

AGGRESSIVE BEHAVIOR AND ALCOHOL USE:
CLASSIFICATION OF COLLEGE ATHLETES

By

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ABSTRACT OF THE DISSERTATION

Aggressive Behavior and Alcohol Use: Classification of College Athletes

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This exploratory study examines aggressive behavior and alcohol use among college athletes. Scholars have been investigating the problem of off-field aggressive behavior among athletes for several decades and recent media coverage of college and professional athletes as perpetrators of interpersonal violence has put the issue of aggression and sports in the national spotlight. Another persistent concern is the heavy alcohol use of college athletes. Athletes drink more often, have more binge-drinking episodes and more negative alcohol-related consequences than their non-athletic peers. Scientists have conducted numerous empirical investigations of the relationship between aggression and alcohol misuse, and findings support the existence of an enduring connection between the two behaviors. This study employed a person-centered statistical technique, Latent Profile Analysis (LPA), to determine if homogeneous profiles of aggressive behavior and alcohol use could be detected in a heterogeneous sample of 276 college athletes. The analysis identified six profiles ranging in behavioral severity from low aggressive/low drinkers to highly aggressive/high drinkers. A subsequent analysis of the demographic characteristics of each profile found significant differences among some of the profiles in their composition of first-year and second-year students. There were

also significant differences among some of the profiles based on gender. These findings have implications for the implementation of tailored prevention and intervention strategies based on each group's unique characteristics. Colleges and universities are the primary recruiting source for professional sports teams and are uniquely positioned to address problem behaviors before athletes fully enter the national spotlight. Creating customized, effective and efficient behavioral health programs that meet the needs of student-athletes could enhance their well-being and elevate their potential for positive contributions to the communities they inhabit.

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- *Isaac Newton*

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Chapter 1

Problem Statement

Introduction

Interpersonal aggression is a pervasive social problem. The potential of being victimized is higher for some people rather than others, but everyone is at risk. The social, economic and public health burden created by the perpetration of aggressive acts is profound (Centers of Disease Control and Prevention, 2013; Haegerich & Dahlberg, 2011). Victims often suffer from serious physical injuries that require immediate and long-term medical attention, develop mental health disorders that disrupt their well-being, and have difficulties with social functioning (Dahlberg & Mercy, 2009; Hanson, Sawyer, Begle & Hubel, 2010). Public and private organizations expend immense financial resources providing physical and mental health treatment to victims (as well as perpetrators), implementing prevention programs, and prosecuting and punishing offenders (Corso, Mercy, Simon, Finkelstein & Miller, 2007; Russo, 2008; U.S. Department of Justice, 2013).

Given the devastatingly negative consequences of aggression, stakeholders from various sectors of society are highly motivated to prevent and curtail aggressive behaviors. These include, but are not limited to, individuals who have close ties to victims and perpetrators, property owners who want to live and conduct business in safe communities, officers of the law and court systems whose jobs entail ensuring such safety, and healthcare professionals who cater to the needs of both victims and perpetrators. The burden of interpersonal aggression on our healthcare, law

enforcement, and court systems is staggering (Garcia-Moreno & Watts, 2011) and this social problem requires continued and vigorous efforts to attenuate its deleterious consequences.

Most scientific investigations regarding aggressive behaviors focus on targeted subpopulations, including but not limited to, violent criminals, people with mental illnesses, domestic violence perpetrators and children who engage in bullying behaviors (Archer, 2007; Harris, Oakley & Picchioni, 2013; Leff & Waasdorp, 2013; McKeown, 2014). An at-risk group that has garnered considerably smaller research attention, is athletes. Recent media coverage of professional athletes as perpetrators of interpersonal violence, however, has put the issue of off-field aggression and sports in the national spotlight (Mauriello, 2014). In 2014, two high-profile football players were indicted for acts of interpersonal violence. Ray Rice faced a charge of aggravated assault for hitting his fiancée, causing her to lose consciousness. Another football player, Adrian Peterson, was indicted on felony child abuse charges for disciplining his four-year-old son by hitting him with a wooden switch (Cohen, 2014). In the wake of these incidents, some professional sports teams reacted by hiring sports psychologists to help athletes manage their off-field aggressive behaviors (Flanagan, 2014) and the National Football League (NFL) televised a 60-second public service announcement about domestic violence (forgoing \$4.5 million dollars in advertising revenue) during the airing of the 2015 Super Bowl game (Boren, 2015).

This dissertation aims to advance the knowledge base regarding interpersonal aggression among athletes. Although professional athletes are a small percent of the general population, their cultural influence is powerful (Hartman, 2003). The footprint of

athletics on American society expands beyond professional players to include millions of sports fans. A particularly impressionable segment of their fanbase are children and young adults, many of whom participate in organized sports during important developmental periods during their life-course (Svare, 2004). As such, research on aggressive behaviors among athletes has an important role to play in addressing interpersonal violence that plagues our society, in general.

Aggression

Concept. Interpersonal aggression refers to tendencies and behaviors that intend to cause harm to another person (Bjorklund & Hawley, 2014; McPherson & Martin, 2010). The targeted individual must perceive the behavior as harmful and be motivated to avoid injury (Anderson & Bushman, 2002; Giancola et al., 2012). Violence is extreme physical aggression (Anderson & Huesmann, 2003; Savage & Yancey, 2008). All aggressive acts are not violent, but all violence is aggressive. Hostility and anger are related constructs that frequently appear in the literature regarding aggression but are separate and distinct in an important way. Anger and hostility are constructs in the realm of affect whereas aggression is a behavioral characteristic (Ramírez & Andreu, 2006). Angry and hostile feelings often precede and increase the likelihood of expressed aggression, but they are not prerequisite (Crane & Testa, 2014). The focus of this proposed study is the behavior. The terms *interpersonal aggression*, *aggressive behaviors*, *aggression*, and *violence* are used in this dissertation to reflect current usage in the literature. Scholars recommend that we view aggression as a multidimensional concept and have written extensively about the complexity of categorizing aggressive

behaviors (Bailey & Ostrov, 2008; Fives, Kong, Fuller & DiGiuseppe, 2011; Ramírez & Andreu, 2006).

Forms. One well-known strategy for categorizing aggression distinguishes between direct and indirect manifestations of the behavior (Crapanzano, Frick, & Terranova, 2010; Salmivalli & Kaukiainen, 2004). Physical and verbal aggression are considered direct because they are easily observable and identifiable (García-Sancho, Salguero & Fernández-Berrocal, 2014; James & Young, 2013). They include actions such as hitting and insulting. Less recognizable are acts of indirect aggression, also known as psychological or relational aggression (Cleverley, Szatmari, Vaillancourt, Boyle & Lipman, 2012; Salmivalli & Kaukiainen, 2004; Sanchez-Martin et al., 2011). These injurious behaviors specifically damage the psychological or emotional well-being of others (Kachadourian et al., 2012; Williams, Richardson, Hammock & Janit, 2012). Examples of psychological aggression include friendship withdrawal, spreading rumors and acts of social isolation (such as excluding a co-worker from an informal office gathering). Less commonly recognized, but still considered aggressive, are instances of withholding information (Giancola et al., 2012). They can range from seemingly harmless pranks (e.g., allowing someone to be drenched with a bucket of paint) to extreme psychological torment (e.g., law enforcement interrogation tactics).

Functions. Aggressive behaviors also have different objectives. Some aggressive behavior is intended solely to harm the target with no other goal in mind (Umukoro, Aladeokin & Eduviere, 2013). This type of behavior is often labeled as reactionary and impulsive (Anderson & Bushman, 2002; McPherson & Martin, 2010). Other aggressive acts are considered instrumental because they are a means to an end—

such as obtaining property (robbery) or attaining sexual gratification (rape) (Bjorklund & Hawley, 2014). It is important to note, however, that many aggressive acts are done for multiple motives (Robertson, Daffern & Bucks, 2012). For example, it is possible that school bullies physically harm their victims because they find inflicting pain pleasurable as well for acquiring the proverbial “lunch money.”

Conditions. Another useful way to distinguish types of aggressive acts is to determine if the behavior is characteristic of the individual or purely a function of situational factors (McPherson & Martin, 2010). In other words, aggressive behaviors are categorized by whether they are a function of an individual’s personality “trait” or limited to their “state” of mind during a particular situation. Trait aggression refers to a person’s enduring tendency to behave in a manner that is harmful to others (Ahmadi, Besharat, Azizi & Larijani, 2011; Bácskai, Czobor & Gerevich, 2011). This aggressive disposition manifests over a course of many years, with a diverse range of targets and in a variety of contexts (Giancola et al., 2012). State aggression manifests only occasionally, in certain types of situations, and during short periods of time (Farrar & Krcmar, 2006; Stephens & Allsop, 2012). An example of state aggression is when a mild-mannered individual engages in extremely violent behavior to protect the safety of loved ones.

Domains

Interpersonal aggression is manifested in several domains, including but not limited to households, schools, and communities—that parallel the degrees of intimacy between the perpetrator and victim. At one end of the spectrum is aggression that occurs in close personal relationships among household members or romantic partners. At the

other end of the spectrum are situations where the perpetrator and victim have never met prior to the incident.

Homes. There is a long tradition of research on aggression between individuals in close relationships. Often aggressive behaviors among family members and romantic partners occurs in the context of abuse. Interpersonal abuse is defined as multiple episodes resulting in physical or psychological injuries to the victim (Mosby's, 2009). Initial studies focused on abuse between spouses (domestic violence) and victimization of children by their parents or caregivers (child abuse). Since the 1970s, when the battered women's movement positioned male-to-female domestic violence at the forefront of public awareness (Bumiller, 2010; Ramsey, 2013), there has been a proliferation of national and international epidemiological and prevention studies (Dalal & Lindquist, 2012; Garcia-Moreno & Watts, 2011; Gucek, Švab & Selic, 2011; Olofinbiyi et al., 2013). Current research on aggression and violence in close relationships is being redefined and is delving into novel areas. The focus on male-to-female violence in marriages has expanded to include intimate partner violence (IPV) in a variety of romantic relationships. Sub-types of IPV include female-to-male violence, same-sex violence and violence in dating relationships among adolescents and young adults (Stiles-Shields & Carroll, 2014; Woodin & O'Leary, 2010; Zosky, 2010). Using this expanded definition, The Center for Disease Control and Prevention (CDC) reports that at some point in their lives 31.5% of females and 27.5% of men will experience IPV victimization (Breiding et al., 2014). The consensus in the research community is that family violence negatively impacts not only the intended adult victims but also others in the household, most notably children (Humphreys & Absler, 2011; Overlein, 2010). Children who

witness domestic violence are susceptible to a multitude of immediate and long-term negative outcomes, including but not limited to depression, anxiety, poor academic performance, behavioral problems and delinquency (Lee, Kolomer & Thomsen, 2012; Meltzer, Doos, Vostanis, Ford & Goodman, 2009; Wolfe, Crooks, Lee, McIntyre-Smith & Jaffe, 2003). In some cases, children are not only witnesses but are also victims (Cox, Kotch & Everson, 2003; Haas, Bauer-Leffler & Turley, 2011). When an adult is violent with another adult, that adult-victim can, in turn, become violent toward children in the home (Damant et al., 2010; Slep & O'Leary, 2005.). Child abuse victims are at risk for the same negative outcomes as those who only witness household violence with the added consequence of direct physical harm (Juby, Downs & Rindels, 2014; Sousa et al., 2011). Also, particularly relevant to the transmission of aggressive behaviors from the private to the public domain, is the finding that child abuse victims, as well as individuals who witness household violence, are more likely to become perpetrators (Jelic Tuscic, Buljan Flander & Mateskovic, 2013; Milaniak & Widom, 2014). During childhood and adolescence, this tendency is often expressed as bullying behaviors.

Schools. The topics of bullying behaviors and school violence have been under intense national scrutiny during the past fifteen years (Bjorklund & Hawley, 2014; Fives et al., 2011; Tsorbatzoudis, Travlos & Rodafinos, 2013). The most recent *Indicators of School Crime and Safety* report (Robers et. al, 2014) suggests that during the five-year period from 2007-2011, approximately one in three students reported being bullied at school. Also, in 2012 there were about 1.4 million incidents of victimization among students ages 12 to 18, including several highly publicized school shooting incidents (Robers et. al, 2014). Similar to adult-perpetrated child abuse, peer victimization is

associated with a host of negative outcomes (Bouffard & Koeppel, 2014; Sansen, Iffland & Neuner, 2014; Smithyman, Fireman & Asher, 2014). Victims are at an increased risk for the development of anxiety disorders, depression, school absenteeism, reduced academic achievement and suicidal behavior (Berry & Hunt, 2009; Moore et al. 2014). For the perpetrators, aggressive behavior and poor peer relationships have implications for future problem behaviors including further violence, delinquency and drug involvement (Fraser et al., 2005; Jansen et al., 2012; Leff & Wassdorp, 2013). Children, adolescents, and young adults are harming each other at alarming rates, motivating parents, teachers, and school administrators to expend considerable resources addressing this serious issue of school safety.

