudes toward help-seeking behavior and expectations of counseling services. *Journal of College Student Development, 46*(4), 442-449. doi:10.1353/csd.2005.0044

WHOQOL SRPB Group. (2006). A cross-cultural study of spirituality, religion, and personal beliefs as components of quality of life. *Social Science & Medicine, 62*(6), 1486-1497. doi:10.1016/j.socscimed.2005.08.001

Wiese-Bjornstal, D. M. (2010). Psychology and socioculture affect injury risk, response, and recovery in high-intensity athletes: A consensus statement: Sport injury psychology consensus statement. *Scandinavian Journal of Medicine & Science in Sports, 20*, 103-111. doi:10.1111/j.1600-0838.2010.01195.x

Williamson, D. F., Thompson, T. J., Anda, R. F., Dietz, W. H., & Felitti, V. J. (2002). Body weight, obesity, and self-reported abuse in childhood. *International Journal of Obesity, 2*(26), 1075-1082. doi:10.1038/sj.ijo.0802038

Wilson, G. W. & Pritchard, M. P. (2005). Comparing Sources of stress in college student athletes and non-athletes. *Athletic Insight*. *7*(1) 1-8.

Wolanin, A., Hong, E., Marks, D., Panchoo, K., & Gross, M. (2016). Prevalence of clinically elevated depressive symptoms in college athletes and differences by gender and sport. *British Journal of Sports Medicine, 50*(3), 167–171.

Wolanian A, Gross M, Hong E. Depression in athletes: prevalence and risk factors. *Curr Sports Med Rep*. 2015;14:56-60.

Wright, L. M., Watson, W. L., & Bell, J. M. (1996). *Belief: The heart of healing in families and illness.* New York: Basic Books.

Yang, J., Peek-Asa, C., Corlette, J.D., Cheng, G., Foster, D.T., & Albright, J. (2007). Prevalence of and risk factors associated with symptoms of depression in competitive collegiate student athletes. *Clinical Journal of Sport Medicine, 17*, 481–487.

Yang, J., Tibbetts, A. S., Covassin, T., Cheng, G., Nayar, S., & Heiden, E. (2012). Epidemiology of overuse and acute injuries among competitive collegiate athletes. *Journal of Athletic Training, 47*(2), 198–204.

Young, J. S., Cashwell, C. S., & Shcherbakova, J. (2000). The moderating relationship of spirituality on negative life events and psychological adjustment. *Counseling and Values, 45*(1), 49-57. doi:10.1002/j.2161-007X.2000.tb0018.

Table 1.

Sport-Specific Information for Student-Athletes (N = 477)

Indicator	*n* (%)
Division	
Division I	342 (71.7)
Division II	40 (8.4)
Division III	85 (17.8)
Did not answer	10 (2.1)
Sport	
Baseball	50 (10.5)
Basketball	33 (6.9)
Bowling	1 (0.2)
Cheerleading	4 (0.8)
Cross Country	1 (0.2)
Dance	2 (0.4)
Field Hockey	5 (1.0)
Football	175 (36.7)
Golf	4 (0.8)
Gymnastics	6 (1.3)
Lacrosse	1 (0.2)
Multi-Sport	33 (6.9)
Rowing	4 (0.8)
Rugby	1 (0.2)
Soccer	30 (6.3)
Softball	20 (4.2)
Swimming & Diving	11 (2.3)
Tennis	14 (2.9)
Track & Field	42 (8.8)
Volleyball	29 (6.1)
Did not answer	11 (2.3)
Season	
In season	172 (36.1)
Off season	295 (61.8)
Did not answer	10 (2.1)
Year of Athletic Eligibility	
Freshman	114 (23.9)
Redshirt Freshman	43 (9.0)
Sophomore	104 (21.8)
Redshirt Sophomore	27 (5.7)
Junior	83 (17.4)
Redshirt Junior	27 (5.7)
Senior	44 (9.2)
Redshirt Senior	25 (5.2)
Did not answer	10 (2.1)
Role	
First Team	248 (52.0)
Second Team	113 (23.7)
Third Team	68 (14.3)
Practicing/training*	38 (8.0)
Did not answer	10 (2.1)
Scholarship	
Yes	287 (60.2)
No	180 (37.7)
Did not answer	10 (2.1)

Table 2.

Measures Selected to Capture Student-Athlete BPSS Health Outcomes

Measure (Acronym)	Authors (Date)	Items (Range)	Scale	Sample Question	Chronbach's α
Injury/Health Problems Oslo Sports Trauma Research Center Questionnaire on Health Problems (OSTRC)	Clarsen, Ronsen, Myklebust, Florenes, & Bahr (2014)	4 (0-100)	*Qs 1 & 4*: 4-point Likert scale (e.g., *full participation-no injury* to *cannot participate due to injury*) *Qs 2 & 3*: 5-point Likert scale (e.g., *no reduction in training* to *cannot participate at all*)	"To what extent have you reduced training volume due to injury, illness or other health problems during the past week?"	.92
Depression Patient Health Questionnaire (PHQ-9)	Kroenke, Spitzer, & Williams (2001)	9 (0-27)	4-point Likert scale (*not at all* to *nearly every day*)	"Over the last 2 weeks, on how many days have you been feeling down, depressed, or hopeless?"	**.86**
Anxiety Generalized Anxiety Disorder Scale (GAD-7)	Spitzer, Kroenke, & Williams (2006)	7 (0-21)	4-point Likert scale (*not at all* to *nearly every day*)	"Over the last 2 weeks, on how many days have you been feeling nervous, anxious or on edge?"	.91
Stress Perceived Stress Scale (PSS-10)	Cohen, Kamarck, & Mermelstein (1983)	10 (0-40)	5-point Likert scale (*never* to *very often*)	"In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?"	**.90**
Substance Use Student-Athlete Substance Use Scale	*Adapted from:* NCAA Study of Substance Use of College Student-Athletes (2006)	Alc: 3 (0-11) THC: 3 (0-10) Tob: 2 (0-6) Amp: 2 (0-8)	3-to 6-point Likert scales (e.g., *1 to 2 drinks* to *more than 10 drinks*)	"During a typical week, on how many occasions do you usually consume [name of substance]?"	Alc: .80 THC: .94 Tob: .89 Amp: .72 Tot: .83
Social Support Multidimensional Scale of Perceived Social Support (MSPSS-12)	Zimet, Dahlem, Zimet, & Farley (1988)	12 (1-7)	7-point Likert scale (*very strongly disagree* to *very strongly agree*)	"I have a special person who is a real source of comfort to me."	**.93**
Spirituality Spirituality, Religion and Personal Beliefs Scale* (SRPB)	WHOQOL SRPB Group (2006)	12 (0-48)	5-point Likert scale (*not at all* to *an extreme amount*)	"To what extent does any connection to a spiritual being help you get through hard times?"	Con: .97 Mng: .83 Str: .96 Tot: .96
ACEs Childhood Experiences Survey (CES-17)	Mersky, Janczewski, & Topitzes (2017)	17 (0-17)	Dichotomous (*yes*/*no*) and Likert scales (e.g., *never* to *very often*)	"How often did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way?"	.74

Note. *Only three subscales from the SRPB—spiritual connection (Con), meaning of life (Mng), and spiritual strength (Str)—were used in this study; Alc = alcohol; THC = marijuana; Tob = tobacco; Amp = amphetamines; Tot = all items; **Bolded** Chronbach's α = measure previously normed in refereed study with student-athlete sample.

Table 3.

Frequencies of ACEs Reported by Student-Athletes (N = 423)

Adverse Childhood Experience	***n* (%) or *M* (*SD*)**
Physical Abuse	103 (24.2)
Sexual Abuse	17 (4.0)
Emotional Abuse	40 (9.4)
Physical Neglect	27 (6.4)
Emotional Neglect	16 (3.8)
Household Substance Abuse	68 (16.0)
Household Mental Illness	93 (21.9)
Domestic Violence	37 (8.7)
Household Incarceration	32 (7.5)
Parental Divorce/Separation	90 (21.2)
Family Financial Problems	51 (12.0)
Food Insecurity	26 (6.1)
Homelessness	16 (3.8)
Parental Absence	56 (13.2)
Peer Victimization	25 (5.9)
Parent/Sibling Death	37 (8.7)
Violent Crime Victimization	9 (2.1)
1st Gen. ACEs Total	1.24 (1.51)
2nd Gen. ACEs Total	0.52 (1.04)
Total ACEs	1.75 (2.22)

Note. M = mean; *SD* = standard deviation; ACEs = adverse childhood experiences; Bold font = 2nd Generation ACEs; Total ACEs = sum of 1st and 2nd Generation ACEs.

Table 4.

Frequencies of BPSS Health Variables

Indicator	*n* (%)
Biological Health	
Injury/Health Problem	
0	157 (39.6)
6-24	105 (26.6)
25-49	68 (17.1)
50-74	42 (10.6)
75-100	24 (6.1)
Days Missed (Past Week)	
0-1	335 (84.4)
2-4	29 (7.3)
5-7	33 (8.3)
Psychological Health	***n* (%)**
Depression	
0-4 (none/minimal)	243 (56.5)
5-9 (mild)	116 (27.0)
10-14 (moderate)	48 (11.2)
15-19 (mod. severe)	18 (4.1)
20-27 (severe)	5 (1.2)
Anxiety	
0 (none)	68 (15.3)
1-5 (mild)	179 (40.5)
6-10 (moderate)	120 (27.0)
11-15 (mod. severe)	51 (11.6)
16-21 (severe)	25 (5.6)
Stress	
0-13 (low)	141 (35.5)
14-26 (moderate)	220 (55.4)
27-40 (high)	36 (9.1)
Substance Use	
Alcohol	
Past month	150 (39.1)
Past year	51 (13.2)
Marijuana	
Past month	28 (7.3)
Past year	30 (7.8)
Tobacco	
Past month	41 (10.6)
Past year	15 (3.9)
Amphetamines	
Past month	13 (3.4)
Past year	9 (2.3)
Social Health	***n* (%)**
Social Support	
1.0-2.9 (low)	5 (1.2)
3.0-5.0 (moderate)	85 (21.0)
5.1-7.0 (high)	315 (77.8)
Spiritual Health	***n* (%)**
Spirituality	
1-12 (low)	32 (8.0)
13-24 (somewhat)	75 (18.7)
25-36 (moderate)	119 (29.7)
37-48 (high)	175 (43.6)

Table 5.

