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Emerging research has highlighted a link between adverse childhood experiences (ACEs) and various health concerns experienced by NCAA student-athletes. Building on prior work (Kaier, Cromer, Davis, & Strunk, 2015), we hypothesized that ACEs would significantly predict student-athletes' biopsychosocial (BPS) health and that spirituality would serve as a protective factor against the effect of ACEs on BPS health outcomes. Division I, II, and III NCAA student-athletes (N = 477) representing 20 sports across 53 universities completed an online quantitative survey (k = 133) that assessed for ACEs, injury/physical health concerns, anxiety, depression, stress, social support, substance use, and spirituality. Nearly two-thirds (64.5%) of student-athletes endorsed at least one ACE. Structural Equation Models (SEMs) yielded significant positive relationships between ACEs and anxiety, depression, perceived stress, injury/health problems, and substance use, and a negative relationship with social support while controlling for sex, race, school, and division. Additionally, spirituality had a significant negative effect on anxiety, depression, perceived stress, injury/health problems, and substance use, and a positive effect on social support. SEM moderation analyses indicated that spirituality only moderated the relationship between ACEs and substance use. Specifically, at average and high levels of spirituality, the relationship between ACEs and substance use was stronger. Clinical implications, study limitations, and future research directions are discussed.

Keywords: adverse childhood experiences, student-athletes, biopsychosocial, spirituality, health outcomes, NCAA

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 have 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 BPS health outcomes among NCAA student-athletes is scant.

Theoretical Framework

BPSS systems metatheory. 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). However, Anchin's (2008) metatheory lacks an essential domain of overall health and well-being—spirituality. Wright, Watson, and Bell (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. Given that spirituality has been positively linked to a myriad of BPS health outcomes (see Koenig, 2012 for a review), and been found to provide a buffering effect between negative life experiences and psychological health concerns (i.e., depression, anxiety; Young, Cashwell, & Shcherbakova, 2000), examining its role in the context of student-athlete health seems warranted.

Toxic stress theory. 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. Recent evidence suggests that exposure to ACEs 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 BPS health outcomes.

The Biopsychosocial-Spiritual Health of NCAA Student-Athletes

Biological Stressors

In addition to common struggles experienced by their non-athlete university peers, student-athletes are faced with additional BPSS stressors. For example, Vetter and Symonds (2010) found that a majority of student-athletes experienced chronic injuries and frequent physical/mental exhaustion (i.e., burnout) both in- 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). With the year-round demands of academic achievement, 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).

Psychosocial Stressors

Depression. In a recent systematic review, Wolanin et al. (2016) highlighted the mixed prevalence rates of depression (i.e., 15.6% to 21.0%) among NCAA student-athletes. However, more recent work suggested the prevalence rate to be much higher, with over one-third of student-athletes endorsing clinically relevant depressive symptoms (Cox, Ross-Stewart, & Foltz, 2017; Li, Moreland, Peek-Asa, & Yang, 2017). Moreover, Sudano and Miles (2017) found that 98.4% of athletic trainers reported depression as a common concern among their student-athletes. Even more alarming is that 69.3% of athletic trainers reported suicidality as a concern for their athletes (Sudano & Miles, 2017), given that suicide has accounted for nearly 30% of all deaths in this population (Maron, Haas, Murphy, Ahluwalia, & Rutten-Ramos, 2014).

Anxiety/stress. Although the occurrence of anxiety disorders (e.g., generalized anxiety disorder) has been minimally studied in this population (Reardon & Factor, 2010), 97.6% of Division I athletic trainers indicated anxiety was a notable concern for their student-athletes (Sudano, & Miles, 2017). Li et al. (2017) found nearly one-third of student-athletes endorsed symptoms of anxiety (e.g., excessive worry) 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. 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).