Communities. Outside the confines of homes and schools, aggressive behaviors are pervasive in the public areas of our neighborhoods, towns, and cities. According to the most recent report of national crime statistics, an estimated 1.2 million crimes involving the use of force or threat of force were committed in 2012 (United States Department of Justice, 2013). These violent crimes include rape, assault, and certain classes of robberies and homicides. Criminal violence has an enduring negative impact on the physical and mental health of victims (Cornaglia, Feldman & Leigh, 2014). Many are hospitalized or die from their physical injuries (McBrearty, 2011). Further, the rates of Post-Traumatic Stress Disorder (PTSD), anxiety and depression are higher among victims than non-victims (Brewin, Andrews & Rose, 2003). Violent crimes are also a significant national economic burden (McCollister, French & Fang, 2010). The cost of incarceration alone is staggering. For example, in 2012 the federal government allocated 6.6 billion dollars to the Bureau of Prisons (U.S. Department of Justice, 2013). High

rates of violent crime also contribute to business divestment in communities (Rosenthal & Ross, 2010). This “flight” stagnates employment opportunities for residents which may in turn create economic stressors and hardships that lead to further acts of violence (Weiss & Lesley Williams, 2005).

In sum, interpersonal violence is pervasive in our society—it plagues our homes, schools and communities—and off-field aggression perpetrated by athletes is evident in each of these domains. Examples include “jocks” bullying non-athletes in elementary and high schools (Jerome et. al., 2001), inter-athlete hazing rituals (Rees, 2010), acts of sexual violence committed by athletes on college campuses (Moynihan, Banyard, Arnold, Eckstein & Stapleton, 2010) and the previously mentioned highly publicized domestic violence incidents among national sports figures. Not all athletes are violent, but the high-profile status of professional players (and increasingly college players) presents an opportunity to address a social problem in an influential subpopulation. Interpersonal aggression is a threat to our physical and emotional well-being, disrupts our social functioning, and siphons large amounts of our financial resources. As such, researchers, health practitioners and policy makers are committed to identifying prevention and intervention solutions. An important first step is to explore the etiology of the behavior.

Risk Factors

Numerous risk factors are associated with perpetration of aggressive acts, and they have been extensively studied and documented in the literature. They include but are not limited to, demographic characteristics, environmental factors and personality variables (Hosie, Gilbert, Simpson & Daffern, 2014; Liu, Lewis & Evans, 2013; Milaniak & Widom, 2014). It is beyond the scope of this study to discuss all of the risk factors;

instead several key areas that have the largest body of empirical literature will be highlighted.

Gender. A long history of research on gender and aggression supports the assertion that males are more likely to engage in aggressive behaviors than females (Burton, Henninger, Hafetz & Cofer, 2009; Tsorbatzoudis et al. 2013). The forms of aggression exhibited by men and women also differ (Anderson & Bushman, 2002; Salmivalli & Kaukiainen, 2004). Males generally engage in direct, easily observable aggressive behaviors such as causing physical harm (Bailey & Ostrov, 2008; Fives et al., 2011). In contrast, females are more likely to use gossip, social exclusion and other forms of relational aggression that are less observable (Card, Stucky, Sawalani, & Little, 2008; Juvonen, Espinoza & Wang, 2013).

Several theories are posited to explain the etiology of gender differences in the rates and forms of aggressive behaviors (Cleverley, Szatmari, Vaillancourt, Boyle & Lipman, 2012; Smith, Rose & Schwartz-Mette, 2010). Some contend that the differences are a result of gender role socialization (Archer, 2004; Letendre 2007), others argue for a biological explanation (Burton et al., 2009; Siever, 2008) and a third perspective suggests that a combination of both influences are at play (Denson, Mehta & Ho Tan, 2013; Mehta & Beer, 2010). Although the debate regarding the etiology of gender differences in the expression of aggression is as yet unresolved, the literature consistently supports the existence of said differences.

Race/Ethnicity. Differences in the rates of aggressive and violent behavior among racial/ethnic groups are also well-documented (Lauritsen & White, 2001; McNulty, Bellair & Watts, 2013; Ulmer, Harris & Steffensmeier, 2012). The majority of

the empirical evidence shows that minorities, particularly Blacks and Latinos, are more likely to engage in these behaviors than Whites (Sampson, Morenoff & Raudenbush, 2005; Shetgiri, Kataoka, Ponce, Flores & Chung, 2010). Some argue that these differences may be caused by the stress and psychosocial difficulties minorities encounter due to their experience of racial/ethnic discrimination and social marginalization (Choi, Harachi, Gillmore & Catalano, 2006). Others, however, contend that focusing on race/ethnicity as risk factors for aggressive behavior is misguided (Haggerty, Skinner, McGlynn-Wright, Catalano & Crutchfield, 2013). They argue that the association between the two variables is spurious due to the confounding effects of other influential variables—notably socioeconomic status (SES), neighborhood disadvantage and family structure (Feldmeyer, Steffensmeier & Ulmer, 2013; Vazsonyi and Keiley, 2007).

Socioeconomic Status. As arguments for the direct effects of race/ethnicity on aggressive behaviors dissipate, empirical evidence supporting the influence of SES accumulates (Williams, Conger & Blozis, 2007; Wolff, Santiago & Wadsworth, 2009). Although interpersonal aggression is present at all levels of social class, published research documents that prevalence is higher among low SES individuals (Santiago, Wadsworth & Stump, 2011). Evidence of the relationship between SES and aggression is present in the domains specified earlier—homes, schools, and communities. For example, in the home setting, researchers are increasingly calling attention to the high co-occurrence of low SES and IPV. They argue that ignoring the connection between the two phenomena is a disservice to victims whose membership in both groups puts them at greatest risk for negative outcomes (Goodman, Borges, Singer & Smyth, 2009; Evans, 2005). A similar case is being made for victims of child abuse in poor families

(Sidebotham & Heron, 2006). In the area of peer victimization in schools, bully prevention specialists report high rates among low-income students and are advocating for the development of interventions that cater to the unique needs of this segment of our nation's student population (Hong, 2009; Jansen et al., 2012;). Finally, the literature is clear with regard to stark differences in the profiles of communities with high rates of violence versus those with lower rates. One significant difference is that individuals who live in poor neighborhoods are more at risk for perpetration and victimization than those who live in wealthier communities (Ohmer, Warner, & Beck, 2010).

Exposure. One risk factor that is undisputed, regardless of gender, race or social class, is exposure to violence. Bandura's social learning theory (Bandura, 1973) posits that observation of aggressive actions normalizes the behavior and increases its attractiveness as a viable option. Many empirical studies that examine the influence of exposure to future aggressive behavior support this theory (Ahmadi et al., 2011, Calvete & Orue, 2011; Ireland & Smith, 2009; Ferguson & Savage, 2012). Three of the most widely researched areas focus on exposure to domestic violence, community violence, and media violence (Eriksson & Mazerolle 2014; Fowler, Tompsett, Braciszewski, Jacques-Tiura & Baltes, 2009; Holmes, 2013; Savage & Yancey, 2008).

Direct and indirect links between exposure to interpersonal violence in the home and the development of aggressive behavior is well documented (Edwards, Dixon, Gidycz & Desai, 2014; Franklin & Kercher, 2012; Holmes, 2013). Scholars contend that children who witness domestic violence, who are the victims of domestic violence (child abuse) or who are witness-victims are likely to behave aggressively (Eriksson & Mazerolle 2014; Ireland & Smith 2009; Vandenberg & Marsh, 2009). The same is said

of exposure to community violence (Calvete & Orue, 2011; Farrell, Mehari, Kramer-Kuhn & Goncy, 2014; Fowler et al., 2009; McDonald & Richmond, 2008). The influence of exposure to media violence, however, is heavily debated.

Numerous studies have provided empirical support for the argument that exposure (via television, video games, music, movies, and the internet) increases the likelihood that individuals will engage in aggressive behavior (Anderson et al., 2010; Coker et al., 2014; Barlett, Anderson, & Swing, 2009; Gentile, Mathieson & Crick, 2011). However, strong criticisms of media exposure studies also have emerged (Bender, Rothmund & Gollwitzer, 2013; Ferguson & Kilburn, 2010; Savage and Yancey, 2008). Critics claim that there is publication bias in favor of empirical studies that support the media exposure hypotheses and that many studies are limited by retrospective or cross-sectional designs (Ferguson & Savage, 2012). They argue that prospective, longitudinal studies are needed to validate media exposure arguments (Calvete & Orue, 2011) and to provide a deeper analysis of contextual factors that may moderate or mediate the relationship between media violence exposure and aggression perpetration (Holmes, 2013; Krahe et al. 2011; Wolfe et al., 2003). Clearly there is more work to be done in the area of exploring the relationship between exposure to media violence and aggressive tendencies. The consensus, however, is that exposure in general—whether it be violence in the home, community or on screen—contributes to the development and persistence of aggressive behaviors.

Psychopathology. Other significant risk factors for perpetration of interpersonal aggression are behavioral health conditions such as mental illness and substance misuse (Stubbs & Dickens, 2008; Swanson, Holzer, Ganju & Jono, 1990; Volavka & Citrome,

2012). Preventing and treating behavioral health conditions have become a national priority during the past 25 years (Cummings, 2001; Mechanic, 2014; Mowbray & Holter, 2002). This is evidenced by the creation in 1992 of a federal agency—The Substance Abuse and Mental Health Services Administration (SAMHSA)—specifically tasked with reducing “the impact of substance abuse and mental illness on America's communities” (SAMHSA, n.d.). Individuals diagnosed with illnesses such as schizophrenia, major mood disorder, antisocial personality disorder, and those who experience psychosis have an elevated risk for interpersonal violence perpetration (Harris, Oakley & Picchioni, 2013; Spidel, Lecomte, Greaves, Sahlstrom & Yuille, 2010; Volavka & Citrome, 2012). Similarly, persons who misuse alcohol and drugs are more prone to behave aggressively (Beck & Heinz, 2013; Mercado-Crespo & Mbah, 2013; Wells, Giesbrecht, Ialomiteanu & Graham, 2011). Research suggests that over half of all violent crimes are specifically linked to alcohol use (Kuhns, Exum, Clodfelter & Bottia, 2014; McMurrin, 2012; Pihl & Sutton, 2009) and the financial cost of alcohol-related crime in the United States is approximately \$205 billion annually (Miller, Levy, Cohen & Cox, 2006).

Prevention and Intervention

By the time an athlete is identified as having a problem with off-field aggression, many of the etiological factors previously described are not modifiable or are very challenging to address. Non-modifiable factors include sex, exposure to violence and family SES. The mental health status of aggressive individuals can be improved, but the treatment of disorders that are most associated with violence (e.g., schizophrenia and antisocial personality disorders) require extensive long-term pharmacological and/or therapeutic interventions. Alcohol misuse is one of the few risk factors for aggressive

behavior that is responsive to prevention efforts, and because sports participation is positively associated with alcohol use athletes competing in collegiate and professional leagues are a prime target population for such efforts (Kwan, Bobko, Faulkner, Donnelly & Cairney, 2014; Sønderlund et al. 2014).

Given that together, interpersonal aggression and alcohol misuse are an enormous public health, safety, and economic burden, the aim of this study was to explore how these conditions cluster and overlap within individuals who belong to a culturally influential group—collegiate athletes. Further, an examination of the demographic characteristics of a college athlete sample was used to obtain evidence that either supports or disconfirms prevailing theories of gender, race/ethnicity, and SES as risk factors. The current health care mechanisms for prevention and treatment of alcohol misuse are robust and supported by immense public and private financial resources (Huebner & Kantor, 2011; Roman, 2014). Examining the connections between alcohol use and interpersonal aggression may enable practitioners to utilize the existing behavioral health care infrastructure to enhance violence prevention and intervention. Currently, the state of research on aggression and alcohol misuse is dominated by studies that focus on examining the causal and/or reciprocal associations between them. This approach often requires identifying and extracting predictive markers and investigating the relationships of the variables in samples of population. This is important work, but a person-centered perspective can investigate how individuals group according to their aggression and alcohol use, thus providing critical information for targeting screening, assessment, intervention, and program development.

Chapter 2

Literature Review

Aggression and Alcohol Use

A significant relationship between alcohol use and interpersonal aggression is firmly established in the literature (Duke, Giancola, Morris, Holt & Gunn, 2011; Kachadourian, Homish, Quigley & Leonard, 2012). Empirical investigations of the enduring connection between these two factors present findings that support differing directional relationships (Abbey, 2011; Foran & O’Leary, 2008; White, Fite, Pardini, Mun & Loeber, 2013). They are as follows: 1) alcohol use leads to aggressive behaviors (Bushman & Cooper, 1990; Hull & Bond, 1986; Steele & Southwick, 1985), 2) aggressive behavior predicts alcohol use (Skara et al., 2008; Moore et al., 2014), 3) the relationship is reciprocal (Huang, White, Kosterman, Catalano & Hawkins, 2001; Xue, Zimmerman & Cunningham, 2009), 4) the connection is coincidental or spurious—due to common risk factors that may account for, or confound, the relationship (Scholes-Balog, Hemphill, Kremer & Toumbourou, 2013).

The literature on the directionality of the relationship between alcohol and aggression is vast and can be divided into two types of designs—experimental and longitudinal. Researchers who conduct experimental studies often hypothesize that alcohol consumption leads to aggressive behavior (Exum, 2006) whereas those who conduct longitudinal analyses may argue that the direction of the relationship is questionable (Fothergill & Ensminger, 2006; White et al., 2013). A search of the key terms “aggression AND alcohol” in several databases, including but not limited to,

Academic Search Premier, PsycINFO, and PubMed returned approximately 573,000 articles. Following is a concise review that focuses on meta-analytical studies and other notable publications.

Alcohol Use Predicts Aggression. Much of the early literature regarding the relationship between alcohol and aggression focuses on alcohol use as the cause of aggressive behaviors (Banay, 1943). In one such study, the author contends “the use of alcohol by the passive individual served to allow a fundamental aggressiveness to come to the fore” (Lourie, 1943, p.334). Since the 1940s, the argument that alcohol causes aggressive behaviors has gained traction and is supported by numerous empirical studies, most of which use laboratory experiments to support their causal hypotheses (Kachadourian et al., 2012; Levinson, Giancola & Parrott, 2011).