Estimated Correlation Matrix for Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. ACEs-1	--																
2. ACEs-2	.74***	--															
3. ACEs-T	.91***	.81***	--														
4. MH-Dx	.19***	.12*	.18***	--													
5. PH-Dx	.14**	.19***	.18***	.17***	--												
6. GAD-7	.34***	.32***	.41***	.44***	.16**	--											
7. PHQ-9	.27***	.34***	.37***	.43***	.14**	.85***	--										
8. SRPB	-.21***	-.14*	-.16**	-.12*	-.09	-.26***	-.34***	--									
9. MSPSS	-.40***	-.34***	-.40***	-.13**	-.06	-.35***	-.47***	.36***	--								
10. PSS-10	.37***	.36***	.44***	.42***	.10†	.71***	.80***	-.34***	-.43***	--							
11. OSTRC	.21**	.09	.17**	.23***	.16**	.21***	.29***	-.19***	-.16**	.30***	--						
12. Days	.10*	.05	.10†	.17**	.11*	.11*	.16**	-.07	-.02	.14**	.72***	--					
13. Alc	.21***	.06	.18***	.07	.06	.07	.06	-.24***	-.01	.11*	.05	.00	--				
14. THC	.26***	.08	.22***	.07	-.004	.14**	.14**	-.17**	-.17**	.14**	.01	-.03	.43***	--			
15. Tob	.07	-.01	.04	.03	-.02	.01	.05	-.05	.02	.08	-.09	-.12*	.42***	.35***	--		
16. Amp	.01	-.01	-.02	.33***	.06	.10*	.19***	-.04	-.10*	.14**	.00	-.02	.16**	.24***	.27***	--	
17. SubUse	.32***	.13*	.19***	.15**	.04	.12†	.10†	-.23***	-.18**	.16**	-.01	-.03	.79***	.71***	.66***	.43***	--
M	1.24	0.52	1.75	0.39	0.23	5.70	5.02	32.73	5.87	16.35	21.41	0.81	2.44	0.78	0.56	0.32	0.88
SD	1.51	1.04	2.22	0.79	0.47	5.09	4.92	12.03	0.99	7.13	25.84	1.93	2.65	1.97	1.49	1.46	1.00
Range	0-7	0-6	0-12	0-4	0-2	0-21	0-26	2-48	2.2-7.0	0-39	0-100	0-7	0-11	0-10	0-6	0-8	0-4

Note. †$p < .06$. *$p < .05$. **$p < .01$. ***$p < .001$. *M* = mean; *SD* = standard deviation; ACEs-1 = 1st Generation ACEs; ACEs-2 = 2nd Generation ACEs; ACEs-T = sum of 1st and 2nd Generation ACEs; MH-Dx = sum of mental health diagnoses; PH-Dx = sum of physical health diagnoses; Days = total practice/competition days missed in past week due to injury/health concern; Alc = alcohol use; THC = marijuana use; Tob = tobacco use; Amp. = amphetamines use; SubUse = sum of substances used.

Table 6.

Effect of ACEs Predicting Biopsychosocial Health Outcomes

Outcome (DV)	**Predictor (IV)**	***b***	***SE* (*b*)**	***β***	***p*-value**
Anxiety	ACEs	0.47	0.07	0.40	**< .001**
	Sex	0.31	0.13	0.14	**.014**
	Race	-0.09	0.05	-0.09	.091
	College	-0.16	0.04	-0.23	**< .001**
	Division	-0.14	0.08	-0.10	.083
Depression	ACEs	0.39	0.07	0.34	**< .001**
	Sex	0.30	0.13	0.13	**.022**
	Race	-0.12	0.05	-0.12	**.032**
	College	-0.18	0.04	-0.26	**< .001**
	Division	-0.13	0.09	-0.09	.134
Stress	ACEs	0.48	0.08	0.41	**< .001**
	Sex	0.31	0.13	0.14	**.014**
	Race	-0.14	0.06	-0.15	**.012**
	College	-0.12	0.04	-0.18	**.002**
	Division	-0.02	0.09	-0.01	.811
Injury	ACEs	0.17	0.06	0.16	**.004**
	Sex	0.19	0.12	0.09	.098
	Race	-0.07	0.05	-0.09	.139
	College	-0.09	0.04	-0.16	**.015**
	Division	-0.01	0.08	-0.01	.878
Social Support	ACEs	-0.36	0.06	-0.33	**< .001**
	Sex	0.01	0.14	0.01	.936
	Race	0.20	0.05	0.22	**< .001**
	College	0.01	0.04	0.01	.884
	Division	0.11	0.09	0.08	.201
Substance Use	ACEs	0.20	0.07	0.19	**.006**
	Sex	-0.18	0.15	-0.09	.240
	Race	-0.10	0.06	-0.11	.077
	College	0.09	0.05	0.15	.067
	Division	0.23	0.08	0.17	**.006**

Note. Italicized predictor variables = control variables; Sex was coded as 0 = male, 1 = female.

Table 7.

Effects of ACEs and Spirituality Predicting Biopsychosocial Health Outcomes

Outcome (DV)	**Predictor (IV)**	***b***	***SE* (*b*)**	***β***	***p*-value**
Anxiety	ACEs	0.41	0.07	0.40	**< .001**
	Spirituality	-0.27	0.06	-0.22	**< .001**
	Sex	0.33	0.14	0.14	**.015**
	Race	-0.10	0.06	-0.10	.083
	College	-0.16	0.05	-0.22	**< .001**
	Division	-0.14	0.09	-0.09	.096
Depression	ACEs	0.32	0.07	0.26	**< .001**
	Spirituality	-0.40	0.07	-0.33	**< .001**
	Sex	0.40	0.15	0.17	**.006**
	Race	-0.14	0.06	-0.14	**.022**
	College	-0.17	0.05	-0.24	**< .001**
	Division	-0.12	0.10	-0.07	.220
Stress	ACEs	0.41	0.08	0.33	**< .001**
	Spirituality	-0.39	0.07	-0.32	**< .001**
	Sex	0.41	0.14	0.17	**.004**
	Race	-0.16	0.06	-0.16	**.008**
	College	-0.11	0.04	-0.15	**.018**
	Division	0.01	0.10	0.00	.945
Injury	ACEs	0.12	0.06	0.12	.051
	Spirituality	-0.17	0.06	-0.16	**.004**
	Sex	0.24	0.12	0.11	.057
	Race	-0.08	0.05	-0.10	.099
	College	-0.08	0.04	-0.13	**.042**
	Division	0.00	0.08	0.00	.999
Social Support	ACEs	-0.29	0.06	-0.24	**< .001**
	Spirituality	0.48	0.07	0.40	**< .001**
	Sex	0.05	0.16	0.02	.756
	Race	0.23	0.06	0.23	**< .001**
	College	0.02	0.05	0.03	.692
	Division	0.13	0.10	0.09	.190
Substance Use	ACEs	0.15	0.09	0.14	.073
	Spirituality	-0.23	0.07	-0.20	**.001**
	Sex	-0.05	0.16	-0.02	.742
	Race	-0.14	0.06	-0.15	**.023**
	College	0.15	0.06	0.22	**.013**
	Division	0.33	0.09	0.23	**< .001**

Note. Italicized predictor variables = control variables; Sex was coded as 0 = male, 1 = female.

Table 8.

Moderating Effect of Spirituality on ACEs and Biopsychosocial Health Outcomes

Outcome (DV)	**Predictor (IV)**	***b***	***SE* (*b*)**	***β***	***p*-value**
Anxiety	ACEs	0.42	0.07	0.36	**< .001**
	Spirituality	-0.27	0.06	-0.22	**< .001**
	Interaction	0.07	0.04	0.06	.082
	Sex	0.29	0.13	0.13	**.020**
	Race	-0.12	0.05	-0.12	**.027**
	College	-0.15	0.04	-0.21	**< .001**
	Division	-0.14	0.08	-0.10	.079
Depression	ACEs	0.27	0.07	0.23	**< .001**
	Spirituality	-0.34	0.06	-0.28	**< .001**
	Interaction	-0.05	0.04	-0.05	.194
	Sex	0.36	0.13	0.16	**.006**
	Race	-0.14	0.05	-0.14	**.009**
	College	-0.15	0.04	-0.21	**.001**
	Division	-0.14	0.09	-0.09	.114
Stress	ACEs	0.44	0.08	0.38	**< .001**
	Spirituality	-0.21	0.06	-0.19	**< .001**
	Interaction	0.08	0.07	0.07	.249
	Sex	0.26	0.12	0.11	**.039**
	Race	-0.03	0.05	-0.03	.505
	College	-0.10	0.04	-0.15	**.007**
	Division	0.02	0.08	-0.01	.821
Injury	ACEs	0.13	0.07	0.12	.066
	Spirituality	-0.08	0.06	-0.08	.132
	Interaction	0.04	0.06	0.04	.555
	Sex	0.12	0.11	0.06	.292
	Race	-0.06	0.05	-0.07	.229
	College	-0.08	0.03	-0.13	**.021**
	Division	-0.00	0.07	-0.00	.995
Social Support	ACEs	-0.32	0.08	-0.29	**< .001**
	Spirituality	0.33	0.07	0.29	**< .001**
	Interaction	-0.03	0.07	-0.03	.679
	Sex	0.09	0.13	0.04	.463
	Race	0.12	0.05	0.14	**.017**
	College	0.01	0.04	0.02	.722
	Division	0.15	0.08	0.10	.076
Substance Use	ACEs	0.25	0.09	0.21	**.007**
	Spirituality	-0.32	0.07	-0.27	**< .001**
	Interaction	0.22	0.08	0.18	**.008**
	Sex	-0.11	0.14	-0.05	.415
	Race	-0.03	0.06	-0.03	.633
	College	0.18	0.04	0.26	**< .001**
	Division	0.39	0.09	0.26	**< .001**

Note. Interaction term = ACEs X Spirituality; Italicized predictor variables = control variables; Sex was coded as 0 = male, 1 = female.

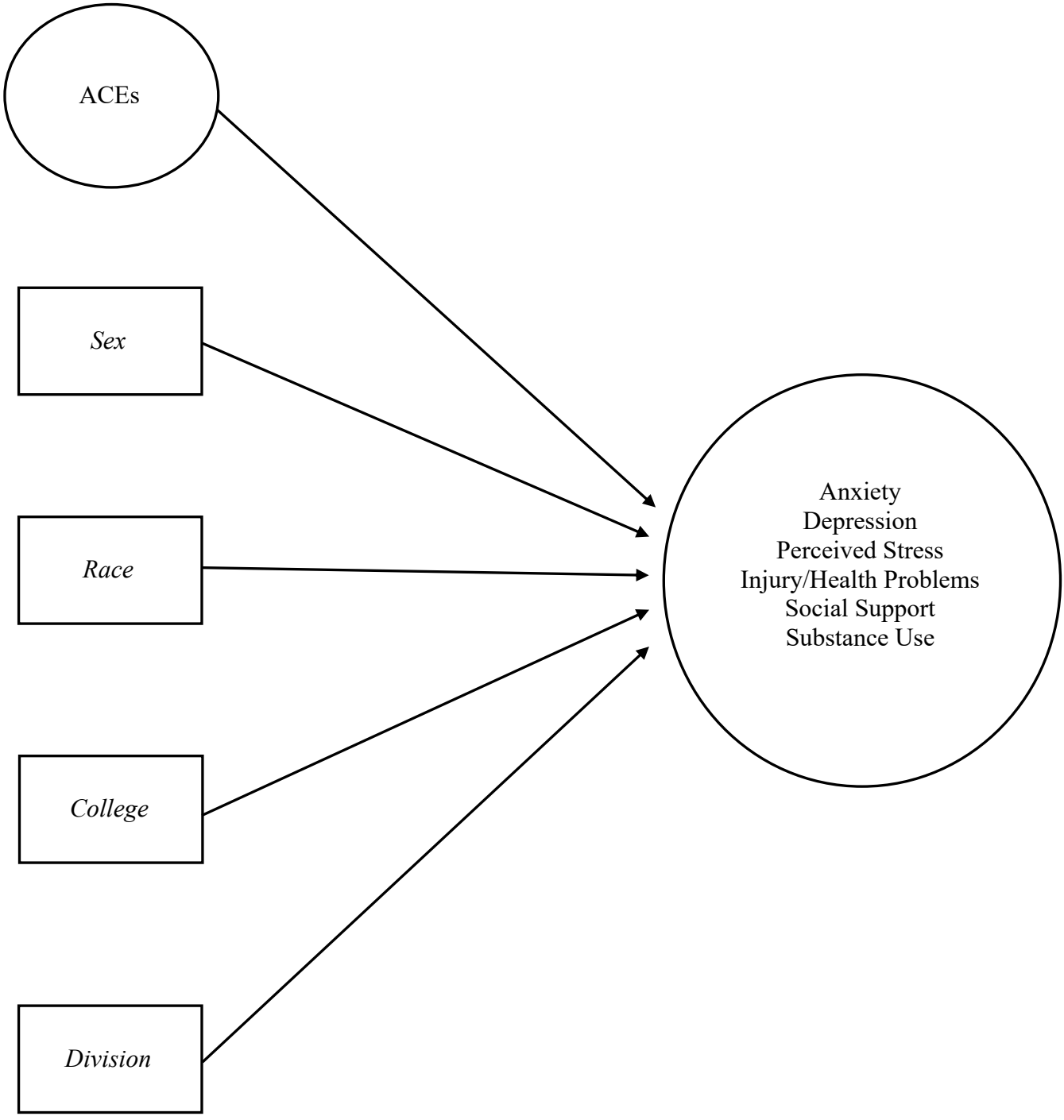

Figure 1.