Substance use. In addition to negatively impacting student-athletes' physical health, academic performance, and social lives, unmanaged stress may also contribute to substance use/misuse as potential coping mechanisms (Martens et al., 2006; Reardon & Creado, 2014). Martens et al. found that student-athletes consumed more alcohol, engaged in more frequent binge-drinking episodes, and experienced more negative alcohol-related consequences compared to their age-related peers. Moreover, a large NCAA (2013) survey 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 misuse is recognized as major health concern in this population (Martens et al., 2006).

Time demands. Student-athletes experience many of the academic and psychosocial concerns as their non-athlete peers (Wilson & Pritchard, 2005). However, they are also expected to manage several unique challenges, such as mandatory practice, training, film study, treatment, study hall, and other sport-related activities (Martens et al., 2006). In fact, data from the NCAA (2015) revealed that some student-athletes spent upwards of 40 hours per week on athletic activities and nearly 80 hours per week on academics and athletics combined. With such time demands, it is not surprising that student-athletes reported higher rates of academic and relationship stress compared to their non-athlete peers (Wilson & Pritchard, 2005).

Spirituality

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/misuse (see Koenig, 2012). McKnight and Juillerat (2011) found that a majority of university athletic trainers agreed that incorporating student-athletes' spiritual views during treatment 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 and various BPS domains of student-athlete health.

Adverse Childhood Experiences and Health Outcomes

Exposure to trauma, abuse, or neglect during childhood has been 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. Researchers have established a strong connection between ACEs and several chronic diseases 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.

Exposure to ACEs has also been linked to a number of psychosocial health concerns such as depression (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. Finally, a large body of research has demonstrated strong links between ACEs and attempted suicide (Merrick et al., 2017), 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/misuse (Forster et al., 2017) later in life.

ACEs and Student-Athlete Health

Research exploring the prevalence and impact of ACEs on BPS health outcomes in the student-athlete population is fairly 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 BPS 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 the likelihood that many student-athletes have experienced at least one ACE (McCormick, Carroll, Sims, & Currier, 2018), research investigating the prevalence and impact of ACEs on student-athlete health is necessary. 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, spirituality, and BPS 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, spirituality, and BPS health outcomes in a sample of NCAA student-athletes. Specifically, we addressed the following research questions: (a) What are the associations among ACEs, spirituality, and BPS health outcomes? (b) Do ACEs predict BPS health outcomes? and (c) Does spirituality moderate these relationships? Building upon prior work highlighting links among ACEs, spirituality, and BPS health outcomes (e.g., Armstrong & Oomen-Early, 2009; Bryant & Astin, 2008; Mersky et al., 2013; Putukian, 2016; Young et al., 2000), we tested the following hypotheses: (a) biological health (i.e., injury/physical health concerns) would be positively associated with psychological health (i.e., depression, anxiety, perceived stress, substance use), (b) social support would be negatively associated with depression, perceived stress, and anxiety, (c) spirituality would be negatively associated with biological (i.e., injury/health problems) and psychological (i.e., depression, anxiety, stress) health problems, (d) ACEs would positively predict depression, anxiety, perceived stress, and substance use and negatively predict 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 from 53 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 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%), and American Indian (n = 1, 0.2%). 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.

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)

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, LinkedIn), 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. 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 rules, 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), which 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 to account for nested data and to ensure we had

data that were generalizable. All data were deidentified to protect the confidentiality of student-athlete participants. Next, participants completed 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 were asked questions about exposure to various ACEs (e.g., childhood abuse/neglect, family dysfunction). The survey contained 133 items and took an average of 14.1 minutes (SD = 3.54) to complete. Participants were informed a priori that the survey would take approximately 15 minutes to complete and text messages of encouragement (e.g., "Keep going! You are almost done!) were used in-survey to mitigate response fatigue (Conrad, Couper, Tourangeau, & Peytchev, 2005). Reliability for all measures was deemed acceptable (i.e., Chronbach's $\alpha > .70$). 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 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 computed 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 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).

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)	Anonymous & 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 NCAA student-athlete sample.