Experimental studies of alcohol’s effect on aggressive behavior studies differ in their methods of beverage administration and measurement of aggression (Bushman 1997; Exum, 2006). One approach is the placebo design (PD) in which all subjects are told they will receive alcohol, but instead some subjects are given an inert beverage (Birkley, Giancola & Lance, 2013; Johansson et al., 2012; Topalli et al., 2014). Another method is the balanced placebo design (BPD) where the researcher informs half the subjects that they will receive alcohol and informs the other half that they will not. In actuality, the researcher administers an alcoholic beverage to only half of each group (Exum, 2006; Johansson et al., 2012). PD experiments allow researchers to examine the effect of alcohol consumption in comparison to alcohol expectancy (i.e., the effect subjects believe alcohol will have on their behavior) (Bartholow & Heinz, 2006; Bègue et al., 2009). BPD experiments also enable researchers to investigate expectancy effects

with the added benefit of observing the “pure” physiological effect of alcohol consumption in subjects who were given alcohol but were told they did not receive it (George, Gilmore & Stappenbeck, 2012).

The most common method used to measure aggression in laboratory experimental studies is the Taylor Aggression Paradigm (Taylor, 1967). The protocol for this procedure requires that subjects complete several rounds of a reaction-time test and deliver electric shocks to competitors who fail the tests. The shocks are fictitious, and often, so is the target. The subject determines the intensity of the shock and the level of intensity delivered is the measure of aggression (Birkley, Giancola & Lance, 2013; Topalli et al., 2014). Variations of the procedure include but are not limited to using verbal insults as provocation and employing an aversive noise blast as the aggressive instrument (Denson, Mehta & Ho Tan, 2013; Johansson et al., 2012).

Several meta-analytic studies have been published during the past thirty years that examine the claim that alcohol use leads to aggressive behavior (Levinson, Giancola & Parrott, 2011). All of them found that alcohol consumption has a significant effect of causing aggressive behaviors (Exum, 2006). Focusing on the period between 1958 and 1982, Steele and Southwick (1985) analyzed the results presented in thirty-four publications regarding the effects of alcohol on several types of social behaviors including but not limited to self-disclosure, gambling, and aggression. Their analysis showed that intoxicated subjects disclosed more intimate information, made riskier bets and were more aggressive than their non-intoxicated counterparts. Hull and Bond (1986) took a different approach in their meta-analysis of publications between 1973 and 1985. Instead of focusing solely on the effect of alcohol consumption, they were particularly

interested in the influence of alcohol expectancy on social behaviors (e.g., aggression), as well as physiological sensations (e.g. sexual arousal). The authors reviewed thirty-four studies, and their analysis showed that alcohol consumption had an effect of increasing aggressive behavior that approached significance. They also found that alcohol expectancy had no significant effect on aggression.

The two meta-analytic studies previously mentioned investigated the effect of alcohol on various social behaviors and physiological sensations, but Bushman and Cooper's (1990) review focused on aggression exclusively. They compiled the findings from thirty reports, between 1972 and 1988, which examined male subjects and found that alcohol consumption caused aggressive behavior with small to medium effect sizes (between 0.25 and 0.61). Seven years after his first meta-analysis, co-written with Cooper, Bushman (1997) revisited the topic. He conducted new analyses with data used in his previous study as well as with data updated through 1995. Findings from his second study were consistent with the results of his previous analyses—subjects who consumed alcohol were more aggressive than those who consumed a placebo drink (with an effect size of 0.43).

Another set of researchers, Ito and colleagues (1996), performed a meta-analysis of 47 experiments conducted between 1966 and 1994. Their stated aim was to investigate the moderating influence of several factors, including but not limited to, anxiety, provocation and frustration, on the relationship between alcohol and aggression. They found that several of their proposed moderating variables influenced the effect of alcohol on aggression in their hypothesized manner. Most pertinent to this study, however, is their overall finding that on average, regardless of moderating influences,

alcohol had a medium effect size (0.54) of causing aggressive behavior. The same effect size was calculated by a different set of researchers, Lipsey and colleagues (1997), who conducted their own meta-analysis of results from 44 experimental studies.

It is important to note that the individual experiments included in the six meta-analytic studies reviewed above often overlapped and may account for the consistency in the findings of the effect sizes. This strengthens the general conclusion that participants who consume alcohol behave more aggressively than those who do not, as the computation of the same data by different researchers can be regarded as a replication of statistical analyses. Another important point is that the results of the literature reviewed above reflect data from experiments conducted over 20 years ago. To my knowledge, no published meta-analytic studies cover experiments conducted since 1996. Since then, however, there have been numerous isolated studies. These more recent experimental investigations focus on exploring the heterogeneity of aggressive responses among individuals. Not everyone behaves aggressively when intoxicated, and many scientists are interested in unveiling the factors that account for such differences (White et al., 2013). Investigations include, but are not limited to, examining the role of anger control (Parrot & Giancola, 2004), executive functioning (Godlaski & Giancola, 2009) agreeableness (Miller, Parrott & Giancola, 2009), weight (DeWall, Bushman, Giancola & Webster, 2010) and thought suppression (Gallagher, Lisco, Parrott & Giancola, 2014). Clearly, the potential for new and innovative research in this area is far from exhausted.

Aggression and Alcohol Use are Interdependent. Research that substantiates the claim that alcohol causes aggressive behavior is evident as early as the 1950s, but challenges to the direction of the causal relationship have a shorter history. The best

evidence that counters the claim of the single-direction relationship emerges from researchers that employ a longitudinal design (Martin-Storey, Serbin, Stack, Ledingham & Schwartzman, 2011). These studies, however, have myriad methodological variations (Huang et al., 2001; Scholes-Balog et al., 2013). They differ by length of time in measurement waves, demographic profiles of the subjects, hypotheses proffered, measurement of key variables and data analysis techniques. The time points observed in the studies range from one year (Skara et al., 2008) to thirty years (Martin-Storey et al., 2011). Some researchers take an exploratory approach and do not hypothesize directionality of the relationship (Fothergill & Ensminger, 2006; Scholes-Balog et al., 2013) but others test specific hypotheses (Martin-Storey et al., 2011; Skara et al., 2008). Another distinction among the studies is the measurement of alcohol use and measurement of aggressive behaviors. For the measurement of alcohol use, some authors focus on the frequency of alcohol consumption (Scholes-Balog et al., 2013; Skara et al., 2008). Others concentrate on the quantity of alcohol typically consumed (Moore et al., 2014; White et al., 2013), or history of alcohol use problems based on Diagnostic and Statistical Manual (DSM) symptomologies (Fothergill & Ensminger, 2006; Martin-Storey et al., 2011). The measure of aggression is usually assessed via a survey that is either self-reported (Moore et al., 2014; Scholes-Balog et al., 2013; Skara et al., 2008) or reported by someone with a pre-existing relationship with the subject (e.g., a parent, peer or teacher) (Fothergill & Ensminger, 2006; Martin-Storey et al., 2011). Finally, the analytic approaches vary. Some studies use path analysis or Structural Equation Modeling (Fothergill & Ensminger, 2006; Scholes-Balog et al., 2013) others, however, use regression models (Huang et al., 2001; Martin-Storey et al., 2011; Moore et al., 2014;

Skara et al. 2008). Most studies control for confounding variables and or risk factors that aggression and alcohol use have in common (Martin-Storey et al., 2015; Moore et al., 2014; Scholes-Balog et al., 2013; White et al., 2013)

Not surprisingly, findings regarding the longitudinal relationships between aggression and alcohol use are inconsistent. A review of studies published during the past decade shows mixed results. Some results support the claim that aggression predicts alcohol use. For example, in a racially diverse sample of 2,064 high school students (mean age 15.3 years), Skara and colleagues (2008) found that physical aggression in males (53% of the sample) significantly predicted alcohol use one-year later. Their hypothesis that the effect of aggression on alcohol would be moderated by the form of aggression (physical or relational), and by gender, was partially supported for physical aggression but not supported for relational aggression. Relational aggression was not moderated by gender—it significantly predicted later alcohol use for both males and females (Skara et al., 2008).

A different set of researchers, Moore and colleagues (2014), also had significant findings that support the predictive value of aggression to later alcohol use. They examined two waves of longitudinal data collected from 1590 subjects (53% females) and found that perpetrators of peer aggression at 14 years-old were at greater risk for harmful alcohol use three years later (Moore et al., 2014). The researchers did not test for gender moderation in this study. They did, however, include gender as a covariate in their regression model, and controlling for gender did not alter the significance of their results.

White and colleagues (2013) conducted a study that also supports the proposition that aggression temporally influences alcohol use. This finding was unexpected—their a priori hypothesis was that increases in alcohol use would predict increases in aggression. Instead they uncovered a reciprocal relationship. Their stated aim was to examine the influence of potential moderators, including but not limited to impulsive behavior, race, and attitudes toward violence, on the relationship between aggression and alcohol use. They used an exclusively male sample and data were collected from 971 adolescents beginning at age 13 for five consecutive years. Their analysis was unique in that they used regression models to investigate within-subject differences (i.e., did changes in alcohol use lead to changes in aggressive behavior within an individual). Their results showed that some factors did moderate the relationship (e.g., attitudes toward violence) but others did not (e.g., race).

Non-significant findings regarding the influence of aggression on later alcohol use problems are also present in the literature. For example, in a study of 676 individuals (57% female) Martin-Storey and colleagues (2011) investigated the relationship between several childhood factors—aggression, self-perceived likeability, and peer-perceived social withdrawal and substance use 25 years later. Results showed that childhood aggression did not significantly predict adult history of alcohol abuse and dependence 25 years later, suggesting that the connection is spurious (Martin-Storey et al., 2011). In fact, the only significant findings regarding alcohol use during the study was that higher ratings of likeability in women and social withdrawal in men predicted lower levels of abuse and dependence.

The longitudinal studies reviewed thus far examined the temporal influence of aggression on later alcohol use problems a recent publication, however, employed an exploratory approach to their investigation. Scholes-Balog and colleagues (2013) explicitly stated that they analyzed the data, using a cross-lagged path analysis, to test all four of the possible options for the relationship between interpersonal violence and alcohol use. Three waves of data were collected from 849 adolescents (53.8% female) at two-year intervals beginning in Grade 7 and ending with Grade 11. Their study design is admirable in that the authors conducted data analyses to explore all the possible configurations of the relationship between the variables, among the same subjects, using uniform measures for violence and two measures of alcohol use—frequency of alcohol consumption and frequency of heavy episodic drinking (HED). Their models also tested for gender differences.

One notable finding from their study was that there were no significant pathways from violence to frequency of alcohol use for either gender (Scholes-Balog et al., 2013). This contrasts with results from previous studies (Skara et al., 2008 & Moore et al., 2014) that support the temporal influence of violence on later alcohol use. Instead, their study showed significant results for a causal relationship in the opposite direction—alcohol frequency predicted violence for both genders. Their findings provide support, using longitudinal data, for the conclusions of the experimental studies that propose alcohol use leads to aggression but not for the proposition that violence leads to alcohol use.

The overwhelming majority of studies regarding the relationship between aggression and alcohol misuse have taken a variable-centered approach. This strategy has been effective in establishing the presence of a connection and allows researchers to

investigate the magnitude and directionality of their influence on each other. This methodology is limited, however, in that it only gives us partial information by focusing on linear relationships between the variables. It does not provide a perspective on how the behaviors cluster and overlap within groups of people. An approach that focuses on the individual instead of the variables can address this matter. Only a few studies, however, have attempted to explore the co-occurrence of alcohol use and aggressive behaviors from a person-centered perspective.

In one such study, of adolescents, Weden and Zabin (2005) examined the co-occurrence of fighting and alcohol use as well as other high-risk behaviors for negative health and social outcomes such as early sexual initiation, truancy and use of cigarettes and marijuana. Using Latent Class Analysis (LCA), the researchers identified multiple sub-groups of individuals with similar profiles of risk. One class demonstrated no risk behaviors, a second all risk behaviors, and several intermediary classes were each characterized by different patterns of behaviors. In a different study, Luk and colleagues (2012) also identified sub-groups in a sample of adolescents with problem behaviors. They restricted their investigation to substance use (alcohol, cigarette and marijuana use) and bullying behaviors and found four sub-groups: non-involved (in either substance abuse or bullying), substances users, bullies, and substance-using bullies. A third study, by Whiteside and colleagues (2013) focused specifically on classifying perpetration and victimization in dating (romantic partner) and peer (non-romantic partner) relationships among adolescents who self-reported past-year alcohol use. They identified three classes in their model: individuals who engaged in aggressive behaviors towards their peers, individuals who were both peer aggression perpetrators and victims, and individuals who

had high levels of violence across multiple domains of aggression and dating victimization.

Although each study used different operational definitions of aggression (e.g., bullying vs. dating violence) and alcohol use (e.g., past-year use vs. past 30-day use) they all focused on identifying profiles based on patterns of the behaviors of individuals. They provided similar justifications for taking this approach centered on the proposition that their findings can facilitate the tailoring of prevention and intervention efforts to specific target groups.

Theory.