Conceptual SEM model depicting ACEs (latent variable) predicting BPS health latent variables, accounting for control variables (Italicized).

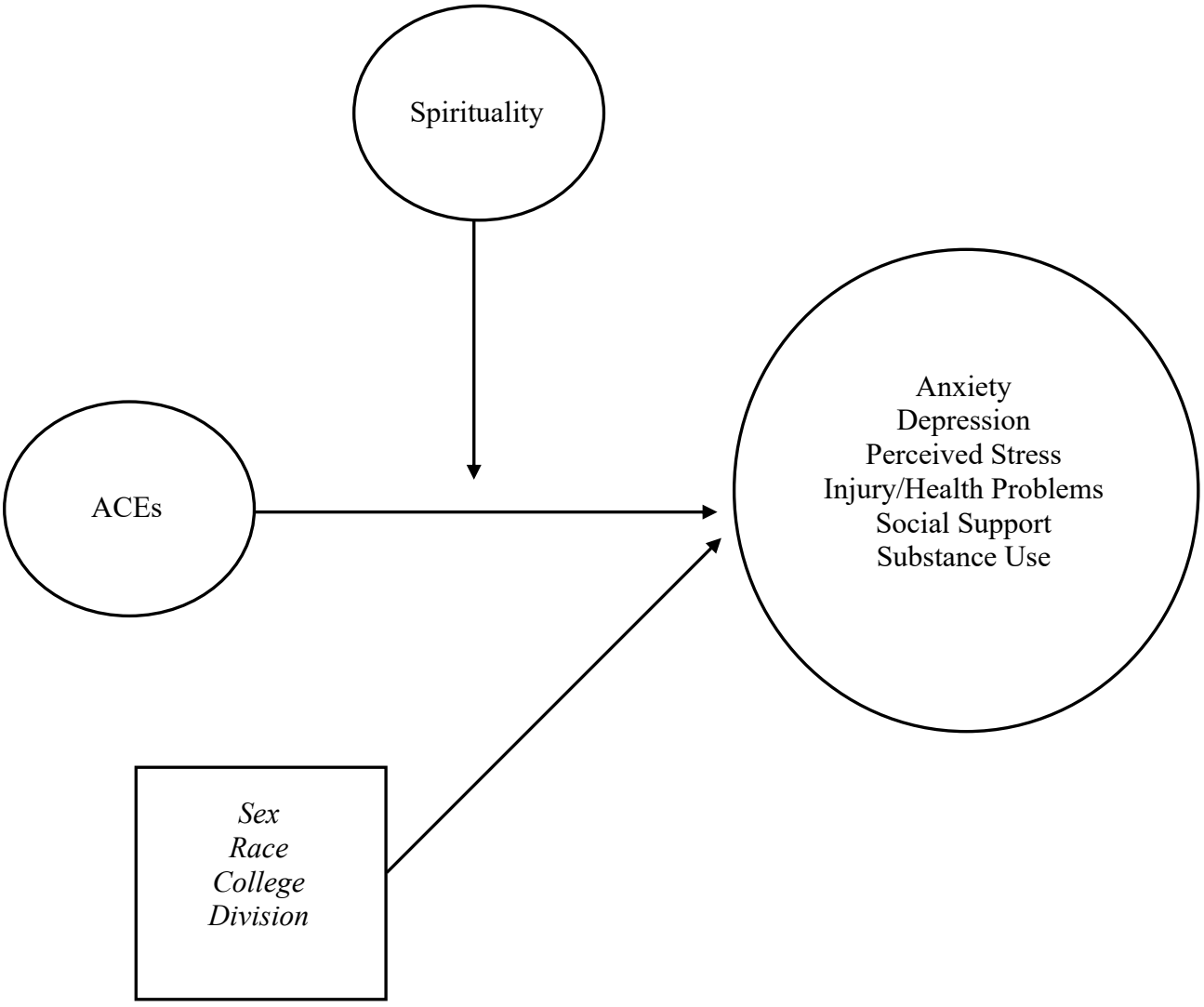

Figure 2.

Conceptual latent moderation model depicting Spirituality (latent variable) moderating the relationship between ACEs (latent variable) and BPS health latent variables, accounting for control variables (Italicized).

CHAPTER 6: IMPLICATIONS OF ADVERSE CHILDHOOD EXPERIENCES AND BPSS HEALTH OUTCOMES AMONG NCAA STUDENT-ATHLETES

The final chapter of this dissertation provides a culmination of findings and the "so what" of the previous chapters. Specifically, this chapter will first provide a general overview of chapters one through five. Next, a summary of noteworthy findings is presented. The chapter will conclude with implications for researchers, National Collegiate Athletic Association (NCAA) athletics personnel, and medical family therapists, with an emphasis on recommendations for addressing and treating adverse childhood experiences (ACEs; Felitti et al., 1998) and biopsychosocial-spiritual (BPSS; Engel 1977, 1980; Wright, Watson, & Bell, 1996) health concerns in the NCAA student-athlete population.

Dissertation in Review

NCAA student-athletes are faced with unique challenges that impact their BPSS health (e.g., Bryant, Choi, & Yasuno, 2003; Chen, Snyder, & Magner, 2010; Reardon & Factor, 2010). In addition to the difficult present-day experiences impacting their overall health, many student-athletes may also be coping with the negative effects of ACEs given the high prevalence rates in young adult populations (e.g., McCormick, Carroll, Sims, & Currier, 2017). However, despite a robust body of evidence linking ACEs to deleterious BPSS health outcomes across the lifespan (e.g., Hughes et al., 2017), few research teams have explored the relationship between ACEs and health in this population. Thus, the purpose of this dissertation was to investigate the interplay between ACEs and biological (i.e., injury/health problems), psychological (i.e., anxiety, depression, stress, substance use), social (i.e., social support), and spiritual (i.e., spirituality) health among NCAA student-athletes. Coupling the biopsychosocial (BPS) systems metatheory (Anchin, 2008) with the theory of toxic stress (National Scientific Council on the Developing

Child, 2005; 2014; Shern, Blanch, & Steverman, 2016) as the guiding theoretical framework, each chapter offered a unique contribution to the literature and furthered our understanding of the impact of ACEs on student-athlete health.

Chapter one set the stage by introducing the need for this research in addition to providing an overview of ACEs and BPSS health challenges experienced by NCAA student-athletes. Chapter two further investigated the critical research in these areas and provided a comprehensive literature review of ACEs and BPSS health outcomes in general, and more specifically in the student-athlete population. In chapter three, a systematic review of the literature examined the effectiveness of current interventions being used to improve BPSS health outcomes among NCAA student-athletes. Next, the proposed methodology to investigate the interplay between ACEs and BPSS health outcomes was detailed in chapter four. Finally, guided by the methodology proposed in chapter four, chapter five presented findings from an original research study that explored the impact of ACEs and spirituality on the current BPS health of NCAA student-athletes. The following section provides a more in-depth summary of the noteworthy findings from chapters three and five.

Noteworthy Findings from Chapter Three

Guided by the BPS systems metatheory (Anchin, 2008), the systematic review detailed in chapter three addressed the following research question: How effective are existing interventions at treating the BPSS health of NCAA student-athletes? Of the 420 initial articles reviewed, only 20 explored the effectiveness of interventions targeting biological, psychological, social, and/or spiritual health outcomes (see chapter three). Of note, due to the scope of the research question, studies that only reported effects of interventions on biological health outcomes (e.g., physical injury) were excluded. One unique finding was related to demographic information of the 20

included studies. Of the 2,434 total student-athlete study participants, over half (n = 1,343, 55%) identified as female whereas less than one-third (n = 738, 30%) identified as male. Among the 13 studies that reported race/ethnicity data, White non-Hispanic student-athletes represented over 75% of the total samples.

The primary findings were related to the effectiveness of different interventions utilized to address BPSS health outcomes in the student-athlete population. Results indicated that both mindfulness- (e.g., diaphragmatic breathing, progressive muscle relaxation, guided imagery) and cognitive behavioral-based interventions (e.g., skills building, cognitive restructuring) may be effective at reducing symptoms of anxiety, depression, eating disorders, and stress, in addition to improving athletic performance and substance use behavior among NCAA student-athletes. However, these results must be interpreted with caution due to the poor methodological quality of the studies. For example, many of the studies did not report gender or race information, lacked a control group, and had insufficient information regarding sequence generation and blinding procedures, raising concerns for the validity and generalizability of the studies' findings. A final finding was related to spirituality. For example, two of the reviewed studies reported outcomes related to mindfulness (e.g., increased awareness, becoming more present-focused). Although researchers have conceptualized mindfulness training as harmonious with components of spirituality (e.g., Bergemann, Siegel, & Belzer, 2013), the utility of spirituality (e.g., as a predictor, mediating/moderating, or outcome variable) in the context of student-athlete health and well-being remains unclear.

Key recommendations. Based on findings from this systematic review, Brown and colleagues (under review) first recommended that future researchers strive to recruit more diverse samples (e.g., male student-athletes, student-athletes of color, more sports teams) to more

accurately reflect the current demographic composition of NCAA student-athletes (NCAA, 2015). A second recommendation was for research teams to explore the interconnectedness among biological, psychological, social, *and* spiritual domains of health to gain a more comprehensive understanding of student-athletes' concerns and needs. Additionally, though this review was focused specifically on the treatment effectiveness of student-athletes' BPSS health outcomes, results supported the need for researchers to investigate additional factors (aside from being a student-athlete) that may contribute to the onset/exacerbation of the well-established BPSS health concerns experienced in this distinct population. One particular area of research that has received increased attention over the past few decades is the prevalence and deleterious impact of ACEs on subsequent health outcomes (see Hughes et al., 2017 for a review). However, despite being linked to a number of BPSS health problems in various populations and being recognized as a global health issue (Anda, Butchart, Felitti, & Brown, 2010), there is limited literature exploring ACEs and student-athlete health (i.e., Barnard, Athey, Killgore, Alfonso-Miller, & Grandner, 2018; Kaier, Cromer, Davis, & Strunk, 2015).