Results

A total of 539 participants completed a 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 (i.e., 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. Of those who reported ACEs, 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, total ACEs were positively correlated with mental and physical health diagnoses, anxiety, depression, perceived stress, injury/health problems, alcohol use, and total substance use. Conversely, total ACEs were negatively correlated with 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.

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.

Do ACEs Predict 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 predict 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 tested if 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 those with greater levels of spirituality endorsed lower symptoms of 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.

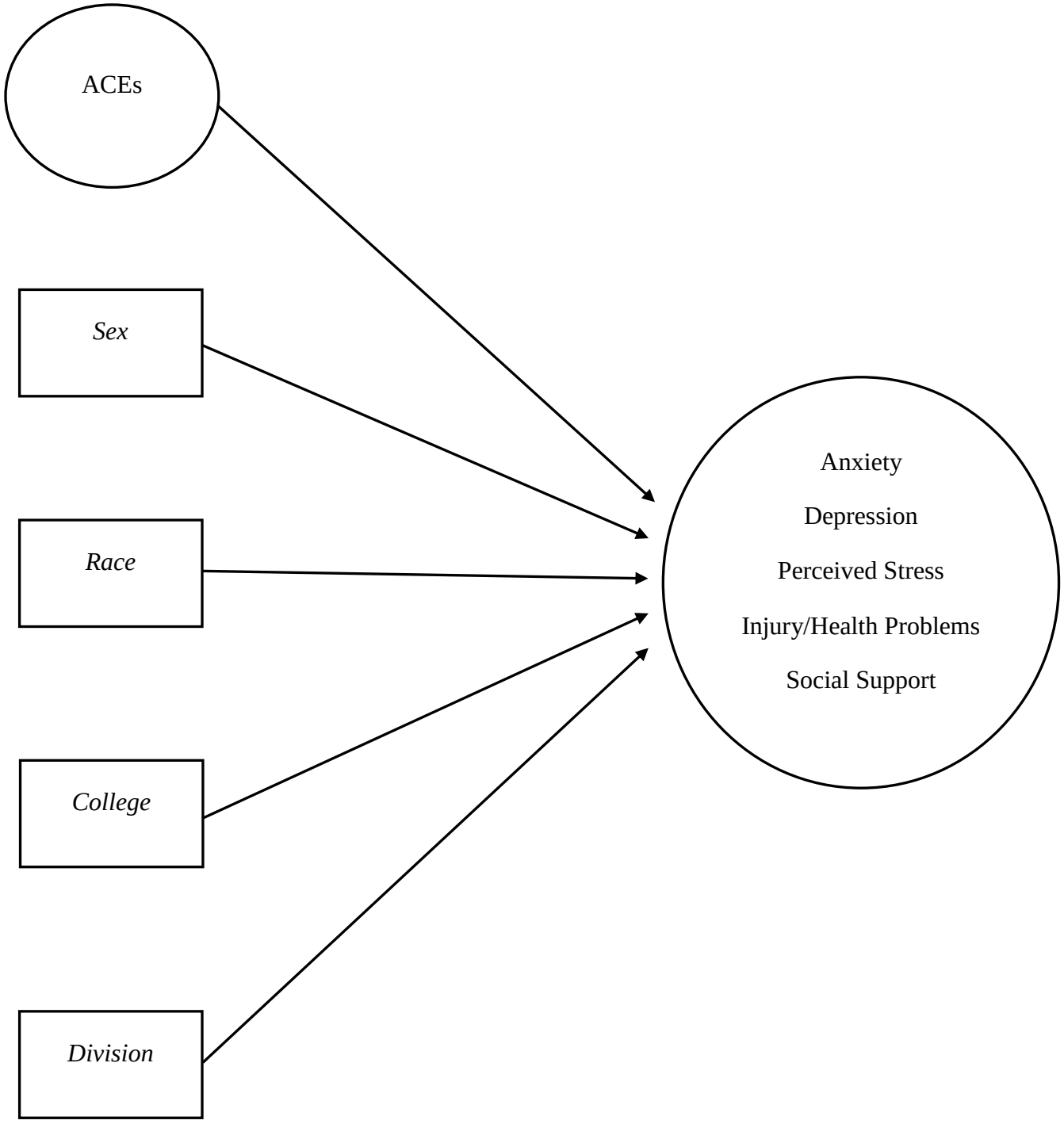

Figure 1.
Conceptual SEM model depicting ACEs (latent variable) predicting BPS health latent variables, accounting for control variables (Italicized).