A review of over 70 years of studies that examine the association between aggression and alcohol use provides a window into the complexity of the relationship. Results are often inconsistent due to the diversity of study designs and methodological approaches (Exum, 2006). In addition, many studies have theoretical underpinnings that differ from each other, primarily based on the proximity of alcohol use to aggressive acts and vice versa. Experimental studies examine the relationship between proximal alcohol use and state aggression, whereas longitudinal studies and person-centered analyses investigate the connections between distal alcohol use and trait aggression.

Proximal Alcohol Use and State Aggression. Experimental research designs explore the phenomena of aggressive behaviors that occur shortly following (i.e., proximate to) alcohol consumption. These studies take as their departure point the long history of observations by scientists, and laypersons, that some individuals are noticeably aggressive under the influence of alcohol (Banay, 1945; MacAndrew & Edgerton, 1969). Two dominant theories that explain this connection have emerged in the literature.

The first theory presumes that alcohol has a pharmacological effect on the body, more specifically on the brain (Gallagher, Lisco, Parrott & Giancola, 2014; Smyth, 2013). Studies have shown that alcohol impairs cognitive skills (Magrys & Olmstead, 2014), elevates levels of endorphins (Roth-Deri, Green-Sadan & Yadid, 2008), and releases stress hormones (Lu & Richardson, 2014). These physiological reactions to alcohol consumption can create a state of lowered inhibitions and poor decision-making that effect human behavior (Marteau, 2008). Steele and Josephs (1990) proposed a derivative framework, named the Alcohol Myopia Model that further explicates the mechanism by which alcohol use can lead to changes in social behavior (Heinz, Beck, Meyer-Lindenberg, Sterzer & Heinz, 2011). They argue that the biological effects of alcohol consumption are not sufficient to engender changes in social behaviors (Godlaski & Giancola, 2009). Rather, the pharmacological effect creates a short-sightedness in information processing that combines with situational cues to affect behavior (Gallagher, Lisco, Parrott & Giancola, 2014). Meaning, for example, the release of stress hormones would not necessarily result in aggressive behaviors if an individual becomes intoxicated while drinking alone in her home. However, she may engage in aggressive actions if provoked by a perceived threat or insult. Thus, the impact of alcohol consumption is a function of “alcohol's general impairment of perception and thought—an effect of alcohol that occurs in every person every time alcohol is consumed... and the nature of the [social] cues impinging on the person during intoxication” (Steele & Josephs, 1990, p.922).

The second theory used to explain why proximal alcohol consumption leads to aggression involves the psychological effect of alcohol expectancies (Kachadourian et al.,

2012; Tuliao & McChargue, 2014). The societal discourse about alcohol consumption is that it induces a state of euphoria, bestows liquid courage (i.e., social assertiveness) and heightens sexual pleasure (Barnwell, Borders & Earleywine, 2006; Kachadourian et al., 2012). Some researchers argue that these are learned beliefs an individual has about the effect of alcohol and that they are sufficient to cause changes in social behavior (Zhang, Welte & Wieczorek, 2002). Thus, an individual's awareness of this "common knowledge" may facilitate a self-fulfillment process such that their behavior reflects their expectations of the effect of alcohol. Researchers have supported this theory by conducting experimental studies, mentioned earlier, in which subjects are informed that they had consumed alcohol when, in fact, they drank a non-alcoholic beverage (Bartholow & Heinz, 2006). A serious limitation of these theories is that they do not account for person-variables (White et al., 2013). Alcohol intoxication does not elicit aggressive behavior from every individual, and not every aggressive act is preceded by alcohol consumption. Attempts to account for the processes and variables that explain the heterogeneity in the effects are most commonly found in the published reports of longitudinal studies.

Distal Alcohol Use and Trait Aggression. Longitudinal studies, and those that take a person-centered approach, examine the relationship between an individual's alcohol consumption patterns (use that is distal from an act of aggression) and their tendency to behave aggressively (trait aggression). Two distinct frameworks are prevalent in the literature that investigate this association. Authors who aim to demonstrate that aggressive behavior can lead to alcohol misuse (Widom, Schuck & White, 2006) employ the first framework. Their conceptual understanding of the

relationship asserts that aggressive behavior, which often manifests in early childhood, temporally precedes and thus influences alcohol misuse, which typically emerges during adolescence (Martin-Storey et al., 2014; Skara et al., 2008). In particular, Moffitt's Developmental Theory (1993) offers an explanation of the mechanisms that facilitates the connection between early aggressive behavior and later alcohol misuse. Moffitt contends that for some individuals, childhood manifestations of aggressive behavior illicit aversive responses from their caregivers and peers (e.g., rejection) that alienate children who behave aggressively. Rejection and social isolation then trigger additional manifestations of problem behaviors. This process "may set in motion a downhill snowball of cumulative continuities" (Moffitt, 1993, p.683) that emerge as life-course persistent risky behaviors that include alcohol misuse.

In contrast to Moffitt's approach (1993), the second theoretical framework does not imply causality (Huang et al. 2001). It only attempts to explain the co-occurrence of trait aggression and alcohol misuse. The model, developed by Jessor & Jessor (1977), is known as Problem Behavior Theory (PBT). The authors assert that aggressive behavior and alcohol misuse (particularly in adolescence) develop as a result of the interaction between shared protective and risk factors (Costa, Jessor & Turbin, 1999; Luk, Wang & Simons-Morton, 2012; Weden & Zabin, 2005). Risk factors can include academic underachievement (Scholes-Balog et al., 2013), co-existing mental health problems (Moore et al., 2014), affiliation with deviant peers (Martin-Storey et al., 2011) and residence in high-crime neighborhoods (Huang et al., 2001). Protective factors include but are not limited to supportive parents (Whiteside et al., 2013), high-quality community activities (White et al., 2013), and religiosity (Galen & Rogers, 2004).

Population - College Athletes

The focus of this study is college athletes. As noted earlier, sports is a critical component of American culture, and national sport figures are often positioned as role models for children and young adults. Because collegiate sports are the primary recruiting source for professional sports teams, institutions of higher learning are uniquely positioned to implement prevention and intervention initiatives that address problem behaviors—such as aggression and alcohol misuse—before athletes fully enter the national spotlight. Further, empirical evidence shows that college athletes are a group at risk for both aggressive behaviors (Dean & Rowan, 2014, O'Brien et al., 2012) and alcohol misuse (Yusko, Buckman, White & Pandina, 2008a, 2008b).

Scholars have been investigating the problem of off-field aggressive behavior among athletes for several decades (Storch, Bagner, Bongilatti, Werner & Storch, 2005). Some studies show a positive association between sports participation and off-field aggression (Atay, 2013), others find no relationship (Mutz & Baur, 2009), and some even propose that sports participation is a protective factor against interpersonal violence (Booth et al., 2008). Although the collective findings are mixed (Kimble et al., 2010), the body of literature attests to the persistent concern that aggressive behavior, sanctioned in the arena of sports, may spill over to other contexts.

Although there is no consensus regarding the positive association between being an athlete and displaying aggressive behavior, the literature regarding collegiate athletes' drinking behaviors are clear—they are an undisputed at-risk group for alcohol misuse (NCAA, 2006; Weaver et al. 2013). Collegiate athletes report higher rates of heavy episodic use (binge drinking)—defined as five or more drinks in one sitting for men or

four or more drinks in one sitting for women (Wechsler, Davenport, Dowdall, Grossman & Zanakos, 1997). They also report more alcohol-related problems such as academic difficulties or problems with the police (Leichliter, Meilman, Presley & Cashin, 1998). Further, Yusko and colleagues (2008b) found that college athletes had dissimilar risk profiles for engaging in binge drinking and having negative alcohol-related consequences from their non-athletic peers. High levels of sensation seeking personality indicators were significantly associated with a greater number of binge drinking episodes for athletes versus non-athletes. High levels of coping motivations were related to negative consequences for athletes but not their non-athlete peers.

Researchers have proposed several explanations for the emerging empirical evidence of harmful athlete-specific drinking patterns. Some contend that sport-related achievement orientation (such as winning or beating personal best records) may be a salient factor (Weaver et al., 2013). Others note that athletes may have drinking motives that are specific to their role identity such as drinking to reward themselves for good sport-related performance or to cope with poor sport-related performance (Martens & Martin, 2010). The literature on athletes and issues relating to off-field aggression and alcohol misuse suggests that there may be a set of factors unique to this subpopulation that require further investigation. A useful approach, grounded in Problem Behavior Theory, is to examine the pattern of the behaviors from a person-centered perspective because student-athletes may cluster into different groups based on shared protective and risk factors for aggressive behavior and alcohol use.

Research Questions and Hypotheses

A review of the literature reveals several undisputed facts—1) aggression and alcohol misuse each have considerable deleterious public health and societal consequences, 2) the connection between them is strong and multifaceted (Huang et al., 2001; Scholes-Balog et al., 2013), and 3) college athletes are an at-risk group for both behaviors (O'Brien et al., 2012).

The literature regarding aggression and alcohol use, however, is fractured into several distinct line of inquiries. The first is concerned with the relationship between alcohol misuse and aggression but does not focus on the athlete population. The second primarily examines alcohol misuse among athletes with little attention to how it relates to off-field aggression. The third focuses on off-field aggression among athletes, but the influence of alcohol misuse is ancillary. This lack of integration of aggression and alcohol variables and examination of an athlete population within the same study hinders a full understanding of aggression and alcohol misuse among athletes. Further, the majority of studies have taken a variable-centered approach. This is an important limitation in that science concerning prevention and treatment of problem behaviors must attempt to reveal the unobservable patterns that characterize behaviors among specific types of individuals. A few studies have conducted person-centered analyses, but none of them have investigated patterns of aggressive behaviors and alcohol use among athletes.

This study contributes to the knowledge base in two important ways. First, it adds to the scant body of literature that uses a person-centered approach to investigate the relationship between aggression and alcohol misuse. Second, the person-centered method was used to examine a unique population that is currently under national scrutiny

for their off-field aggressive behaviors. Not every athlete is a perpetrator of interpersonal violence. This exploratory study helps to unveil some of the characteristics, including but not limited to alcohol misuse, that distinguish those who do from those who do not. Identifying these factors can contribute to the development of innovative prevention and intervention strategies customized to the needs of this specific population. In light of these goals, the research questions and hypotheses that guided this investigation were as follows:

Question 1: Can college athletes be grouped based on their aggressive tendencies and alcohol use?

Hypothesis: The person-centered approach will identify multiple independent groups of athletes that differ in their overall profile of aggression and alcohol use. Person-centered analyses have been conducted with other subpopulations (Luk et al., 2012; Whiteside et al., 2013) and suggest that individuals can be grouped in this manner.

Question 2: Will there be significant differences in the demographic composition, (i.e., school-year, gender, race, ethnicity, and SES) of the groups?

Hypothesis: Gender and school-year will be the only demographic variables that significantly differ among the groups. Numerous studies have consistently reported that men and women differ in their rates of aggression as well as in their

alcohol consumption patterns (Card et al., 2008; Greenfield, Back, Lawson & Brady, 2010). Many studies also have findings that support the argument that alcohol use among students often increases during the course of their first year in college (Borsari, Murphy & Barnett, 2007; Turrissi, Mallett, Mastroleo, & Larimer, 2006). Findings are inconclusive, however, regarding the influence of race/ethnicity and SES on aggression (Haggerty et al., 2013; Karriker-Jaffe, 2013) and on alcohol consumption (Bryden, Roberts, Petticrew & McKee, 2013; Fesahazion, Thorpe, Bell & LaVeist, 2012).

Chapter 3

Methods and Analysis

Study Design

A cross-sectional study design was employed, as the purpose of this study was not to determine a causal relationship between aggression and alcohol use. This study was an investigation of whether college athletes could be clustered into groups based on their aggressive behaviors and alcohol use and if so, which demographic characteristics significantly predicted group membership. This study did not involve addressing causality or the temporal relationship between aggression and alcohol use; therefore, the design was cross-sectional.

A person-centered statistical strategy, latent profile analysis (LPA), was employed to examine the patterns of aggression and alcohol use among the study participants. This person-centered approach was followed by a more traditional variable-centered analysis to explore how the identified latent groups differed by demographic characteristics. The following sections contain detailed information regarding the participants, measures, data collection and data analyses of the study.

Sample Description

Researchers at the Rutgers University Center of Alcohol Studies (CAS) have been collecting data on college athlete health behaviors for over a decade. The current principal investigator (PI) for the athlete research program granted permission for the use of CAS student-athlete data for this study (See Appendix A). A criterion sampling approach was employed. The criterion for inclusion was student-athlete status at Rutgers

University. The usable sample size for the study was 276. The response rate was 75.82% (364 student-athletes were offered the opportunity to participate and 276 accepted). Data collection was approved by the Institutional Review Board (Appendix B) and was conducted under the auspices of the Rutgers-Supporting the Health of Athletes through Research and Education (R-SHARE) project.

R-SHARE was a collaborative effort, initiated and directed by the CAS, which combined the expertise of research scientists, physicians, mental health clinicians and prevention specialists to create a fully integrated continuum of care for student-athletes that encompassed all aspects of health behaviors and wellness. Project goals included accelerating detection of maladaptive health behaviors and physical/mental health problems; strengthening behavioral and medical interventions through standardization and improved information flow; and streamlining the process of recovery and return-to-play of athletes following detection of an injury, mental health problem or substance use concerns.