Noteworthy Findings from Chapter Five

The aforementioned gaps in the existing literature, in addition to the established interplay among various biological, psychological, social, and spiritual health experiences and concerns among student-athletes, provided a strong rationale for developing an original research study that explored the prevalence and impact of ACEs and spirituality on BPS health outcomes in the student-athlete population. Using the BPSS systems metatheory (Anchin, 2008; Engel, 1977, 1980; Wright et al., 1996) and theory of toxic stress (National Scientific Council on the Developing Child, 2005, 2014; Shern et al., 2016) as the theoretical framework, the original research study in chapter five answered the following research questions: (a) What is the

association among ACEs and BPSS health outcomes? (b) Do ACEs predict BPS health outcomes? and (c) Does spirituality moderate the relationship between ACEs and BPS health outcomes?

Results from univariate and bivariate analyses. A total of 477 male (*n* = 290, 60.8%) and female (*n* = 184, 38.6%) student-athletes representing 20 different sports teams from 55 different colleges/universities participated in the study. Results revealed that nearly two-thirds (*n* = 272, 64.5%) of student-athletes endorsed at least one cumulative ACE and about 40% (*n* = 163, 38.7%) reported two or more total ACEs. Notably, student-athletes who reported higher total ACE exposure had greater mental and physical health diagnoses, symptoms of anxiety and depression, and higher perceived stress, injury/health problems, alcohol use, and total substance use. Conversely, those reporting higher ACE frequency had lower levels of spirituality and social support. Additionally, student-athletes with higher levels of spiritualty reported greater social support and were less likely to endorse mental health diagnoses and symptoms of anxiety/depression, and reported lower levels of perceived stress, injury/health problems, alcohol use, marijuana use, and total substance use.

Results from multivariate analyses. Results from more robust analyses (i.e., structural equation modeling) indicated that cumulative ACEs negatively predicted social support and positively predicted anxiety, depression, perceived stress, injury/health problems, and total substance use, while controlling for the effects of sex, race, school attended, and division. Additionally, spirituality positively predicted social support and negatively predicted anxiety, depression, perceived stress, injury/health problems, and substance use while controlling for ACEs and all control variables. Finally, it was discovered that spirituality did not significantly moderate the relationships between ACEs and anxiety, depression, stress, social support, or

injury/health problems. However, while spirituality did significantly moderate the relationship between ACEs and total substance use, the effect was not in the hypothesized direction (i.e., at average and high levels of spirituality, substance use increased in linear fashion with total ACEs). Taken together, these findings highlight the significant impact of ACEs and spirituality on the BPS health of NCAA student-athletes and provide important implications for researchers, clinicians, and NCAA athletics personnel.

Research Implications

Building upon findings from Felitti et al.'s (1998) landmark study, a substantial body of literature has continued to highlight a strong link between ACEs and health outcomes later in life (see Hughes et al., 2017 for a review). However, only two known studies (i.e., Barnard et al., 2018; Kaier et al., 2015) have explored the impact of ACEs on biological (e.g., somatic complaints) and psychological (e.g., alcohol use, sleep disturbances) health outcomes in the NCAA student-athlete population. Although emerging research revealed significant relationships between and among ACEs and various biological, psychological, social, and spiritual health concerns in the student-athlete population (e.g., Brown et al., under review), researchers need to further investigate these relationships with an eye towards identifying factors/strategies that may help mitigate the long-term harmful health effects of ACEs. Specifically, researchers should continue exploring the role of different resiliency factors (i.e., spirituality) that may protect against the negative effects of ACEs and investigate why these factors may impact health outcomes differently. Researchers should also investigate additional protective factors (e.g., social support, relationship satisfaction with teammates, coaches, significant others) that may directly or indirectly influence the effect of ACE exposure on overall health (Meng, Fleury, Xiang, & D'Arcy, 2018), particularly in the student-athlete population.

Given the variability of reported ACEs in different populations (e.g., Hughes et al., 2017; Kaier et al., 2015), research teams should continue examining differences in ACE occurrences and BPSS health concerns across different young adult samples. For example, comparing student-athletes to their age-related university peers would provide further insight into potential characteristics and resiliency factors that may differentiate the two subgroups. Additionally, due to the diversity of NCAA student-athletes (NCAA, 2015)—Division I athletes in particular—researchers should strive to recruit more diverse samples to determine how the prevalence and impact of ACEs differs across various racial and ethnic groups (Sacks & Murphey, 2018). However, given the differences in how ACEs are conceptualized and measured in the extant literature (Mersky et al., 2017), researchers should continue working to develop a universal, manualized assessment tool and scoring guidelines for the measurement of ACEs. This would allow for more valid cross-study comparisons of the type and quantity of ACE exposure across different populations.

Finally, given the recent changes in legislature requiring certain NCAA institutions to provide mental health services for student-athletes (Hosick, 2019), researchers should implement prospective, longitudinal studies examining the effectiveness of mental health treatment on BPS health outcomes among treatment-seeking student-athletes. Of particular interest would be exploring whether or not mental health treatment impacts subjective (e.g., player- and coach-reported performance evaluation) and objective (e.g., race times) measures of athletic performance over time. Notwithstanding the various challenges of implementing such studies, findings would add to the understanding of the interplay between physical and mental aspects of sports. Further, research exploring potential differences in BPS outcomes among different mental health provider types (e.g., sports psychologist, professional counselor, marriage and family

therapist) would help determine if the treatment in and of itself is effective, or if *who* is providing the treatment makes a meaningful difference.

Implications for NCAA Athletics Personnel

Results from Brown, Jensen, Hodgson, Schoemann, and Rappleyeas' (under review) original research study offer several important clinical implications for healthcare professionals providing care to student-athletes. First, results highlighting significant links among ACEs and BPSS health outcomes highlight the need for athletic departments to screen student-athletes for ACEs and BPSS health complaints. This would help identify those who may be at greater risk for various BPS concerns such as injury, anxiety, depression, and substance use (Brown et al., under review; Kaier et al., 2015). Although the NCAA currently does not have a formalized protocol to screen for ACEs or psychosocial health concerns (e.g., depression, anxiety, substance abuse), there are practical ways to implement these screenings. For example, prior to each season, student-athletes are required to undergo a preparticipation physical exam (PPE) to determine if they are medically cleared to participate in their sport. Though focused primarily on student-athletes' physical health, these PPEs offer a prime opportunity for athletic trainers, team physicians, and/or mental health providers to administer brief assessments for ACEs (e.g., CES-17; Mersky, Janczewski, & Topizes, 2017), spirituality (e.g., SRPB; WHOQOL SRPB Group, 2006), and common psychosocial health concerns (e.g., PHQ-9, Kroenke, Spitzer, & Williams, 2001, GAD-7, Spitzer, Kroenke, & Williams, 2006).

However, if implemented, a number of ethical challenges need to be addressed, such as determining: (a) who would have access to this sensitive information (e.g., athletic trainers, team physicians), (b) how to appropriately address and manage these concerns, and (c) when to follow-up with those who report having experienced ACEs and/or screen positive for

psychosocial health concerns. Perhaps athletic departments can develop and implement a triage system to manage student-athletes who endorse clinically significant mental health symptoms. Specifically, similar to the management of student-athletes' physical health concerns (e.g., attending mandatory treatment until recovering from an injury), those who screen positive for psychosocial concerns (e.g., depression, anxiety, substance abuse) should be required to meet with a mental health provider until symptoms decrease in severity and the specific treatment goals that have been established with the student-athlete are achieved.

The Role of Athletic Trainers

Athletic trainers are in a unique position to observe and interact with student-athletes on a daily basis and play an integral role in identifying symptoms of mental health conditions and other problematic behaviors. Although the primary responsibility of athletic trainers is to manage student athletes' medical concerns (e.g., sport-related injury), researchers found a large percentage are also managing their athletes' psychosocial concerns (e.g., depression, anxiety, eating disorders, substance abuse; Sudano & Miles, 2017). Cormier and Zizzi (2015) found that a majority of highly trained athletic trainers were competent in accurately identifying common mental health symptoms, though many feel unprepared to effectively manage these concerns. To be sure, while nearly all athletic trainers agreed that recognizing psychological concerns and facilitating mental health referrals fell under their scope of practice, a majority felt that providing counseling or implementing psychological interventions was not their responsibility (Cormier & Zizzi, 2015). Taken together, it is evident that athletic trainers are currently being tasked with managing both the physical and psychosocial concerns of their student-athletes. Given that the assessment and appropriate treatment of mental health challenges falls outside the scope of athletic trainers' scope of practice, integrating a qualified mental health professional as part of a

collaborative healthcare team would help ensure that all aspects of student-athlete health are appropriately managed by trained professionals in their respective fields.

Implementing a Collaborative Healthcare Approach

A convincing body of literature shows collaborative healthcare to be more effective than usual care for a number of BPS health conditions (depression, anxiety, post-traumatic stress disorder; see Archer et al., 2012 for a review). Given the high prevalence of these and other BPS concerns (e.g., injury, substance abuse) in the student-athlete population (Brown et al., under review), athletic departments should strongly consider adopting a collaborative care approach for the management of student-athlete health and wellness. This would allow all members of a student-athlete's primary care team (i.e., athletic trainers, team physicians, and mental health providers) to provide more effective and efficient comprehensive care that addresses all domains (i.e., BPSS) of health with equal importance. To be sure, results from Brown et al.'s (under review) study support the need for NCAA athletic departments to employ mental health professionals who are competent in assessing, diagnosing, and treating psychosocial health concerns, understand the systemic interplay among the BPSS domains of student-athlete health, and are familiar with the culture of college sports. These mental health clinicians should be competent in integrating both mindfulness- and cognitive behavioral-based interventions given their effectiveness at treating not only trauma-related disorders (Vujanovic, Niles, Pietrefesa, Schmertz, & Potter, 2013), but also a number of common psychosocial health concerns (e.g., depression, anxiety) in the student-athlete population (see Brown et al., under review). Additionally, due to the intergenerational and relational transmission of ACE-related effects (National Scientific Council on the Developing Child, 2005, 2014), mental health providers with

training in systems-based theories and trauma-informed interventions/modalities would be especially suited for this role.

An Argument for Marriage and Family Therapists

Of the Division I NCAA institutions currently providing mental health services for student-athletes, it appears the majority employ sports or clinical psychologists (Sudano & Miles, 2017). However, it can be argued that other mental health clinicians (e.g., marriage and family therapists; MFTs) may be better suited to work with this population for several reasons. First, there are many parallels that exist between sports teams and family systems. For example, a sports team, much like a family, is comprised of players (children) and coaches (parents) who develop "a collective identity, a sense of shared purpose, structured patterns of interaction, structured methods of communication, personal and task interdependence, and interpersonal attraction" (Carron, 1988, p.7). Next, researchers have highlighted the effectiveness of couple/family therapy and systemic interventions for a variety of psychosocial problems commonly encountered by students-athletes such as depression, anxiety, substance abuse, and adjustment/relationship difficulties (Carr, 2018; Crane & Payne, 2011; Sprenkle, 2012). Additionally, when comparing training requirements across core mental health provider types (i.e., psychiatry, clinical psychology, professional counseling, social work, and marriage and family therapy), Crane et al. (2010) revealed that MFTs receive three times more systems-based coursework than other provider types and require 16 times more face-to-face clinical hours for licensure. Finally, unlike other mental health disciplines, it is mandated that half of MFTs' face-to-face clinical hour requirements be relational in nature (i.e., more than one person in the room). Given the systemic nature of college sports teams, and the various relational challenges (i.e., between individuals, teammates, and/or coaches) that impact student-athletes' psychosocial

functioning and athletic performance (Holt, Knight, & Zukiwski, 2012; Wachsmuth, Jowett, & Harwood, 2018), MFTs are uniquely qualified to work in this capacity.