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.

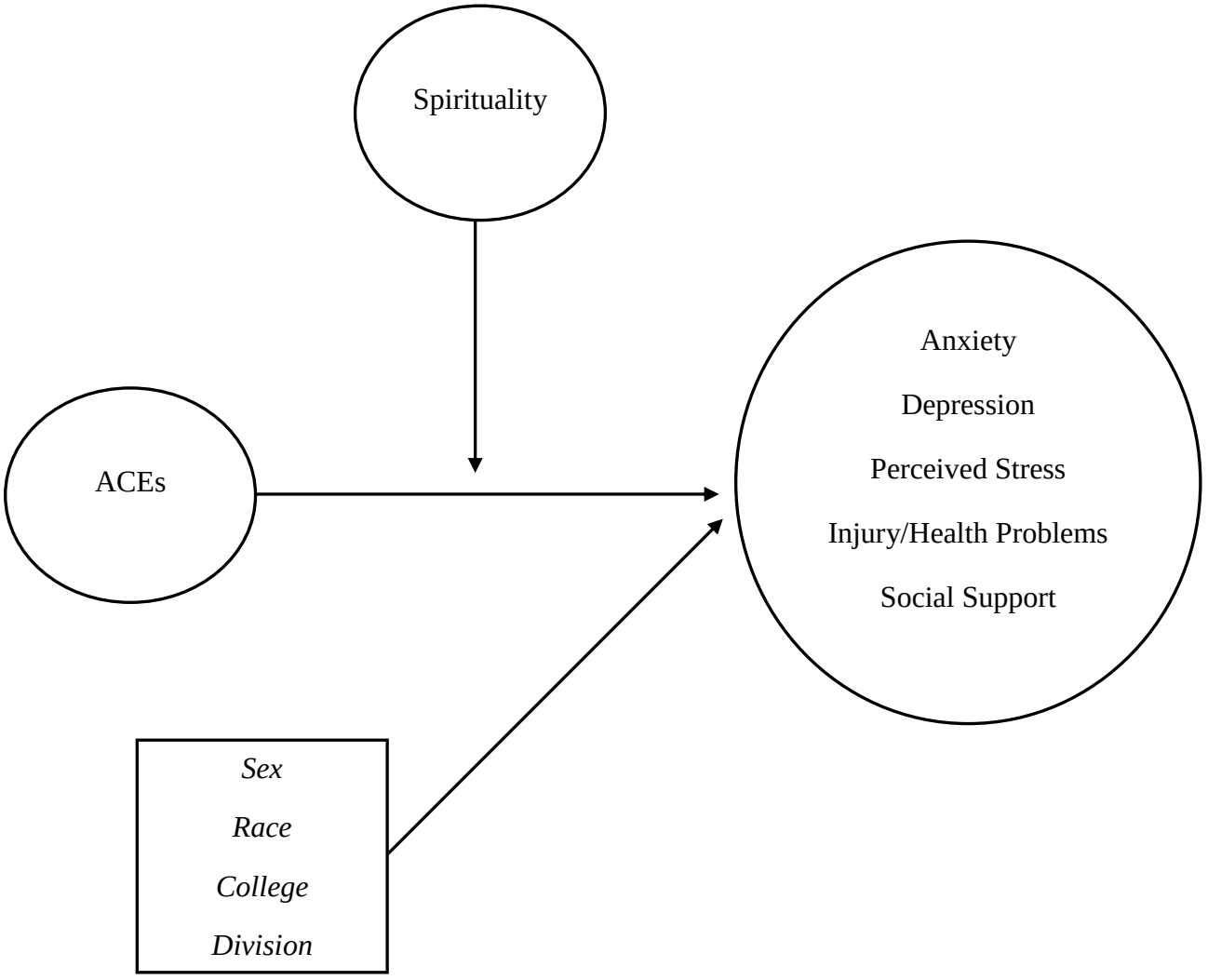

Figure 2.
Conceptual latent moderation model depicting Spirituality (latent variable) moderating the relationship between ACEs (latent variable) and BPS health latent variables, accounting for control variables (Italicized).

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.

Discussion

A convincing 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 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 and spirituality on BPS 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 rates of ACEs reported by young adults in prior studies (e.g., McCormick et al., 2018). 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 (≥ 2 = 16.8%; ≥ 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. Another potential factor contributing to the discrepancies in reported ACEs is the variability in how ACEs were scored and defined. Notably, the current study assessed for both conventional and expanded ACEs (k = 17), 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, Spirituality, and BPS 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 discovery 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, aligns 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 student-athletes who endorsed higher total ACEs reported greater symptoms of 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., 2018) 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 student-athletes with higher levels of spirituality reported lower symptoms of anxiety, depression, stress, injury/health problems, and substance use, and greater levels of social support. These findings are consistent with a large volume of research highlighting a positive link between spirituality and BPS health (see Koenig, 2012) 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. Contrary 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. While spirituality may, indeed, be directly associated with lower anxiety, depression, etc. among

student-athletes, its ability to protect against ACEs during this stage of intense focus on academics, athletics, and social functioning may wane at this particular point in the lifespan. More research with this population is needed to clarify this non-significant moderation finding.

Conversely, we discovered a significant interaction for spirituality, ACEs, and substance use. 