The research component of the R-SHARE project is financially supported by two New Jersey state grants from the Commission on Brain Injury Research that focus on investigating the risk for and recovery from sports-related concussions. The participants in this study were first-year students (incoming student-athletes) who began attendance at Rutgers, The State University of New Jersey in September 2014 and second-year students (rising juniors) who began attendance in September 2013. They compete at the highest level of college sports (Division I), as designated by the National Collegiate Athletic Association (NCAA), and participate in 17 different sports, including but not limited to, baseball, basketball, field hockey, football, golf, softball, swimming,

volleyball and wrestling. As a graduate assistant, my role on this project was to assist faculty with the creation of survey instruments to measure athlete health behaviors, help design a protocol for execution of the study, manage data collection procedures on the days of survey administration and conduct data analysis on the survey results.

Data Collection

Data for this study were collected between June 2014 and June 2015. First-year students were contacted by personnel from the Rutgers University Sports Medicine office in May and June of 2014 to schedule their NCAA mandated Pre-Participation Physical Exam (PPE). The function of the PPE is to assess the general health of athletes and to “clear” (i.e., approve) the athlete to participate in competitive athletics (Joy, Paisley, Price, Rassner & Thiese, 2004). The physicals were conducted at the Hale Athletic Center (HAC). The facility includes the offices for the team physicians and medical staff, lockers rooms for various sports, a track, and a 14,000 square foot weight room. The physicals were scheduled over the course of several weeks to facilitate the screening of the approximately 190 incoming athletes. The majority were scheduled by team, with up to 20 athletes screened per day. Out-of-state athletes or those unavailable during the team testing days were scheduled for later in the summer or immediately prior to fall semester. Between 10 and 20 athletes were scheduled to complete their physicals on each day.

Upon arrival at the physician’s office athletes submitted or completed administrative forms, including family health history and insurance forms, as well as waivers related concussion awareness, sickle cell testing, and Attention Deficit Hyperactivity Disorder (ADHD) medication exceptions. Basic vitals, such as height and

weight, heart rate, blood pressure, body temperature, neck size, and vision were tested by a physician extender. The athletes were then individually examined by a physician who assessed cardiovascular and musculoskeletal health. The R-SHARE research team members then performed multiple assessments to complement the physician examinations.

The R-SHARE research team members were all IRB approved, had obtained Health Insurance Portability and Accountability Act (HIPAA) clearance, and were granted permission from the Sports Medicine office to collect data during the physicals. One research station collected physiological information on each athlete; specifically, heart rate variability was measured during a stress test and a relaxation exercise. At a second station, research staff conducted a baseline screener of concussion indicators (e.g., balance, visual acuity, reaction time, and multiple domains of cognitive ability). A third station involved completion of the electronic HBS. Instructions and guidance were provided by trained clinicians.

Prior to the day of testing, the research team responsible for the HBS station set up between three and six computers (depending on the number of athletes scheduled) on a table approximately five feet long located in the men's athletic meeting room behind the medical examination rooms. Athletes were chaperoned between the medical offices and research stations by a research team member. The connecting doors between the medical and research rooms were left open to provide a sense of integration between the research stations and the medical exam rooms, and to allow easy transition from one station to another. The room was large enough to accommodate several large sofas

allowing athletes to sit and wait for their turn to complete the multiple research stations, although an effort was made to reduce waiting time when possible.

When a computer became available, athletes were instructed by a member of the research team to complete the HBS. The staff explained that the survey would take approximately 15 minutes to complete and that the questions, about various health habits, would be used to help plan programs on mental health. They informed the athletes that their answers would not be used by the physicians to make decisions about their readiness to play. Upon completion of the survey, a member of the research team asked them if they were willing to participate in a research study about athlete health behaviors by allowing researchers to access their responses to the questionnaire, as well as information they provided to the sports medicine office, as part of their routine health care. The research team member explained that although the athletes' name was attached to their survey responses, and therefore, were not anonymous, their identity would be kept confidential except in the case where their safety was at risk (e.g., endorsing an item assessing suicidal ideation), in which case the mental health team and/or physicians would be informed. They were assured that neither coaches nor athletic trainers would have access to their data. The athlete was then given the opportunity to consent to participate or to decline. If they consented, they were asked to sign an informed consent agreement (see Appendix C).

Data collection for the second-year students was administered in a similar manner except for the following modifications. Second-year students were contacted in March and April of 2015 to complete their follow-up physicals (which are conducted annually for all current student-athletes). The duration of time allocated to second-year physicals

is less than allocated for first-year physicals since most of the health information has already been collected by the Sports Medicine Department. Due to this time constraint second-year students completed an abbreviated version of the HBS, in paper format, which included the demographic questions, the aggression questionnaire and the alcohol use questions. The implications of these methods are discussed later in the dissertation.

Measures

One of the research aims of the R-SHARE project was to create an educational program for student-athletes that focused on preventing substance use, reducing harm, and facilitating early intervention in use trajectories of college athletes. The first step in establishing said education program was to survey athletes about their health behaviors and attitudes. The R-SHARE Health Behavior Survey (HBS) was created by project staff for this purpose, and the data for this study were collected with this instrument.

The HBS (see Appendix D) is an electronic self-report questionnaire composed of 154 items designed to cover several content areas. Such content areas are: aggression, alcohol use, drug use, nutrition/hydration, eating habits/eating disorders, energy levels, sleep behaviors, stress levels, depression and anxiety symptoms, sexual behaviors, mental skills, high school characteristics and demographics. Data from three content areas of the survey - aggression, alcohol use, and demographics - were used for this study.

Aggression. The HBS measured aggression using the Short-Form Buss-Perry Aggression Questionnaire (BPAQ-SF) (Bryant & Smith, 2001) (See Appendix E). The BPAQ-SF is the third in a series of measures, developed by Arnold Buss and colleagues, that attempt to capture multiple domains of aggression. The original scale, the Buss-Durkee Hostility Inventory (BDHI) (Buss and Durkee, 1957) had 75 items and seven

subscales, including but not limited to, resentment, negativism, and suspicion. Thirty-five years after he developed the BDHI, Buss acknowledged that the measure had several flaws, the most important being that factor analysis was not used to decide which items belonged in each subscale (Buss & Perry, 1992).

For his reformulation of the measure, Buss partnered with Perry and together they employed factor analysis to aid in their revision of the BDHI. They made several changes using psychometric statistical analyses to support the revised measure. Changes include, but are not limited to, reducing the number of items from 75 to 29, changing the response options from true/false to a 5-point Likert format, and reducing the subscales from seven to four—Physical Aggression, Verbal Aggression, Anger, and Hostility. The product of their revisions, the Buss-Perry Aggression Questionnaire (BPAQ) (Buss & Perry, 1992) has been used in over 400 studies and is one of the most popular measures of aggression in social science research. The survey asks respondents to rate items on a scale from one to five based on whether the statement is “extremely uncharacteristic” or “extremely characteristic” of them. Sample items are as follows: “given enough provocation, I may hit another person,” “I often find myself disagreeing with people,” and “I have trouble controlling my temper.”

Approximately ten years after the BPAQ was developed Bryant and Smith (2001) conducted a confirmatory factor analysis of the scale. Using the standard that goodness of fit index (GFI) values should exceed 0.90, Bryant and Smith found that the model fit values of the BPAQ in three independent samples ($GFI = .76-.81$) were less than optimal. They revised the measure by omitting several items with low or multiple loadings. They also changed the response options from a 5-point to 6-point Likert format, removing the

midpoint such that respondents must make a choice that lands on one side of the “uncharacteristic” or “characteristic” poles. Bryant and Smith tested the psychometric properties of the shortened form (the BPAQ-SF) with independent samples from three different countries (Canada, England and the United States) and found that the model fit statistics were improved ($GFI = .93-.94$). The BPAQ-SF measures the same four dimensions of aggression as the longer version. The number of items, however, are reduced from 29 to 12 (three items for each subscale). Each question is scored one to six, with lower numbers signifying lower levels of aggression. The highest possible score for each subscale is 18 and the highest possible score for the entire scale is 72. At least two studies have confirmed the reliability and validity of the BPAQ-SF. Diamond and Magaletta (2006) conducted a validation study with 1,616 federal offenders and found adequate internal consistency reliabilities ($.64 - .77$). The findings of the study also supported the concurrent validity of the BPAQ-SF and several violence-related subscales on the Personality Assessment Inventory (PAI). In the study conducted by Kalmoe (2015) using a nationally representative sample of 1,308 adults, reliabilities for the aggression subscales were good and ranged between $.72$ and $.83$. The findings of the Kalmoe (2006) study also supported the convergent validity of the BPAQ-SF and violent political attitudes.

The BPAQ-SF was used in the questionnaire for this study with one modification. The words “uncharacteristic” and “characteristic” that anchor the Likert response format were changed to “unlikely” and “likely.” The research team made this revision to minimize the possibility that the participants would misunderstand the word

“characteristic.” For reasons described in the forthcoming data analysis section, only the verbal and physical aggression scales of the BPAQ-SF were used in this study.

Alcohol Use. The HBS captures information on alcohol use by utilizing questions from the Youth Risk Behavior Survey (YRBS). The YRBS was developed by the Centers for Disease Control and Prevention (CDC) to monitor health-risk behaviors of high school students (grades 9-12) in six areas: alcohol and other drug use, tobacco use, sexual behaviors, unhealthy dietary behaviors, inadequate physical activity, and behaviors that contribute to unintentional injuries and violence (Brener et al., 2004). The questions that measure alcohol consumption patterns on the HBS were adapted from the CDC survey. A Days Drinking variable was created that asked “In the past 30 days, how many days did you have at least one drink of alcohol? A single Binge Drinking variable was created, and it asked men “In the past 30 days, how many days did you have 5 or more drinks of alcohol within a couple of hours?” but it asked women “In the past 30 days, how many days did you have 4 or more drinks of alcohol within a couple of hours?” Skip patterns in the questionnaire allowed the coding of this into one variable. These questions were chosen to capture two different patterns of drinking behavior. The first captures the frequency of alcohol consumption, the second captures the level of risky drinking, formerly called binge drinking. College students often engage in high-risk drinking that leads to many deleterious consequences. This study aimed to capture the frequency of alcohol consumption as well as the alcohol consumption behavior that is most problematic for our sample.

Demographics. Data on the demographic characteristics of the participants were captured in different ways. R-SHARE team members decided to distribute the response

burden of the student-athletes by strategically placing items among several sources. As such, information regarding race/ethnicity was obtained from the Rutgers University Concussion Knowledge and Attitude Survey (RUCKAS), developed by the R-SHARE team to assess student-athletes' knowledge of and attitudes towards sports-related concussion injuries. For the item "ethnicity" participants were given two choices, "Hispanic/Latino/Latina" and "Not Hispanic/Latino/Latina." For the item "race" they were given seven choices, "American Indian/Alaskan Native," "Asian," "Black/African American," "Native Hawaiian/Other Pacific Islander," "White," "More than one race," and "Other/Unknown."

The participants' age and school-year were obtained from the Sports Medicine Department. Gender and SES were items developed by the research team and are included in the HBS questionnaire. The gender item in the HBS has three response choices: "male," "female," and "intersex." The SES question is "How would you categorize your family's social class"? The five response options are "Poor (sic)," "Working class/lower-middle class," "Middle class," "Upper-middle class," and "Upper class." Appendix F contains information on how the variables from the measures were coded for the analysis.

Data Analysis

This research study had two primary statistical aims. The first was to classify college athletes based on their aggressive behaviors and alcohol use. The second was to determine which demographic characteristics significantly predict group membership. Various statistical techniques and statistical software packages were employed to attain these aims. Data cleaning and analysis were conducted using Microsoft Office Excel

2013, SPSS 20, SAS 9.3 (SAS Institute Inc., 2011) and Mplus 7.11 software (Muthén & Muthén, 1998-2012). Following is a detailed explanation of the data preparation procedures and analyses.

Data Entry and Cleaning. The HBS questionnaire was administered to first-year students via Qualtrics, a web-based survey generator. Rutgers University has an institutional site license for the software. This allows researchers at the university to collect and store survey data in a manner that meets the university standards for the protection of human subjects. By using the Qualtrics software, the majority of the manual data entry tasks were not necessary as the responses were automatically stored when entered by the study participants into a computer on the day of their physical exam. All data were downloaded from the Qualtrics platform into an Excel document and saved to a USB flash drive by the PI and database coordinator of the project as a password protected document. A separate Excel document was created with a list of first-year students, and the students were assigned randomly selected study identification numbers (Study IDs). The Study ID document was also password protected and saved on a separate flash drive. Both flash drives remained in separate locked drawers in the office of the PI and the office of the database coordinator when not in use.

The abbreviated HBS questionnaire was administered to second-year students in paper format because of the constraints mentioned previously. After gaining written consent, a member of the research team assigned a temporary identification number to each student, and this number was written on the paper questionnaire. The student's name was not recorded on the questionnaire. Once the questionnaires were collected, the names of second-year students (provided by the Sports Medicine Department) were

added to the list of the first-year students in the excel document. Second-year students were then assigned Study ID numbers. Two graduate research assistants each entered the responses from the questionnaires into the Qualtrics survey software. They independently cross-checked the temporary ID list and study ID list to ensure that the correct Study ID number was assigned to each entry. After the double-entry of data from the paper questionnaires, a SAS program was run to compare the entries for consistency. All discrepancies were checked by a third research staff member who referred to the original paper questionnaires to identify the correct responses and modify the data when necessary. All data were visually inspected for inaccuracies and cleaned by the PI and database coordinator (e.g., instances of duplicate entries and “test” entries by the research staff were removed from the dataset).

Two separate files contained the HBS data for the first-year students and the HBS data for the second-year students. This is because the data were collected in two different formats (electronic for the first-year students and paper for the second-year students). In preparation for subsequent analyses these two files were merged. Also, as previously mentioned, data for the present study were collected using the HBS and RUCKAS surveys. As such, another merge was conducted to connect the data from the two surveys. The HBS and RUCKAS datasets were merged using the participants’ Study ID numbers.