Barriers to Help-Seeking

Despite the NCAA's recent mandate for autonomy conferences to provide mental health services to student-athletes (Hosick, 2019), a number of barriers impede the utilization of these services. For example, student-athletes are generally conditioned to exhibit a high level of mental and physical toughness due to a sports culture that promotes a "suck it up" and "no pain, no gain" attitude. As a result, many athletes may be reluctant to let others know if and when they are struggling mentally, emotionally, and/or physically (Watson, 2005). Data from the American College Health Association (2012) revealed that while nearly two-thirds of student-athletes indicated a willingness to seek help for mental health concerns, they were significantly less likely to report having received mental health services compared to their non-athlete peers. Additional barriers that contribute to student-athletes' reluctance to seek support for mental health problems include, but are not limited to: (a) perceived stigma (e.g., viewing depression or help-seeking as a sign of weakness), (b) a lack of knowledge about symptoms of mental health disorders (i.e., difficulty differentiating between "normal" feelings of tiredness/sadness and clinical mental health symptoms), (c) increased feelings of shame/fear of diminished social status among teammates and coaches for seeking mental health support services, (d) an overall lack of understanding about the interrelationship between mental health functioning and sport performance, and (e) concerns that a mental health care provider would not understand them (Gulliver, Griffiths & Christensen, 2012; Neal et al., 2013; Reardon & Factor, 2010).

Facilitators to Help-Seeking

Conversely research has highlighted various facilitators that aid in student-athlete help-seeking behavior. Among the most important factors for student-athletes seeking mental health services include having an established relationship with a mental health provider, receiving encouragement from trusted relationships, and perceiving positive attitudes of others towards seeking help (Gulliver et al., 2012). In particular, student-athletes rely most heavily on the attitude, encouragement, and support of coaches to seek help from mental health providers, outranking all other sources of support (i.e., friends, family members, and teammates; Gulliver et al., 2012). Though coaches cannot and should not be expected to treat the mental health concerns of their players, this highlights the need for regular trainings on how coaches can better identify signs of mental health problems and make appropriate referrals. Lastly, student-athletes are more likely to seek help from mental health providers when trusted sources (i.e., coaches, athletic trainers, teammates) normalize the prevalence and treatment of mental health issues. Thus, it is essential for coaches, athletic trainers, and team physicians to encourage the utilization of available mental health resources to student-athletes under their care. Having readily available mental health services in athletic departments, and support from key stakeholders (e.g., coaches, athletic trainers), would be a major step forward and aid in the NCAA's efforts to reduce the stigma surrounding mental health/treatment-seeking in the world of college sports (Baumann, 2016).

Implications for Medical Family Therapy

The theoretical foundation of Medical Family Therapy (MedFT; McDaniel, Hepworth, & Doherty, 1992) is grounded in General Systems Theory (GST; von Bertalanffy, 1968) and the BPSS framework (Engel, 1977; 1980; Wright et al., 1996). GST provides an understanding of

how parts—within and between individuals—work within a larger system and how changes in part of an individual/system impacts other parts of that individual/system. Likewise, the premise of the BPSS framework is that the *whole* person is comprised of biological, psychological, social, and spiritual components that are inextricably linked and systemically connected. In addition to their extensive training in systems-based theories, interventions, and treatment plans, MedFTs operate through a comprehensive framework in their assessment, diagnosis, and treatment of individuals, couples, and families—paying particular attention to the interplay among the biological, psychological, social, and spiritual influences of individual and relational functioning (AAMFT, 2018). Thus, due to their unique training and systemic, BPSS framework, MedFTs are well-suited to fulfill various clinical, research, management, policy, and supervisory/leadership roles in a variety of healthcare settings, including NCAA athletic departments (AAMFT, 2018).

Research Implications for MedFTs

While prior researchers have identified significant links between certain BPSS components in student-athlete samples (e.g., social support/spirituality and injury recovery, anxiety/depression and injury occurrence; Armstrong & Oomen-Early, 2009; Mann, Bryant, Johnstone, Ivey, & Sayers, 2016; McKnight & Juillerat, 2011), limited studies (e.g., Brown et al., under review) have investigated the intersection of biological, psychological, social, *and* spiritual domains in this population. Findings from Brown and colleagues (under review; e.g., significant links between and among ACEs and all BPSS domains) provide support for the theoretical basis of the BPSS framework and punctuate the importance of addressing all aspects of student-athlete health with equal importance (AAMFT, 2018). However, a less studied area in the student-athlete literature is the role of social support and spirituality in the context of overall health.

Therefore, MedFTs are encouraged to use their systemic, BPSS theoretical orientation to conduct additional research exploring the significance of social support and spirituality in the context of trauma, health, and performance in this population.

Clinical and Training Implications for MedFTs

MedFTs are not only uniquely qualified to manage the established BPSS health concerns of many student-athletes from a clinical perspective, but also to train and educate key athletic department personnel such as coaches and athletic trainers (AAMFT, 2018). For example, given their specialized training in effective collaboration strategies with medical and mental health care providers (AAMFT, 2018), MedFTs possess many skills (e.g., charting in electronic medical records, developing collaborative treatment plans) to practice in a variety of integrated care settings, such as NCAA athletic departments (AAMFT, 2018). Specifically, MedFTs are trained and assessed for competencies in: (a) assessing, diagnosing, and delivering evidence-based interventions/treatments for DSM-5 conditions, (b) crisis management (e.g., suicidal ideation, domestic violence, (c) stress management and self-care interventions, (d) psychoeducation and interventions geared toward improving health behaviors such as sleep, nutrition, and medication adherence, (e) alcohol and substance abuse screenings, (f) motivational interviewing techniques, (g) pain management psychoeducation and interventions (e.g., mindfulness), and (h) designing and building interdisciplinary collaborative care teams (AAMFT, 2018). Because of these competencies and the relatively high prevalence of ACEs and their negative impact on BPS health outcomes in the student-athlete population (Brown et al., under review; Kaier et al., 2015), MedFTs may be well-suited to work with this population. However, MedFTs are encouraged to seek additional training/education opportunities related to trauma-informed therapy/interventions

(e.g., mindfulness) due to their potential efficacy in treating BPS health and trauma-related concerns among NCAA student-athletes (see Brown et al., under review).

As mentioned previously, MedFTs receive extensive training and acquire competencies in working alongside others from diverse backgrounds to deliver a cooperative, organized, and comprehensive approach to health care (AAMFT, 2018). Thus, MedFTs are in a unique position to develop and implement collaborative healthcare models across NCAA institutions (Sudano, Collins, & Miles, 2017). However, to effectively do so, it is imperative for MedFTs to develop a sound understanding of the clinical, operational, and financial worlds (i.e., three world view; Peek, 2008) of college sports. One way for MedFTs to accomplish this is to develop relationships with key stakeholders across NCAA athletic departments, such as athletic directors, athletic trainers, and team physicians. This would help ensure the delivery of efficient, effective, and sustainable (clinically, operationally, and financially) collaborative care to student-athletes and potentially reduce the stigma surrounding mental health treatment (Sudano et al., 2017).

Finally, given the culturally and racially diverse makeup of NCAA student-athletes and athletics personnel (NCAA, 2015), it is essential for MedFTs to develop and maintain a stance of cultural humility—engaging in a continual process of self-reflection and discovery to examine personal biases, assumptions, and values while embracing aspects of others' cultural identity deemed most important to them (Hook, Davis, Owen, Worthington, & Utsey, 2013). In doing so, MedFTs are encouraged to build honest and trustworthy relationships with student-athletes and key athletic department personnel while striving to understand and eliminate existing power imbalances and BPS health disparities that exist across NCAA institutions (Coakley, 2009; Li, Moreland, Peek-Asa, & Yang, 2017; Yang, 2012). Utilizing their systemic, comprehensive, and culturally humble approach, MedFTs are well-equipped to implement culturally sensitive,

collaborative care that strives to eliminate existing health disparities while improving the overall BPSS health of NCAA student-athletes.

Conclusion

Taken together, the findings presented in this dissertation offer meaningful contributions to the ACEs and student-athlete health literature. The discovery that ACEs and spirituality were significantly linked to a number of BPS health concerns (e.g., depression, anxiety, substance use) emphasize the need for student-athlete healthcare providers to administer routine ACE and BPSS health screenings to help identify those who are at-risk for various health challenges. Additionally, researchers and medical family therapists should continue exploring potential protective factors and/or treatments that may buffer the negative impact of ACEs on health outcomes. If the NCAA is serious about tackling the ongoing and ever-present psychosocial health concerns of its student-athletes, administrative personnel should continue developing policies to make mental health services readily available and easily accessible to the many who are struggling. Attending to ACEs, spirituality, and prioritizing psychosocial health concerns and needs will help create a health-promoting culture that supports and encourages the overall wellness and development of today's nearly 500,000 NCAA student-athlete participants.

REFERENCES

American Association for Marriage and Family Therapy. (2018). *Competencies for family therapists working in healthcare settings.* Retrieved from www.aamft.org/healthcare.

American College Health Association. American College Health Association-National College Health Assessment II: Undergraduate Reference Group Executive Summary Spring 2012. Hanover, MD: American College Health Association; 2012.

Anchin, J. C. (2008). Pursuing a unifying paradigm for psychotherapy: Tasks, dialectical considerations, and biopsychosocial systems metatheory. *Journal of Psychotherapy Integration, 18*(3), 310-349. doi:10.1037/a0013557

Anda, R. F., Butchart, A., Felitti, V. J., & Brown, D. W. (2010). Building a framework for global surveillance of the public health implications of adverse childhood experiences. *American Journal of Preventive Medicine, 39*(1), 93-98. doi:10.1016/j.amepre.2010.03.015

Archer, J., Bower, P., Gilbody, S., Lovell, K., Richards, D., Gask, L., . . . Coventry, P. (2012). Collaborative care for depression and anxiety problems. *The Cochrane Database of Systematic Reviews, 10*, CD006525.

Armstrong, S., & Oomen-Early, J. (2009). Social connectedness, self-esteem, and depression symptomatology among collegiate athletes versus nonathletes. Journal of American College Health, 57(5). 521-526.

Barnard, S., Athey, A., Killgore, W. D., Alfonso-Miller, P., & Grandner, M. A. (2018). 0962 adverse childhood experiences among student athletes are associated with sleep disturbances: Evaluating the mediating roles of depression and anxiety. *Sleep, 41*(suppl_1), A357-A357. doi:10.1093/sleep/zsy061.961

Baumann, J. N. (2016). The stigma of mental health in athletes: Are mental toughness and mental health seen as contradictory in elite sports. *British Journal of Sports Medicine, 50*(3), 135-136.