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. This finding indicates 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, given that psychosocial health problems have been recognized as the number one concern for today's NCAA student-athletes (NCAA, 2013), results highlight the need to screen student-athletes for ACEs to help 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 (e.g., CES-17) and psychosocial health concerns (e.g., PHQ-9, GAD-7) during routine preparticipation physical exams. Although universities do not currently screen all students in the same manner, the evidence that mental health concerns (e.g., depression, substance misuse) are disproportionately high among student-athletes (Mastroleo et al., 2013; Proctor & Boan-Lenzo, 2010; Reardon & Factor, 2010) justifies a more comprehensive and thorough screening process for these individuals. 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., under review).

Despite recent changes to NCAA legislation requiring autonomy conferences to provide mental health services to student-athletes (Hosick, 2019), significant barriers to accessing these resources prevail. Given that student-athletes may be less likely to acknowledge mental health problems and seek out behavioral health services (Wolanin, Gross, & Hong, 2015), it is vital for coaches, athletic trainers, and team physicians to encourage the utilization of available resources. Further, availability of mental health services should be equal across NCAA divisions because of the similar rates of psychosocial 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, spirituality, and BPS health outcomes in this population. Additionally, the current sample represented 20 NCAA sports from all three divisions across 53 different colleges/universities, increasing the generalizability of findings. Finally, 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 (Balota, Dolan, & Duchek, 2000; Hardt & Rutter, 2004).

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 among ACEs, spirituality, and BPS 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 preceded and impacted their present-day BPS health. Additionally, the current study relied solely on self-reported data. Although a Web-based approach was employed to help 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 deemed valid and reliable, and remain widely used in empirical studies. Another notable limitation was the lack of a comparison sample, precluding inferences 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). Finally, though we examined the potential buffering effect of spirituality, future research should examine the role of additional influences (e.g., social support from teammates, coaches, family) that may serve as protective factors against BPS health concerns in this population (Armstrong & Oomen-Early, 2009; Malinauskas, 2010).

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 overall health 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.

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