Univariate Analysis. Frequency tables were created to identify missingness in the data, histograms and box plots were created to identify outliers, and tests for skewness and kurtosis were performed. Also, descriptive statistics of the samples’

demographic characteristics and of the aggression and alcohol use variables were produced.

Factor Analysis. A factor analysis was performed to identify if the data fit the hypothesized factor structure proposed by the authors of the aggression measure (the BPAQ-SF). Survey researchers often use two types of factor analysis—confirmatory and/or exploratory—to examine the underlying structure of a set of variables (Suhr, 2006). In a confirmatory factor analysis (CFA) researchers impose a factor structure, essentially forcing the data into a specified number of groups (Field, 2005). The authors of the BPAQ-SF conducted a CFA as part of their development process for the instrument (Bryant & Smith, 2001). They imposed a four-factor structure to verify that the structure of the short-form of the instrument matched the structure of the original 29-item Buss-Perry Aggression Questionnaire. Based on their analysis, the authors confirmed that the BPAQ-SF captured the same four factors (Physical Aggression, Verbal Aggression, Anger and Hostility) as the original BPAQ (Bryant & Smith, 2001). Although the BPAQ-SF has been previously established as psychometrically sound (Diamond & Magaletta, 2006), it is important to ascertain if data from this study's participants match the factor structure proposed by the authors. If not, interpretation of the scores may be misspecified (Bryant, 2000).

In an exploratory factor analysis (EFA), the data collected is grouped into factors based on correlations without imposing a designated number (Field, 2005). In this study, an exploratory factor analysis (EFA) was conducted for several reasons. First, the nature of the study is exploratory. As such, imposing a factor structure would be contrary to the aim of discovering how trait aggression manifests in this specific student-athlete sample.

Although the authors of the BPAQ-SF imposed a four-factor structure in their validation study, the sample for this study is very different from the ones used by the authors and others in previous validation studies. It is possible that the four-factor structure will not fit the data generated from the sample for this data. Second, imposing a factor structure on the data for this study (i.e., conducting a CFA) requires identification of misspecified items by examining the modification indices. Whereas, an EFA allows identification of misspecified items using direct observation of the factor loadings (Rubenheimer, 2004). Finally, the number of minimum items per factor is debatable. Some researchers recommend a minimum of three items (Forman, 2001), others recommend at least four items (Muthén & Muthén, 2009). Imposing a four-factor structure on the 12-item BPAQ-SF restricts the data to a pre-determined minimum. Conducting an EFA allows for the possibility that for the sample in this study, four items may load on one factor and possibly satisfy the alternative standard a minimum number of items. The results of the factor analysis determined the aggression subscales that were used in the subsequent analyses. The EFA results are presented in the Results chapter.

Latent Profile Analysis (LPA). The first aim of this study was to investigate whether college athletes could be clustered into groups based on their aggressive behaviors and alcohol use. LPA was conducted to address this aim. LPA identifies distinct profiles (groups) of people within a study based on the pattern of their individual characteristics (Collins & Lanza, 2010). The identified groups should be mutually exclusive, and there should be substantial homogeneity among the members. This underlying homogeneity is conceptualized as being reflective of a latent (i.e., unmeasured) factor (Goodman, 2002). Several models were created to determine the

optimal numbers of groups that fit the data. Model fit indices were examined to inform decision-making regarding the optimal number of profiles. The Bayesian Information Criterion (BIC) and entropy are fit indices widely recommended by researchers who specialize in latent profile modeling. Lower values for BIC and entropy values closer to 1.0 generally indicate a good model fit. In addition, the bootstrap likelihood ratio test (BLRT) is sometimes used. The BLRT compares model fit between models with k and $k - 1$ classes. If the p value for the test is significant, the $k - 1$ class is rejected (Nylund, Asparouhov & Muthén, 2007; Celeux & Soromenho, 1996). Decision-making regarding the optimal model was also guided by substantive interpretation as this is considered critical by the well-regarded statisticians and MPlus developers, Bengt and Linda Muthén (Muthén, 2012). The model that best fits the data not only had the best fit statistics but also produced groups that were conceptually interpretable. Details of the analysis are included in the Results chapter.

Analysis of Demographic Differences. Friedman tests, a non-parametric alternative to a two-way analysis of variance (ANOVA), were conducted to determine significant differences among the groups based on demographic variables. Post hoc Fisher's exact tests were then conducted for each pairwise comparison to determine which specific groups differed from which others. An explanation of why the Friedman and Fisher's tests were chosen is provided in the subsequent results section.

Power Analysis. LPA was conducted to address the first aim of the study. LPA has no sample size requirements or methods for determining power that are generally agreed upon by researchers who employ this technique (Tein, Coxe & Cham, 2013). As such, G*Power software was used to conduct a post hoc analysis of the Fisher's tests to

determine the statistical power of the findings of the group comparisons. Statistical power is the probability of finding significance when it exists (i.e., of correctly rejecting the null hypothesis) (Cohen, 1992). Cohen's recommended value of .80 is generally accepted among researchers (Myors, 2006).

Missing Data. Missing data in social science survey research are almost inevitable. Data missing for reasons unrelated to the variables in the study (e.g., because a respondent got tired and decided to skip questions or not finish the survey) are classified as missing at random (MAR). Alternatively, data missing because of reasons related to the variable (e.g., respondents are hesitant to report incidents of having unprotected sex) are classified as not missing at random (NMAR) (Peugh & Enders, 2004). Given that high levels of aggression and alcohol use are commonly seen as undesirable behaviors, it is unlikely that missingness in the data for this study are completely at random.

Researchers have developed alternative approaches to handling missingness based on the type of missing data (Schafer & Graham, 2002). One way to address this issue is known as listwise deletion and recommends exclusion of any case with missing values for any variable of interest from the analysis (Tabachnick & Fidell, 2006). Listwise deletion however, may negatively affect the sensitivity and/or power of the data analytic techniques by reducing the sample size. An alternative approach called a Full Information Maximum Likelihood (FIML) procedure was used in the LPA with Mplus software and is applicable for when data are classified as either MAR or NMAR (Allison, 2002; Muthén & Muthén, 2012).. The Mplus software uses the FIML approach to perform the LPA using all the data available to estimate the models. FIML assumes that

missing values on a variable are dependent on the other observed variables in the dataset. The software uses an equation that implies probable values for missing data in the model estimation process without imputing or directly filling in the missing values (Enders, 2001). This allows for the retention of observations with missing data. As such, no data were deleted from the dataset.

Chapter 4

Results

Factor Analysis. After the data were entered and cleaned, an EFA was performed to identify if the data fit the hypothesized factor structure proposed by the authors of the BPAQ-SF. The data for this study passed the preliminary tests of sampling adequacy and covariance of the items. Sample size is an essential determinant of obtaining reliable factor solutions. The dataset should have enough observations to capture all of the theorized factors (Field, 2005). One measure of sample size adequacy is the Kaiser-Meyer-Olkin (KMO) test. Kaiser (1974) classifies scores, below 0.5 as unacceptable, in the 0.70's as "middling", in the 80's as "meritorious" and scores of 0.90 and above as "marvelous." The KMO score for the data in this study was 0.86.

Another important consideration for performing an EFA is the test for sphericity (i.e., covariance). If the test is not significant, then the intercorrelation matrix is an identity matrix. In an identity matrix the diagonals are all 1's (every variable is correlated with itself) and the off-diagonals are all 0's (no item is correlated with any other item) (Tabachnick & Fidell, 2006). No correlations among the items means that there are no separate underlying factors among the variables, and a factor analysis is not appropriate. The Bartlett's Test of Sphericity for the dataset in this study was significant at $p < .001$, so a factorial analysis of the aggression measure in our study met the criteria for covariance as well as for sample size.

The EFA was performed in SPSS 20 using principal axis factoring with a varimax rotation. Varimax rotation is an orthogonal method which produces factors that are

uncorrelated (Field, 2005). A three-factor solution that explained 66.56% of the variance was returned. Next, principal axis factoring with a direct oblimin rotation was performed. Direct oblimin rotation is an oblique method which permits correlation between factors (Field, 2005). Based on theory and previous psychometric evaluation of the BPAQ-SF, the identified factors are purportedly correlated (Bryant & Smith, 2001). When the oblique rotation was used with our data, the same three-factor solution, as identified with the orthogonal rotation method, was returned. Recall that the previously-validated factor structure comprised four factors.

Identification of the number of factors to retain is usually decided by examining a scree plot of the eigenvalues to locate the bend in the data where the curve flattens out (Costello & Osborne, 2005) and examining the factor loadings (where loadings of 0.50 or higher indicate strongly loaded items). To facilitate a meaningful interpretation of the factor loading, SPSS was instructed to sort the items by loading size and to suppress any loadings under 0.25. An examination of the scree plot of the data showed four factors before the bend or curve. The pattern matrix, however, only indicated three factors with strong loadings (see Appendix G). The three items for verbal aggression loaded strongly onto Factor 1 (0.73, 0.78, 0.91), the three items for physical aggression loaded strongly onto Factor 2 (0.82, 0.89, 0.64), and the three items for hostility loaded strongly onto Factor 3 (0.77, 0.88, 0.58).

According to the authors of the BPAQ-SF, the remaining three items should load on a fourth factor that measures anger. The EFA for this study, however, did not produce this result. Instead, each anger item loaded onto different factors in the three-factor solution, and all were cross-loaded with low loadings. As such, the anger items of the

BPAQ-SF were excluded from further analysis in this study because of their poor performance in the EFA. Although the hostility items emerged as a discernable factor in the EFA, theoretically they did not align with the aims of the study—to examine aggressive *behaviors*. As such, the hostility items were also excluded from further analysis. Anger and hostility are constructs in the realm of affect that may precede and increase the likelihood of aggressive behaviors, but they are not prerequisite (Crane & Testa, 2014). As such, in this study the physical aggression and verbal aggression subscales will be used in the subsequent analysis. These subscales were identified by the EFA as distinct factors, align with theoretical conceptualizations of aggressive behavior, and match two of the factors determined by a psychometric evaluation of the BPAQ-SF conducted by the authors of the instrument.

Univariate Analysis. After determining which aggression subscales would be used in the study, SAS 9.3 software was used for univariate analysis of the data. First, frequency tables were created to examine the degree of missingness. Results of the analysis showed no missing data for the physical aggression and verbal aggression variables. School-Year, Sex and SES also had no missingness. The missingness percentages for the variable that measured the number of days respondents reported consuming at least one drink in the past 30 days (Days Drinking) and the number of days respondents reported binge drinking (Days Binge-Drinking) were 12.68% and 25% respectively. The Race and Ethnicity variables each had 13.41% missing data and Age had 0.72% missingness.

The next analysis involved examining the data for normality. First, histograms were produced, and a visual inspection of the graphs identified no outliers. Several

extreme scores were observed for the aggression and alcohol use measures. These scores were not considered outliers, however, because they fit the theoretically expected distribution of the data. Several studies report that college student populations have extreme scores on drinking measures, and that student athletes do as well (Yusko, Buckman, White & Pandina, 2008a, 2008b). In addition, the aggression and alcohol use measures each have a restricted range of response values which establishes firm boundaries that disallow widely implausible data. For example, participants were not able to choose 50 days as a response to the question regarding the number of days they consumed at least one drink in the past 30 days.

Test for skewness and kurtosis—measures of the distribution of data in comparison to a normal curve—were also performed. Absolute values between zero and three, for either parameter, are generally considered to indicate normality (Field, 2005). None of the aggression or alcohol use variables were skewed. The figures ranged between 1.57 and 2.49. The analysis showed, however, that the data for these variables were kurtotic—ranging between 3.12 and 8.40. Although a critical assumption for most statistical analysis procedures requires data that are neither skewed nor kurtotic, this rule does not apply when conducting an LPA (Collins & Lanza, 2010; Muthén, 2010).

Univariate tests were also conducted to produce descriptive statistics for the demographic characteristics of the data (Table 1) and for the aggression and alcohol use variables (Table 2). A sample of 276 students participated in the study, and their average age was 18.97 years-old. The majority were first-year students (69.20%), but males (50.72%) and females (49.28%) were almost equally represented in the data. A majority of the participants were White (72.38%). In terms of ethnicity they were predominantly

Not Hispanic (89.54%). Also, most individuals identified themselves as either Working Class/Lower-Middle Class (46.74%) or Middle Class (34.42%).

Table 1: Demographic Characteristics (N=276)

	% or mean	SD
Age (range 18-23)	18.97	1.15
School-Year		
First-Year	69.20	
Second-Year	30.80	
Gender		
Male	50.72	
Female	49.28	
Ethnicity		
Hispanic	10.46	
Not Hispanic	89.54	
Race		
American Indian/Alaskan Native	0.00	
Asian	2.09	
Black/African American	17.15	
Native Hawaiian/Other Pacific Islander	0.42	
White	72.38	
More Than One Race	5.86	
Other/Unknown	2.09	
SES		
Poor	0.72	
Working Class/Lower-Middle Class	13.77	
Middle Class	46.74	
Upper-Middle Class	34.42	
Upper Class	4.35	

Note: For the analysis of group differences:

"Race" was recoded into three variables (White = 1, Black = 2, Other = 3)

"SES" was recoded into three variables (Below Middle-Class = 1, Middle-Class = 2, Above Middle-Class = 3)

On average participants scored 5.23 on the physical aggression (PA) scale and 5.85 on the verbal aggression (VA) scale. They also had a mean of 3.56 days drinking (DD) and 2.01 days binge-drinking (DBD) in the past 30 days. A correlation matrix was created to examine the correlations among the aggression and alcohol use variables. Although the results showed that the items were significantly correlated with each other, the absence of multicollinearity is not an assumption of an LPA analysis. LPA, as a person-centered analysis, is not driven by the linear association of the variables to draw its conclusions; instead, it is driven by creating probability models to place people into groups.