Bergemann, E. R., Siegel, M. W., Belzer, M. G., Siegel, D. J., & Feuille, M. (2013). Mindful awareness, spirituality, and psychotherapy. In K. I. Pargament, A. Mahoney, & E. P. Shafranske (Eds.), *APA handbooks in psychology. APA handbook of psychology, religion, and spirituality (Vol. 2): An applied psychology of religion and spirituality* (pp. 207-222). Washington, DC, US: American Psychological Association. http://dx.doi.org/10.1037/14046-010

Brown, B. J., Jensen, J. F., Hodgson, J. L., Schoemann, A. M., & Rappleyea, D. L. (2019). *Beyond the lines: Exploring the impact of adverse childhood experiences on NCAA student-athlete health.* Manuscript submitted for publication

Brown, B. J., Jensen, J. F., Hodgson, J. L., Brown, R. E., Rappleyea, D. L., & Schoemann, A. M. (2019). *Mind, body, spirit, and sport: A systematic review examining the effectiveness of interventions targeting the biopsychosocial-spiritual health of NCAA student-athletes.* Manuscript submitted for publication

Bryant, A. N., Choi, J. Y., & Yasuno, M. (2003). Understanding the religious and spiritual dimensions of students‘ lives in the first year of college. *Journal of College Student Development, 44*, 723-745. doi:10.1353/csd.2003.0063

Carr, A. (2018). Couple therapy, family therapy and systemic interventions for adult-focused problems: The current evidence base. *Journal of Family Therapy,* doi:10.1111/1467-6427.12225

Carron, A.V. (1988). Group dynamics in sport: Theoretical and practical issues. London, Ontario: Spodym Publishers.

Chen, S., Snyder, S., & Magner, M. (2010). The effects of sport participation on student-athletes' and non-athlete students' social life and identity. *Journal of Issues in Intercollegiate Athletics, 3,* 176-193.

Coakley, J. (2009). *Sports in society: Issues and controversies* (10th ed.). New York, NY: McGraw-Hill.

Crane, D. R. & Payne, S. H. (2011) Individual versus family therapy in managed care: Comparing the costs of treatment by the mental health professions. *Journal of Marital and Family Therapy*, *37*(3), 273-289. doi: 10.1111/j.1752-0606.2009.00170.x

Crane, D.R., Shaw, A.L., Christenson, J. D., Larson, J.H., Harper, J. M., & Feinauer, L.L. (2010). Comparison of the family therapy educational and experience requirements for licensure or certification in six mental health disciplines. *The American Journal of Family Therapy, 38*(5), 357-373. doi:10.1080/01926187.2010.513895.

Engel, G.L. (1980). The clinical application of the biopsychosocial model. *The American Journal of Psychiatry, 137*, 535–544.

Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science, 196,* 129-136. doi:10.1126/science.847460

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . . Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ACE) study. *American Journal of Preventive Medicine, 14*(4), 245-258. doi:10.1016/S0749-3797(98)00017-8

Gulliver, A., Griffiths, K.M., & Christensen, H. (2012). Barriers and facilitators to mental health help-seeking for young elite athletes: A qualitative study. *BMC Psychiatry, 12*, 157. doi: 10.1186/1471-244X-12-157

Holt, N. L., Knight, C. J., & Zukiwski, P. (2012). Female athletes' perceptions of teammate conflict in sport: Implications for sport psychology consultants. *The Sport Psychologist, 26*(1), 135-154. doi:10.1123/tsp.26.1.135

Hook, J. N., Davis, D. E., Owen, J., Worthington Jr., E. L., & Utsey, S. O. (2013). Cultural humility: Measuring openness to culturally diverse clients. *Journal of Counseling Psychology®*. doi:10.1037/a0032595

Hosick, B. H. (2019). *Access to mental health services guaranteed by autonomy conferences.* Retrieved from http://www.ncaa.org/about/resources/media-center/news/access-mental-health-services-guaranteed-autonomy-conferences

Hu, L., Bao, X., & Wang, Q. (2011). The repetition principle in scientific research. *Zhong Xi Yi Jie He Xue Bao = Journal of Chinese Integrative Medicine, 9*(9), 937-940. doi:10.3736/jcim20110903

Hughes, K., Bellis, M. A., Hardcastle, K. A., Sethi, D., Butchart, A., Mikton, C., . . . Dunne, M. P. (2017). The effect of multiple adverse childhood experiences on health: A systematic review and meta-analysis. *The Lancet Public Health, 2*(8), e356-e366. doi:10.1016/S2468-2667(17)30118-4

Kaier, E., Cromer, L., Davis, J., & Strunk, K. (2015). The relationship between adverse childhood experiences and subsequent health complaints in elite athletes. *Journal of Child & Adolescent Trauma. 8*. doi:10.1007/s40653-015-0041-4.

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine, 16*(9), 606-613. doi:10.1046/j.1525-1497.2001.016009606.x

Li, H., Moreland, J. J., Peek-Asa, C., & Yang, J. (2017). Preseason anxiety and depressive symptoms and prospective injury risk in collegiate athletes. *The American Journal of Sports Medicine, 45*(9), 2148-2155. doi:10.1177/0363546517702847

Mann, J. B., Bryant, K. R., Johnstone, B., Ivey, P. A., & Sayers, S. P. (2016). Effect of physical and academic stress on illness and injury in division 1 college football players. *Journal of Strength and Conditioning Research, 30*(1), 20-25. doi:10.1519/JSC.0000000000001055

McCormick, W. H., Carroll, T. D., Sims, B. M., & Currier, J. (2017). Adverse childhood experiences, religious/spiritual struggles, and mental health symptoms: Examination of mediation models. *Mental Health, Religion & Culture, 20*(10), 1042-1054.

McKnight, C. M., & Juillerat, S. (2011). Perceptions of clinical athletic trainers on the spiritual care of injured athletes. *Journal of Athletic Training, 46*(3), 303.

Meng, X., Fleury, M.-J., Xiang, Y.-T., & D'Arcy, C. (2018). Resilience and protective factors among people with a history of child maltreatment: A systematic review. *Social Psychiatry and Psychiatric Epidemiology*. doi:10.1007/s00127-018-1485-2

Mersky, J. P., Janczewski, C. E., & Topitzes, J. (2017). Rethinking the measurement of adversity: Moving toward second-generation research on adverse childhood experiences. *Child Maltreatment, 22*(1), 58-68. doi:10.1177/1077559516679513

National Scientific Council on the Developing Child (2005/2014). *Excessive stress disrupts the architecture of the developing brain: Working paper no. 3*. Updated Edition. Retrieved from www.developingchild.harvard.edu.

National Collegiate Athletic Association (2015). *Student-athlete participation* [Data file]. Retrieved from https://www.ncaa.org/sites/default/files/Participation%20Rates%20Final.pdf

Neal, T.L., Diamond, A.B., Goldman, S., Klossner, D., Morse, E.D., Pajak, D.E., …Welzant, V. (2013). Mental health and the college student athlete: Developing a plan to recognize and refer student athletes with psychological concerns at the collegiate level. *Journal of Athletic Training, 50*(3), 231-249. doi: 10.4085/1062-6050-50.3.03

Reardon, C.L., & Factor, R.M. (2010). Sport psychiatry: a systematic review of diagnosis and medical treatment of mental illness in athletes. *Sports Medicine, 40*(11), 961-980. doi: 10.2165/11536580-000000000-00000.

Sacks, V., & Murphey, D. (2018) The prevalence of adverse childhood experiences, nationally, by state, and by race or ethnicity. Retrieved from https://www.childtrends.org/publications/prevalence-adverse-childhood-experiences-nationally-state-race-ethnicity

Shern, D. L., Blanch, A. K., & Steverman, S. M. (2016). Toxic stress, behavioral health, and the next major era in public health. *American Journal of Orthopsychiatry, 86*(2), 109-123. doi:10.1037/ort0000120

Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine, 166*(10), 1092-1097. doi:10.1001/archinte.166.10.1092

Sprenkle, D. (2012). Intervention research in couple and family therapy: A methodological and substantive review and an introduction to the special issues. *Journal of Marital and Family Therapy, 38*, 3-29. doi: http://dx.doi.org/10.1111/j.1752-0606.2011.00271.x

Sudano, L. E., Collins, G., & Miles, C. M. (2017). Reducing barriers to mental health care for student-athletes: An integrated care model. *Families, Systems & Health : The Journal of Collaborative Family Healthcare, 35*(1), 77-84. doi:10.1037/fsh0000242

Sudano, L. E., & Miles, C. M. (2017). Mental health services in NCAA division I athletics: A survey of head ATCs. *Sports Health: A Multidisciplinary Approach, 9*(3), 262-267. doi:10.1177/1941738116679127

von Bertalanffy, L. (1968). *General system theory: Foundations, developments, applications*. New York: Braziller.

Vujanovic, A. A., Niles, B., Pietrefesa, A., Schmertz, S. K., & Potter, C. M. (2013). Mindfulness in the treatment of posttraumatic stress disorder among military veterans. *Spirituality in Clinical Practice, 1*(S), 15-25. doi:10.1037/2326-4500.1.S.15

Wachsmuth, S., Jowett, S., & Harwood, C. G. (2018). Managing conflict in coach—athlete relationships. *Sport, Exercise, and Performance Psychology, 7*(4), 371-391. http://dx.doi.org/10.1037/spy0000129 (Watson, 2005).

WHOQOL SRPB Group. (2006). A cross-cultural study of spirituality, religion, and personal beliefs as components of quality of life. *Social Science & Medicine, 62*(6), 1486-1497. doi:10.1016/j.socscimed.2005.08.001

Wright, L. M., Watson, W. L., & Bell, J. M. (1996). *Belief: The heart of healing in families and illness.* New York: Basic Books.

APPENDIX A: IRB APPROVAL

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board
4N-64 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** · **www.ecu.edu/ORIC/irb**

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB
To: Braden Brown
CC: Jake Jensen
Date: 3/25/2019
Re: UMCIRB 19-000235
Beyond the Lines: Exploring the Impact of Adverse Childhood Experiences on the Biopsychosocial-Spiritual Health of NCAA Student-Athletes

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) occurred on 3/23/2019. The research study is eligible for review under expedited category # 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a Final Report application to the UMCIRB prior to the Expected End Date provided in the IRB application. If the study is not completed by this date, an Amendment will need to be submitted to extend the Expected End Date. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
consent letter	Consent Forms
Dissertation Proposal Chapters	Study Protocol or Grant Application
Dissertation Survey	Surveys and Questionnaires
Email Campaign	Recruitment Documents/Scripts
Phone Solicitation	Recruitment Documents/Scripts
Social Media Ad	Recruitment Documents/Scripts

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

APPENDIX B: INFORMED CONSENT

Informed Consent to Participate in Research
Information to consider before taking part in research that has no more than minimal risk.

Title of Research Study: BEYOND THE LINES: EXPLORING THE IMPACT OF ADVERSE CHILDHOOD EXPERIENCES ON THE BIOPSYCHOSOCIAL-SPIRITUAL HEALTH OF NCAA STUDENT-ATHLETES

Principal Investigator: Braden J. Brown
Institution, Department or Division: East Carolina University: College of Health and Human Performance, Department of Human Development and Family Science
Address: Rivers RW 134
Greenville, NC 27858-4353
Telephone #: 252-328-1356

Researchers at East Carolina University (ECU) study issues related to society, health problems, environmental problems, behavior problems and the human condition. To do this, we need the help of volunteers who are willing to take part in research.

Why am I being invited to take part in this research?
The purpose of this research is to better understand the relationship between childhood experiences and the current biopsychosocial-spiritual health of NCAA student-athletes. You are being invited to take part in this research because you are currently a member of an NCAA Varsity sports team. The decision to take part in this research is yours to make. By doing this research, we hope to learn about the overall health experiences of NCAA student-athletes. We have no affiliation with the NCAA.

If you volunteer to take part in this research, you will be one in about 300 NCAA student-athletes to do so.

Are there reasons I should not take part in this research?
I understand that I should not take part in this study if I am not currently an NCAA student-athlete or am under 18 years of age.

What other choices do I have if I do not take part in this research?
You can choose not to participate.

Where is the research going to take place and how long will it last?
If you agree to participate, the research will take place via an online survey that you can complete at your convenience. The survey will be completed once and should take approximately 15 minutes to complete.

What will I be asked to do?
You will be asked to complete an online survey containing questions about your childhood experiences and current physical, mental, social, and spiritual health. Questions will ask about basic

demographic information (e.g., age, relationship status, race/ethnicity, sport team), your childhood experiences, and your overall health and well-being. Your name will not be attached to the questionnaire.

What might I experience if I take part in the research?
Other people who have taken part in this type of research have experienced some increased stress or embarrassment from sharing information regarding their childhood experiences, health experiences, and other pertinent personal information. While there may not be physical risks from participating in this study, some of the questions asked on the questionnaire could cause some emotional distress. You are welcome to stop at any time.

If any part of this study causes you discomfort (whether during the study or in the days following), please contact any of the following resources:

- Crisis Text Line – 24-hour, confidential support; text "Start" to 741-741
- National Suicide Prevention Hotline – 24-hour support; call 1-800-273-8255

Will I be paid for taking part in this research?
Per NCAA rules, we will not be able to pay you for the time you volunteer while being in this study.

Will it cost me to take part in this research?
It will not cost you any money to be part of the research.

Who will know that I took part in this research and learn personal information about me?
ECU and the people and organizations listed below may know that you took part in this research and may see information about you that is normally kept private. With your permission, these people may use your private information to do this research:

- The members of the research team.
- The University & Medical Center Institutional Review Board (UMCIRB) and its staff have responsibility for overseeing your welfare during this research and may need to see research records that identify you.

How will you keep the information you collect about me secure? How long will you keep it?
We will not ask for your name. Your privacy is important to us and will be protected in several ways. Our survey is distributed via REDCap, a secure, HIPAA-compliant, web-based application for research studies. All study records will be kept in encrypted files and stored on a password protected server, then discarded upon generation of the report. This report will be kept for a minimum of three years after completion of the study. Only the researchers working on this project will have access to the data; however, please note that the Institutional Review Board and internal East Carolina University auditors may review the research records.

Information gathered from this study will be used to publish potential findings in scientific communities and/or report these results to government agencies, funding agencies, or manufacturers. However, strict guidelines regarding confidentiality will be enforced and no identifying information will be published.

What if I decide I don't want to continue in this research?
Your participation is completely voluntary. You can stop at any time after it has already started. There will be no consequences if you stop and you will not be criticized. You will not lose any benefits that you normally receive.

Who should I contact if I have questions?
The people conducting this study will be able to answer any questions concerning this research, now or in the future. You may contact the Principal Investigator at brownbra16@students.ecu.edu. If you have questions about your rights as someone taking part in research, you may call the Office of Research Integrity & Compliance (ORIC) at phone number 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, you may call the Director for Human Research Protections, at 252-744-2914.

Is there anything else I should know?
Identifiers might be removed from the identifiable private information and, after such removal, the information could be used for future research studies or distributed to another investigator for future research studies without additional informed consent from you or your Legally Authorized Representative (LAR). However, there still may be a chance that someone could figure out the information is about you.

I have decided I want to take part in this research. What should I do now?
The person obtaining informed consent will ask you to read the following and if you agree, you should select the option to participant in the current study.

- I have read (or had read to me) all of the above information.
- I have had an opportunity to ask questions about things in this research I did not understand and have received satisfactory answers.
- I know that I can stop taking part in this study at any time.
- By electronically signing this informed consent form, I am not giving up any of my rights.
- I know that I can print a copy of this consent form and it is mine to keep.
- I know I will not gain access to the survey without first confirming the following statements:

By selecting the following option I am consenting to the eligibility requirements.

 I am over 18 years of age.

 I am currently an NCAA student-athlete.

By selecting the following option, I am consenting to participate in this study.

 I have read all of the above information, asked questions and have received satisfactory answers in areas I did not understand.

APPENDIX C: ONLINE REDCAP SURVEY

Student-Athlete Health Experiences Survey

By selecting the following option, I am consenting to the eligibility requirements and to participate in this study.

I am over 18 years of age.
* must provide value

a. Yes
b. No

I am currently an NCAA student-athlete.
* must provide value

a. Yes
b. No

Thank you for taking time to participate in this survey. As you complete the survey, please keep the following in mind:

1. Please carefully read through the instructions and response options for each question
2. Please answer each question honestly and to the best of your ability
3. Please remember that all possible precautions will be made to protect your confidentiality

We estimate that it will take you 15 MINUTES to complete this survey.

Again, we thank you for your time! Best of luck this season!

Braden J. Brown, MA
Doctoral Candidate
East Carolina University

A. General Demographic Information

1. What is your current age? _____

2. What is your gender?
    a. Male
    b. Female
    c. Other (Please specify: _____)
    d. Prefer not to answer

3. What is your race (select all that apply)?
    a. American Indian or Alaska Native
    b. Asian
    c. Black/African American
    d. Multi-ethnic
    e. Native Hawaiian or Pacific Islander
    f. White
    g. Other (Please specify: _____)
    h. Prefer not to answer

4. What is your ethnicity?
    a. Hispanic or Latino/Spanish Origin
    b. Not Hispanic or Latino/Spanish Origin
    c. Prefer not to answer

5. What is your sexual orientation?
    a. Straight
    b. Gay/Lesbian
    c. Bisexual
    d. Other (Please specify:_____)
    e. Prefer not to answer

6. What is your religious affiliation, if any?
    a. Agnostic
    b. Atheist
    c. Buddhist
    d. Catholic
    e. Church of Jesus Christ of Latter-Day Saints
    e. Hindu
    f. Jehovah's Witness
    g. Jewish
    i. Muslim
    j. Protestant
    k. Other (Please specify: _____)
    l. Prefer not to answer

7. Where do you currently live?
    a. Residence hall
    b. Fraternity/Sorority house
    c. Apartment/House (other than fraternity/sorority)
    d. Parent's home
    e. Other (Please specify: _____)

8. What is your current relationship status?
    a. Single, never married
    b. In a committed relationship
    c. Married or civil union
    d. Widowed
    e. Divorced
    f. Legally separated
    g. Other (Please specify: _____)

9. Do you have any children?
    a. Yes (How many?_____)
    b. No

B. Sport-Specific Information

1. What college/university do you attend?
    a. _____

2. What is your school's NCAA Division?
    a. Division I
    b. Division II
    c. Division III
    d. Other (Please specify:_____)

3. In which NCAA sport(s) do you participate?
    a. Baseball
    b. Basketball
    c. Bowling
    d. Cross Country
    e. Fencing
    f. Field Hockey
    g. Football
    h. Golf
    i. Gymnastics
    j. Ice Hockey
    k. Lacrosse
    l. Rowing

m. Soccer
n. Softball
o. Swimming & Diving
p. Tennis
q. Track & Field
r. Volleyball
s. Water Polo
t. Wrestling
u. Other (Please specify:_____)

4. Is your sport currently in season or off season?
a. In season
b. Off season

5. What is your current year of athletic eligibility?
a. Freshman
b. Redshirt Freshman
c. Sophomore
d. Redshirt Sophomore
e. Junior
f. Redshirt Junior
g. Senior
h. Redshirt Senior

6. Based on your roster spot, how would you classify your current role on your sports team?
a. First team (you start in a team sport or compete in your preferred events in individual sports)
b. Second team (regular substitute in a team sport, often compete in some event in individual sports)
c.Third team (participate in practice but compete infrequently)
d. Practicing or training but not competing

7. Are you receiving an athletics scholarship?
a. Yes
b. No

C. We'd like to ask you some questions about your overall health and health behaviors

1. Have you ever been diagnosed by a medical or mental health professional with any of the following mental health conditions? (select all that apply)
a. ADD/ADHD
b. Anxiety
c. Bipolar
d. Body Dysmorphic Disorder
e. Depression
f. Eating Disorder

g. Insomnia
h. Obsessive-Compulsive Disorder (OCD)
i. Post-Traumatic Stress Disorder (PTSD)
j. Substance Use Disorder
k. Other (Please specify:_____)

2. Have you ever been diagnosed by a medical health professional with any of the following medical health conditions? (select all that apply)

a. Autoimmune Disease
b. Asthma
c. Cancer
d. Diabetes
e. High Cholesterol
f. Hypertension (high blood pressure)
g. Obesity
h. Sleep Apnea
i. Other (Please specify:_____)

3. All things considered, how would you rate your overall health?

a. Very Poor
b. Poor
c. Fair
d. Good
e. Excellent

4. All things considered, how would you rate your quality of life?

a. Very Poor
b. Poor
c. Fair
d. Good
e. Excellent

5. All things considered, how would you compare your overall health to non-student-athletes at your college/university?

a. Much Worse
b. Somewhat Worse
c. About the Same
d. Somewhat Better
e. Much Better

6. All things considered, how would you compare your quality of life to non-student-athletes at your college/university?

a. Much Worse
b. Somewhat Worse
c. About the Same
d. Somewhat Better
e. Much Better

GENERALIZED ANXIETY DISORDER SCALE

Over the last 2 weeks, how often have you been bothered by the following problems? *(Use "✔" to indicate your answer"*	Not at all	Several days	More than half the days	Nearly every day
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 is 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

PATIENT HEALTH QUESTIONNAIRE-9

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✓" to indicate your answer)*	**Not at all**	**Several days**	**More than half the days**	**Nearly every day**
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 of hurting yourself in some way	0	1	2	3

D. We'd like to ask you some questions about events that happened during your childhood. This information will allow us to better understand how certain childhood experiences may affect people later in life.