Table 2: Descriptives for Aggression and Alcohol Variables

	Mean	SD
Aggression		
Physical (PA)--(range 3-18)	5.23	2.95
Verbal (VA)--(range 3-18)	5.85	2.85
Alcohol Use		
Days Drinking (DD)--Past 30-Days	3.56	3.79
Days Binge Drinking (DBD)--Past 30-Days	2.01	2.62

Latent Profile Analysis. The first aim of this study was to investigate whether college athletes can be clustered into groups based on their aggressive behavior and alcohol use. To address this aim a Latent Profile Analysis (LPA) was conducted using the following variables: Physical Aggression (PA), Verbal Aggression (VA), past 30 Days Drinking (DD) and past 30 Days Binge-Drinking (DBD). The range for the PA and VA variables is 3 to 18 (with higher numbers signifying higher levels of aggression). The range for the DD variable is 0 to 30 (days), and the range for the DBD variable is 0 to 25

(days). The data were analyzed using Mplus 7.11 software (Muthén & Muthén, 1998-2012). Model fit indices (BIC and entropy) as well as conceptual fit were used to determine the best model that fit the data. Six models, with consecutively increasing number of profiles, were created. Table 3 contains information on the fit indices and the group sizes for each model.

Table 3: Latent Profile Model Fit Statistics

Models	BIC	Difference in BIC	Entropy	Group Sizes
2-Profile	4860.53	--	0.97	258, 18
3-Profile	4793.17	-67.36	0.93	238, 15, 23
4-Profile	4724.59	-68.58	0.93	219, 42, 10, 5
5-Profile	4672.82	-51.77	0.91	202, 51, 11, 7, 5
6-Profile	4627.39	-45.43	0.92	160, 60, 31, 7, 13, 5
7-Profile	4647.81	20.42	0.93	205, 46, 7, 6, 4, 4, 4

Note: BIC = Bayesian Information Criteria, **Bold** = Optimal Model

Two-Profile Model

The first model constrained the data to a two-profile solution which resulted in a BIC of 4860.53 and an entropy of 0.97. The two groups created by the analysis had distinctly different profiles. The larger group (n=258, 93.48%) reported relatively low scores on the alcohol use and aggressive behavior measures. The small group (n=18, 6.52%) reported considerably higher scores on all of the measures (See Appendix H). Individuals in the large group reported 2.77 drinking days and 1.47 days binge drinking. In contrast, members of the small group reported 13.77 DD and 8.01 DBD. The discrepancies in the scores on the aggression measures were also noteworthy. The large group reported 56.26% lower PA scores and 64.92% lower VA scores than the small group.

Three-Profile Model

A three-profile model was then created to serve as a comparison to the two-profile solution. The BLRT was significant which indicated that the three-profile model should be retained in favor of the two-profile model. In the three-profile model, the largest group ($n=238$, 86.23%) had 20 fewer members than it had in the two-profile model, and it continued to have the lowest scores among all three groups on all of the aggression and alcohol use measures. This group (Group 1) had similar, but slightly lower, scores than the large group in the two-profile model.

Two smaller, distinct groups were evident. One group ($n = 15$, 5.43%) scored highest on the alcohol use variables ($DD = 14.81$ and $DBD = 8.17$), but their aggression scores ($PA = 9.25$, $VA = 7.45$) were only the second highest among the three groups. The other small group ($n = 23$, 8.33%) had the highest aggression scores among all three groups ($PA = 10.26$, $VA = 10.98$) but only the second highest alcohol use ($DD = 4.13$ and $DBD = 3.06$). Although entropy decreased slightly between the two-profile and three-profile model (from 0.97 to 0.93), results also showed a decrease of 67.36 in the BIC. Since the BIC decreased from the two-profile to the three-profile model a four-profile model was created to ascertain if a lower BIC was obtainable.

Four-Profile Model

The results of the analysis showed that the BIC for the three-profile model was not the lowest BIC that could be obtained with the data. The BIC decreased by 68.58 between the three-profile and four-profile models and entropy remained the same at 0.93. Also, the BLRT was significant which indicated that the four-profile model should be retained in favor of the three-profile model. Four interpretable groups emerged. The

largest group, Group 1 ($n = 219$, 79.35%), continued to have the lowest aggression and alcohol use scores, but it lost 19 members in this model. The next largest group, Group 2 ($n = 42$, 15.22%), had the second lowest scores across all measures. Their PA and VA scores were respectively 1.95 and 1.26 points higher than the largest group, and their alcohol use was 3.89 DD and 3.13 DBD higher. The four-profile-model continued to extract groups with ever-increasing scores. Group 3 ($n = 10$, 3.62%) had the second highest scores across all measures among the four groups. Their PA and VA scores were respectively 3.01 and 2.64 points higher than the lowest scoring group, and their alcohol use was 8.75 DD and 6.73 DBD higher. The final subset, Group 4 ($n = 5$, 1.81%), has the highest scores among the groups on all of the measures. Their PA and VA scores were respectively 5.25 and 4.64 points higher than the lowest scoring group, and their alcohol use was 14.76 DD and 13.73 DBD higher.

Five-Profile Model

Because the BIC decreased between the three-profile and the four-profile model, a five-profile model was created to ascertain if a lower BIC was obtainable that also would provide a conceptually clear model. The results of the analysis revealed that the BIC for the four-profile model was not the lowest BIC that could be obtained with the data. The BIC decreased by 51.77 between the four-profile and five-profile models, and entropy decreased to 0.91. Also, the BLRT was significant which indicated that the five-profile model should be retained in favor of the four-profile model. Five interpretable groups emerged. Consistent with prior models, the group with the largest number of members, Group 1 ($n = 202$, 73.19%), reported the lowest scores on both the aggression and alcohol variables. It is important to note that with each succeeding model, this group remained

the largest but was diminishing in size. The next-largest group, Group 2, increased in size by nine members ($n = 51$, 18.48%) and reported moderate alcohol use and moderately aggressive behavior. Group 3 ($n = 11$, 3.99%) remained about the same size, and although its members reported moderately aggressive behavior it now had the second highest alcohol use scores.

Inspection of the five-profile model also revealed a notable development—the re-emergence of a small subset of individuals, Group 4 ($n = 7$, 2.54%), with the highest aggression scores but second lowest drinking scores. The PA and VA scores of Group 4 were respectively 9.92 and 6.42 points higher than the lowest scoring group whereas their alcohol use was only 0.51 DD and 1.48 DBD higher. A subset that fit a similar profile was evident in the three-profile model but not discernable in the four-profile model. Another noteworthy observation is that the re-emergence of this relatively high-aggression/low-drinking group coincided with the disappearance of a profile that was characterized as scoring the highest on every measure. Group members with similar scores, Group 5 ($n = 5$, 1.81%), now reported the highest alcohol use but only second highest aggressive behaviors.

Six-Profile Model

Because the BIC decreased between the four-profile and the five-profile models, a six-profile model was created to ascertain if a lower BIC was obtainable. The results of the analysis showed that the BIC for the five-profile model was not the lowest BIC that could be obtained with the data. The BIC decreased by 45.43 between the five-profile and six-profile models, and entropy increased to 0.92. Next a seven-profile model was created for further investigation of the BIC and entropy indices, but the BIC for the

seven-profile model increased by 20.42 and entropy increased to 0.92. As such, the lowest value of BIC for the data was attained in the six-profile model. The BLRT for the six-profile model seemed to indicate that the 5-class model was sufficient. However, the 6-class model was identified as optimal by both the BIC and the entropy indices. The six-profile model was retained as the best model that fit the data due to the fit statistics (the lowest BIC value and entropy score that was close to 1.00) and because the profiles created were conceptually interpretable. It appeared that the larger groups remained stable and that distinctions among the smaller groups were conceptually important.

Table 4 contains the average latent profile probabilities for the most likely class membership. The statistics show a high degree of accuracy in class prediction ranging from 88.50% to 100.00%.

Table 4: Average LP Probabilities for Most Likely LP Membership (Row) by Latent Profile (Column)

Latent Profile	Probability					
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
1	1.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.997	0.002	0.000	0.000	0.000
3	0.022	0.052	0.921	0.001	0.002	0.002
4	0.023	0.016	0.013	0.926	0.004	0.017
5	0.000	0.008	0.004	0.000	0.988	0.000
6	0.029	0.032	0.033	0.020	0.001	0.885

Note: **Bold** represents the percentage match between observed and predicted

To facilitate an in-depth analysis of the six-profile model, the Mplus analysis results files were examined. For the creation of each model the “SAVEDATA” command in Mplus was used to save the analysis results of the most likely class

membership for each individual's survey response. Mplus creates a separate file for each model (Muthén & Muthén, 2012), and visual inspection of the files for the five-profile and six-profile models were used to interpret the underlying structures of the groups. This comparison was performed because it appeared that at least two of the groups from the five-profile model, Group 4 ($n = 7$) and Group 5 ($n = 5$), were retained in the six-profile model. The unanswered question was whether the membership of these groups remained stable. That is, did the same individuals cluster together in the five-profile and six-profile models? An analysis of the Mplus data analysis files confirmed that membership in these two groups remained stable. These groups were notable not only for their stability across two models but also for their markedly distinct profiles. Figure 1 presents a graphical representation of the mean scores for each profile and Table 5 contains the mean scores on the aggression and alcohol use variables for each profile.

Figure 1: Mean Values for Aggressive Behavior and Alcohol Use Profiles

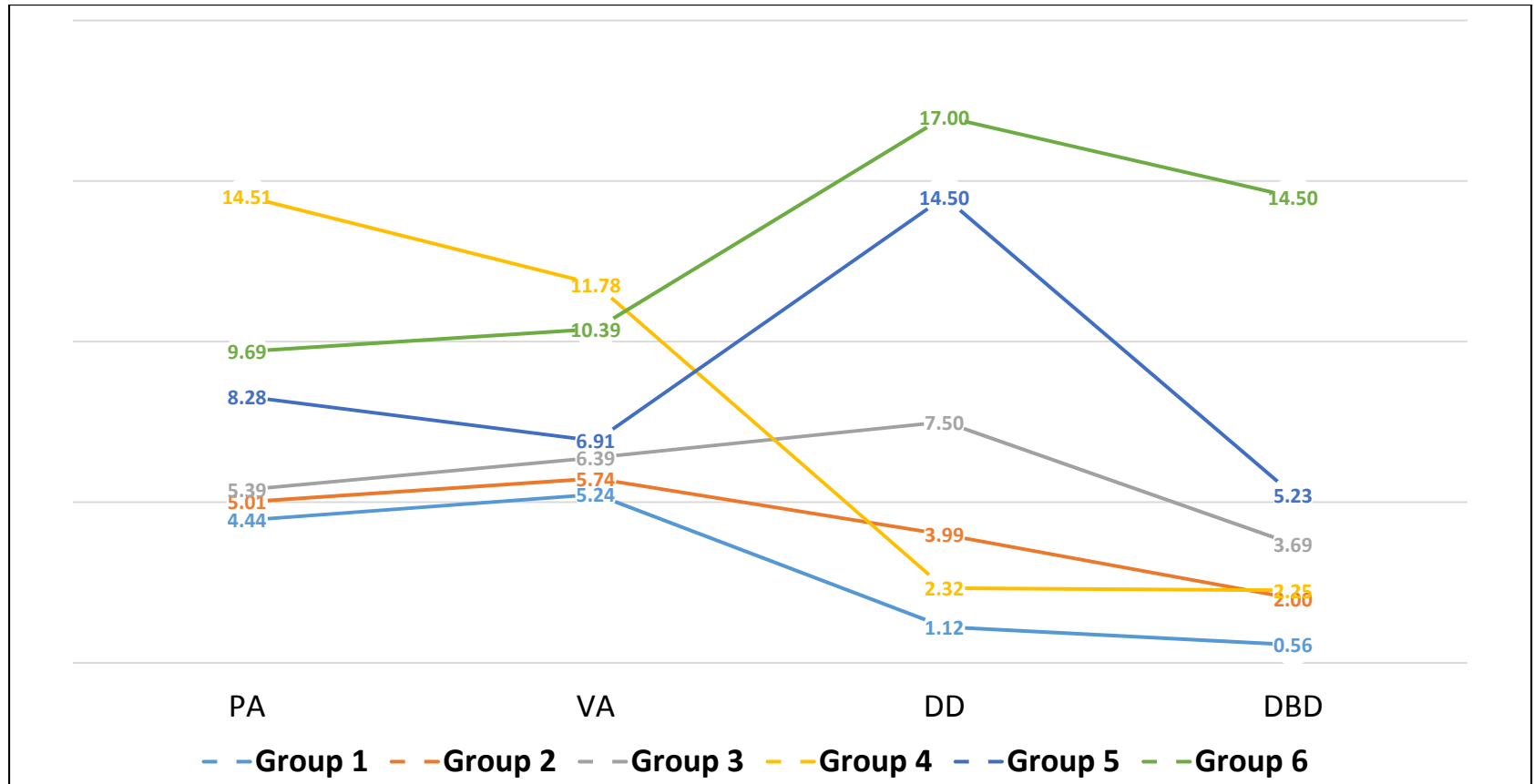


Table 5: Latent Profile Groups Mean Scores

Variable	Group 1 (LL) n = 160 (57.97%)	Group 2 (MM) n = 60 (21.74%)	Group 3 (ME) n = 31 (11.23%)	Group 4 (HL) n = 7 (2.54%)	Group 5 (HF) n = 13 (4.71%)	Group 6 (HH) n = 5 (1.81%)
Aggression						
Physical (PA)--(range 3-18)	4.44	5.01	5.39	14.51	8.28	9.69
Verbal (VA)--(range 3-18)	5.24	5.74	6.39	11.78	6.91	10.39
Alcohol Use						
Days Drinking (DD)--Past 30-Days	1.12	3.99	7.50	2.32	14.50	17.00
Days Binge Drinking (DBD)--Past 30-Days	0.56	2.00	3.69	2.25	5.23	14.50

Note:

Group 1: Low aggressive/Low drinkers (LL)

Group 2: Moderately aggressive/Moderate drinkers (MM)

Group 3: Moderately aggressive/Emerging high drinkers (ME)

Group 4: Highly aggressive/Low drinkers (HL)

Group 5: Highly aggressive/Frequent drinkers (HF)

Group 6: Highly aggressive/High drinkers (HH)

The groups were ranked from one to six based on the severity of their reported aggressive behavior and alcohol use. Higher group numbers indicated higher severity of reported behaviors. Consistent with previous models the group with the largest membership (Group 1, $n = 160$, 57.97%), scored the lowest on every aggression and alcohol use variable. This group was characterized as low aggressive/low drinkers.