CHILDHOOD EXPERIENCES SURVEY

All of the following questions refer to the time before you were 18 years of age. Now, looking back before age 18…

1. *Physical abuse:* How often did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way?

a. Never
b. Once
c. More than once

2. *Sexual abuse:* How often did an adult, or anyone at least 5 years older than you, touch you sexually, try to make you touch them sexually, or force you to have sex?

a. Never
b. Once
c. More than once

3. *Emotional abuse:* How often did a parent or adult in your home ever swear at you, insult you, or put you down?

a. Never
b. Rarely
c. Sometimes
d. Often
e. Very often

4. *Physical neglect:* How often was there an adult in your household who tried hard to make sure your basic needs were met?

a. Never
b. Rarely
c. Sometimes
d. Most of the time
e. Always

5. *Emotional neglect:* How often was there an adult in your household who made you feel safe and protected?

a. Never
b. Rarely
c. Sometimes
d. Most of the time
e. Always

6. *Alcohol/drug problem:* Did you live with anyone who was a problem drinker or alcoholic? Did you live with anyone who used illegal street drugs or who abused prescription medications?

a. Yes
b. No (either one)

7. *Mental illness:* Did you live with anyone who was depressed, mentally ill, or suicidal?

a. Yes
b. No

8. *Domestic violence:* How often did your parents or adults in your home ever slap, hit, beat, kick, or physically hurt each other?

a. Never
b. Once
c. More than once

9. *Incarceration:* Did you live with anyone who served time or was sentenced to serve time in a prison, jail, or other correctional facility?

a. Yes
b. No

10. *Divorce/separation:* Were your parents separated or divorced?

a. Yes

b, No (parents were married)
c. No (parents were not married)

11. *Family financial problems:* As a child, how often did your family experience serious financial problems?
a. Never
b. Rarely
c. Sometimes
d. Often
e. Very often

12. *Food insecurity:* How often were you hungry because your family could not afford food?
a. Never
b. Rarely
c. Sometimes
d. Often
e. Very often

13. *Homelessness:* How often were you homeless when you were growing up?
a. Never
b. Rarely
c. Sometimes
d. Often
e. Very often

14. *Parental absence:* Was either one of your parents absent from your life for a long period of time?
a. Yes
b. No

15. *Peer victimization:* How often were you bullied or severely teased by other children or adolescents?
a. Never
b. Rarely
c. Sometimes
d. Often
e. Very often

16. *Parent/sibling death:* Before age 18, did you experience the death of a parent, caregiver, or sibling?
a. Yes
b. No

17. *Violent crime victimization:* Before age 18, were you ever the victim of a violent crime?
a. Yes
b. No

KEEP GOING! YOU ARE ALMOST DONE!

SPIRITUALITY, RELIGIOUSNESS AND PERSONAL BELIEFS INSTRUMENT

E. The following questions ask how your beliefs have affected different aspects of your quality of life in the past two weeks.

1. How much does spiritual strength help you to live better?
    a. Not at all
    b. A little
    c. A moderate amount
    d. Very much
    e. An extreme amount

2. To what extent do you find meaning in life?
    a. Not at all
    b. A little
    c. A moderate amount
    d. Very much
    e. An extreme amount

3. To what extent does taking care of other people provide meaning of life for you?
    a. Not at all
    b. A little
    c. A moderate amount
    d. Very much
    e. An extreme amount

4. To what extent do you feel your life has a purpose?
    a. Not at all
    b. A little
    c. A moderate amount
    d. Very much
    e. An extreme amount

5. To what extent do you feel you are here for a reason?
    a. Not at all
    b. A little
    c. A moderate amount
    d. Very much
    e. An extreme amount

6. To what extent do you feel inner spiritual strength?
    a. Not at all
    b. A little
    c. A moderate amount

d. Very much
e. An extreme amount

7. To what extent can you find spiritual strength in difficult times?
a. Not at all
b. A little
c. A moderate amount
d. Very much
e. An extreme amount

8. To what extent does your spiritual strength help you feel happy in life?
a. Not at all
b. A little
c. A moderate amount
d. Very much
e. An extreme amount

9. To what extent does any connection to a spiritual being help you to get through hard times?
a. Not at all
b. A little
c. A moderate amount
d. Very much
e. An extreme amount

10. To what extent does any connection to a spiritual being help you to tolerate stress?
a. Not at all
b. A little
c. A moderate amount
d. Very much
e. An extreme amount

11. To what extent does any connection to a spiritual being help you to understand others?
a. Not at all
b. A little
c. A moderate amount
d. Very much
e. An extreme amount

12. To what extent does any connection to a spiritual being provide you with comfort/reassurance?
a. Not at all
b. A little
c. A moderate amount
d. Very much
e. An extreme amount

MULTIDIMENSIONAL SCALE OF PERCEIVED SOCIAL SUPPORT

Instructions: We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

Circle the "1" if you **Very Strongly Disagree**
Circle the "2" if you **Strongly Disagree**
Circle the "3" if you **Mildly Disagree**
Circle the "4" if you are **Neutral**
Circle the "5" if you **Mildly Agree**
Circle the "6" if you **Strongly Agree**
Circle the "7" if you **Very Strongly Agree**

1.	There is a special person who is around when I am in need.	1	2	3	4	5	6	7	SO
2.	There is a special person with whom I can share my joys and sorrows.	1	2	3	4	5	6	7	SO
3.	My family really tries to help me.	1	2	3	4	5	6	7	Fam
4.	I get the emotional help and support I need from my family.	1	2	3	4	5	6	7	Fam
5.	I have a special person who is a real source of comfort to me.	1	2	3	4	5	6	7	SO
6.	My friends really try to help me.	1	2	3	4	5	6	7	Fri
7.	I can count on my friends when things go wrong.	1	2	3	4	5	6	7	Fri
8.	I can talk about my problems with my family.	1	2	3	4	5	6	7	Fam
9.	I have friends with whom I can share my joys and sorrows.	1	2	3	4	5	6	7	Fri
10.	There is a special person in my life who cares about my feelings.	1	2	3	4	5	6	7	SO
11.	My family is willing to help me make decisions.	1	2	3	4	5	6	7	Fam
12.	I can talk about my problems with my friends.	1	2	3	4	5	6	7	Fri

PERCEIVED STRESS SCALE

INSTRUCTIONS:

The questions in this scale ask you about your feelings and thoughts during THE LAST MONTH. In each case, please indicate your response by placing an "X" over the circle representing HOW OFTEN you felt or thought a certain way.

	Never	Almost Never	Sometimes	Fairly Often	Very Often
1. In the last month, how often have you been upset because of something that happened unexpectedly?	○	○	○	○	○
2. In the last month, how often have you felt that you were unable to control the important things in your life?	○	○	○	○	○
3. In the last month, how often have you felt nervous and "stressed"?	○	○	○	○	○
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	○	○	○	○	○
5. In the last month, how often have you felt that things were going your way?	○	○	○	○	○
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	○	○	○	○	○
7. In the last month, how often have you been able to control irritations in your life?	○	○	○	○	○
8. In the last month, how often have you felt that you were on top of things?	○	○	○	○	○
9. In the last month, how often have you been angered because of things that were outside your control?	○	○	○	○	○
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	○	○	○	○	○

OSLO SPORTS TRAUMA RESEARCH CENTER QUESTIONNAIRE ON HEALTH PROBLEMS

Please answer the following questions whether or not you have experienced health problems in the past week. Select the alternative that is most appropriate for you, and in the case that you are unsure, try to give the best answer you can.

1. Have you had any difficulties participating in normal training and competition due to injury, illness or other health problems during the past week?
    a. Full participation without health problems
    b. Full participation, but with injury/illness
    c. Reduced participation due to injury/illness
    d. Cannot participate due to injury/illness

2. To what extent have you reduced you training volume due to injury, illness or other health problems during the past week?
    a. No reduction
    b. To a minor extent
    c. To a moderate extent
    d. To a major extent
    e. Cannot participate at all

3. To what extent has injury, illness or other health problems affected your performance during the past week?
    a. No effect
    b. To a minor extent
    c. To a moderate extent
    d. To a major extent
    e. Cannot participate at all

4. To what extent have you experienced symptoms/health complaints during the past week?
    a. No symptoms/health complaints
    b. To a mild extent
    c. To a moderate extent
    d. To a severe extent

5. Please state the number of days over the past 7-day period that you have had to completely miss training or competition due to injury, illness or other health problems?
    a. 0
    b. 1
    c. 2
    d. 3
    e. 4
    f. 5
    g. 6
    h. 7

APPENDIX D: SOCIAL MEDIA RECRUITMENT AD

Are You a Current NCAA Student-Athlete?

- ✓ **Are you 18 years or older?**
- ✓ **Do you have access to the Internet?**
- ✓ **Can you spare 10-15 minutes to help out a former student-athlete?**

If you answered **YES**, you are eligible to participate in a research study!

PURPOSE:
To explore how childhood experiences and spirituality impact the overall health and wellness of NCAA student-athletes

WHAT WILL I HAVE TO DO?
If you choose to participate, you will complete a 10-15 minute online survey.
ALL INFORMATION WILL BE KEPT CONFIDENTIAL

**Due to NCAA rules, you cannot be reimbursed for participating in this study*

HOW DO I PARTICIPATE?
Please go to the following link:

https://redcap.ecu.edu/surveys/?s=HNJYH3AEXX

Please **LIKE** and **SHARE** this post with any/all NCAA student-athletes you know!

ADDITIONAL QUESTIONS:
Contact Braden Brown (PI)
brownbra16@students.ecu.edu
IRB #: UMCIRB 19-000235

APPENDIX E: EMAIL RECRUITMENT SCRIPT

Dear <Name of Athletic Director>,

My name is Braden Brown and I am a former NFL athlete and Division I football player for Brigham Young University. Since my football career ended, I have received a master's degree in Marriage and Family Therapy and am currently working to finish my PhD in Medical Family Therapy at East Carolina University.

My dissertation is exploring the relationships among adverse childhood experiences, spirituality, and the overall health and well-being of NCAA student-athletes. I am reaching out to you in hopes that you will help me distribute my survey to as many of your student-athletes as possible.

The purpose of this research is to gain a more comprehensive understanding of student-athlete wellness. Results from this research will provide NCAA athletics personnel with further insight regarding how to best assist the holistic development of student-athletes during their college experience.

The online questionnaire will be administered through a HIPAA-compliant, web-based modality (REDCap), and will take 10-15 minutes to complete. Participation is voluntary and all precautions will be made to protect respondents' confidentiality. By clicking the link to the survey below, you give your informed consent to participate in this research.

<INSERT SURVEY LINK>

*If you experience any trouble accessing the survey by clicking the link, please copy and paste the URL into a web browser

Thank you for your time and consideration. Go <INSERT TEAM MONIKER>!

Sincerely,

Braden J. Brown
Doctoral Candidate, Medical Family Therapy
East Carolina University
Brownbra16@students.ecu.edu

APPENDIX F: PHONE SOLICITATION

Hello <Name of Athletic Director/Coach>,

My name is Braden Brown and I am a former football player at Brigham Young University. I am currently a doctoral candidate in the Medical Family Therapy program at East Carolina University. For my dissertation, I am conducting research that examines how adverse childhood experiences and spirituality impact the overall health and well-being of NCAA student-athletes. I am wondering if you would be willing to share my survey with your student-athletes?

The survey is online and should take 10-15 minutes to complete. It will be administered through a secure, HIPAA-compliant website, and has been approved by the IRB team at ECU. Participation is voluntary and all precautions will be made to protect respondents' confidentiality. Unfortunately, due to NCAA rules, I am unable to compensate the student-athletes for their participation.

My hope is that results from this research will provide NCAA athletics personnel with a greater understanding of factors that impact the overall health and well-being of student-athletes so we can continue to develop better programs, interventions, educational materials, etc. to aid in the development of all aspects of student-athlete wellness.

What questions or concerns do you have about the study?

Thank you for taking time to speak with me and for your help distributing my survey to your student-athletes!

Best of luck this season. Go <SCHOOL MONIKER>!