Group 2 ($n = 60$, 21.73%) and Group 3 ($n = 31$, 11.23%) had moderate aggression scores and moderate alcohol use in comparison to the higher scoring groups in the model. It is important to note, however, that individuals in Group 3 appear to be on the verge of becoming heavy alcohol users and were characterized as moderately aggressive/emerging high drinkers. Their alcohol use is almost twice as much as Group 2 (the moderately aggressive/moderate drinkers), and they scored 6.39 DD and 3.14 DBD higher than Group 1 (the lowest alcohol users). The aggression scores for Group 3 (the moderately aggressive/emerging high drinkers) are also higher than Group 1 and Group 2.

The group with the highest aggression scores were the highly aggressive/low drinkers (Group 4, $n=7$, 2.54%). Their PA and VA scores were 10.07 and 6.54 points higher than the profile with the lowest aggression scores. In contrast, their alcohol use was relatively low. They were the second lowest at 14.68 DD and 12.25 DBD lower than the profile with the highest alcohol use scores. Another distinguishing feature of the highly aggressive/low drinkers was that their PA score was higher than their VA score. This feature was shared with only one group—the highly aggressive/frequent drinkers (Group 5, $n = 13$, 4.71%). Group 5 had the third highest PA score and the second highest DD.

The highly aggressive/high drinkers (Group 6, $n=5$, 1.81%), had the smallest number of individuals and reported the highest alcohol use scores, both in frequency and in days binge drinking. Their scores were 15.89 DD and 13.94 DBD higher than the profile with the lowest alcohol use. Their aggression scores were not the highest; however, they were the second highest.

Overall the LPA of the 276 student-athletes resulted in continuous extraction of distinct, theoretically interpretable, homogeneous groups based on aggression and alcohol use variables across multiple models. One consistent pattern is that the largest group of individuals in each model had the lowest levels of aggression and alcohol use. Also noteworthy is the presence of two groups of individuals who remained clustered together in the five-profile and six-profile solution—the group with the highest alcohol use and the group with highest aggression scores. The creation of models with consecutively increasing profiles allowed for a comparison of model fit indices which, along with theory, resulted in a six-profile solution as the optimal model. The emergence of theoretically meaningful groups and a ranking of the groups along a continuum of severity points to the possibility of employing tailored prevention and intervention strategies based on each group's unique characteristics.

Analysis of Demographic Differences. Once the optimal model was identified, the second aim of the research study—to determine if there were significant differences in the demographic characteristics among the groups—was investigated. For this part of the analysis, several categories in the race and SES variables were consolidated. The seven race categories listed on the questionnaire were re-coded into three categories (Black, Other and White). The five SES categories listed on the questionnaire were re-

coded into three categories (Below Middle-Class, Middle-Class, and Above Middle-Class). These transformations facilitated the analysis of demographic differences in instances in which too few participants occupied certain categories. After collapsing the categories, the first step in the analysis was to create frequency tables to provide descriptive data. Second, Friedman's tests were conducted to compare the distributions of each demographic variable among the groups and to assess for significant differences. Third, post hoc pairwise comparisons using Fisher's exact test were conducted to determine which particular groups differed from which others.

Group Descriptives

Table 6 contains the frequencies and percentages of the demographic characteristics of each group. Group 1 (low aggressive/low drinkers) was comprised primarily of first-year (76.88%), female (55.00%), not-Hispanic/Latino (87.50%), White (64.93%) and middle-class (42.50%) students. Group 2 (moderately aggressive/moderate drinkers) and Group 3 (moderately aggressive/emerging drinkers) have a similar demographic profile as Group 1 (low aggressive/low drinkers) with one exception. The group of moderately aggressive/emerging drinkers has a larger percentage of males than females (58.06% vs. 41.94%).

The remaining groups (4 to 6), all of which were classified as highly aggressive, were also predominantly male (85.71% in Group 4, 84.62% in Group 5, and 80% in Group 6). Group 4 (the highly aggressive/low drinkers) had a larger percentage of second-year than first-year students (57.14% vs. 42.86%). The same was true for group 6 (highly aggressive/high drinkers), comprised of 80.00% second-year students and 20.00% first-year students. The ethnic, racial and SES profiles of the highly aggressive groups (4

to 6) followed the pattern of the low aggressive groups (1 to 3) consisting primarily of not-Hispanic/Latino, White, middle-class students.

Table 6: Group Demographics

	First- Year		Second-Year		Male		Female		Not-Hispanic/Latino		Hispanic/Latino	
	Freq.	%*	Freq.	%*	Freq.	%*	Freq.	%*	Freq.	%*	Freq.	%*
Group 1 (LL)	123	76.88%	37	23.13%	72	45.00%	88	55.00%	119	87.50%	17	12.50%
Group 2 (MM)	35	58.33%	25	41.67%	29	48.33%	31	51.67%	45	88.24%	6	11.76%
Group 3 (ME)	22	70.97%	9	29.03%	18	58.06%	13	41.94%	28	96.55%	1	3.45%
Group 4 (HL)	3	42.86%	4	57.14%	6	85.71%	1	14.29%	6	100.00%	0	0.00%
Group 5 (HF)	7	53.85%	6	46.15%	11	84.62%	2	15.38%	11	91.67%	1	8.33%
Group 6 (HH)	1	20.00%	4	80.00%	4	80.00%	1	20.00%	5	100.00%	0	0.00%
Total	191	69.20%	85	30.80%	140	50.72%	136	49.28%	214	89.54%	25	10.46%

	White		Black		Other		Below Middle-Class		Middle-Class		Above Middle-Class	
	Freq.	%*	Freq.	%*	Freq.	%*	Freq.	%*	Freq.	%*	Freq.	%*
Group 1 (LL)	87	64.93%	30	22.39%	17	12.69%	30	18.75%	68	42.50%	62	38.75%
Group 2 (MM)	44	86.27%	1	1.96%	6	11.76%	5	8.33%	31	51.67%	24	40.00%
Group 3 (ME)	25	83.33%	4	13.33%	1	3.33%	4	12.90%	16	51.61%	11	35.48%
Group 4 (HL)	5	71.43%	2	28.57%	0	0.00%	0	0.00%	5	71.43%	2	28.57%
Group 5 (HF)	10	83.33%	2	16.67%	0	0.00%	1	7.69%	6	46.15%	6	46.15%
Group 6 (HH)	2	40.00%	2	40.00%	1	20.00%	0	0.00%	3	60.00%	2	40.00%
Total	173	72.38%	41	17.15%	25	10.46%	40	14.49%	129	46.74%	107	38.77%

* Row Percents

Tests for Significant Differences

Friedman tests were conducted to determine if observed differences in the distributions of the demographic characteristics among the groups were statistically significant. Traditionally a chi-square analysis is performed to test for significant differences among categorical variables (such as gender and race). The frequency distribution of the data for this study, however, did not meet the chi-square requirement of a cell size of at least 5 cases. For example Group 4 had only one female student and zero students in the below middle-class SES category. After consultation with a statistician (Dr. Carl Siebert) whose expertise includes non-parametric analyses, the Friedman test was chosen as an alternative analysis (C. Siebert, personal communication, September 28, 2015). The Friedman test is based first on rank ordering the measures of the dependent variable. Then the analysis of variance procedure (ANOVA) is applied to the ranks (Conover & Inman, 1981). For this analysis, group membership was the dependent variable. The groups were ranked from one to six based on the severity of their reported aggressive behavior and alcohol use. The SAS statistical package contains a procedure for conducting the Friedman test that converted the group numbers into statistical ranks and then performed the ANOVA test. Results of the Friedman tests indicated that there were significant differences among the groups for two of the five demographic variables. There was a statistically significant difference in gender ($\chi^2(1) = 13.88, p = 0.0002$) and school-year ($\chi^2(1) = 12.68, p = 0.0004$). The results of the Friedman tests for ethnicity, race and SES were not significant.

The results of a series of post hoc pairwise comparisons were conducted using the Fisher's exact test. The Fisher's exact test was chosen because, like the Friedman test,

there is no assumption that cell sizes have more than five cases (McDonald, 2014). The results of the Fisher's tests indicated significant differences in the proportions of male to female students and in the proportions first-year to second-year students in several group pairings (Table 7). The gender composition of each of the low and moderate aggression and drinking groups (Groups 1-3) was significantly different from each of the high aggression and drinking groups (Groups 4-5) at $p < .001$. In the low and moderate groups, the proportions were close to equal. There is an abrupt change, however, in the high groups. These groups were predominantly male (composing 80.00% to 85.71% of the members). These results are not surprising. Traditionally, females are characterized as having less alcohol use and being less aggressive than males (Card et al., 2008; Greenfield et al., 2010).

Significant differences were also identified between first-year and second-year students. Even before testing, it was evident that the proportions of school-year membership for the low aggressive/low drinkers (Group 1) and the highly aggressive/high drinkers (Group 6) were polar opposites. Group 1 members were predominantly first-year students (76.88%) whereas Group 6 were mostly second-year students (80.00%). Findings from the Fisher's exact tests show that these school-year proportions (between Group 1 and Group 6) were significantly different from each other. In addition, the highly aggressive/high drinkers (Group 6) had a larger proportion of second-year students than every other group at $p < .001$ for every comparison. Conversely, the low aggressive/low drinkers (Group 1) had a larger proportion of first-year students than every other group at $p < .001$. There was one exception, however—there was no significant difference in school-year status between the low aggressive/low drinkers

(Group 1) and the moderately aggressive/emerging high drinkers (Group 3). Significant school-year differences among the groups that were not at the polar ends of the behavioral severity spectrum (Groups 2-5) were not consistent. For example, although there was a significant difference in school-year between the moderately aggressive/moderate drinkers and the highly aggressive/low drinkers. Significance was not found between the moderately aggressive/moderate drinkers and the highly aggressive/frequent drinkers. This study's findings suggests that second-year students (with high levels of alcohol use) may be more aggressive than first-year students (with low levels of alcohol use).

Table 7: Group Comparisons

Pair	Gender (<i>P</i> -Value)	School-Year (<i>P</i> -Value)
Group 1 vs. Group 2	0.64	0.004**
Group 1 vs. Group 3	0.06	0.33
Group 1 vs. Group 4	< 0.001***	< 0.001***
Group 1 vs. Group 5	< 0.001***	< 0.001***
Group 1 vs. Group 6	< 0.001***	< 0.001***
Group 2 vs. Group 3	0.17	0.05
Group 2 vs. Group 4	< 0.001***	0.03*
Group 2 vs. Group 5	< 0.001***	0.57
Group 2 vs. Group 6	< 0.001***	< 0.001***
Group 3 vs. Group 4	< 0.001***	< 0.001***
Group 3 vs. Group 5	< 0.001***	0.013*
Group 3 vs. Group 6	< 0.001***	< 0.001***
Group 4 vs. Group 5	0.83	0.12
Group 4 vs. Group 6	0.29	< 0.001***
Group 5 vs. Group 6	0.39	< 0.001***

**p* < .05

***p* < .01

****p* < .001

Chapter 5

Discussion

Recent media coverage of professional athletes as perpetrators of interpersonal violence has put the issue of off-field aggression and sports in the national spotlight. Although professional athletes are a small percent of the general population, their cultural influence is powerful. One indicator is the considerable resources that companies spend to have successful athletes promote their products. Millions of sports fans, including children and young adults, are privy to the private and public behaviors of athletes and may model the behaviors of the athletes they admire. As such, the goal of this study was to advance the knowledge base regarding interpersonal aggression perpetrated by athletes by providing actionable information for improved design and implementation of violence prevention and intervention efforts.

This study focused specifically college athletes. They are a critical population for two important reasons. First, collegiate sports are the primary recruiting source for professional sports teams. Second, institutions of higher education are uniquely positioned to implement prevention and intervention initiatives that address problem behaviors before athletes fully enter the national spotlight. This study investigates aggression and alcohol use among student-athletes. Alcohol misuse is one of the few risk factors for aggressive behavior that is responsive to prevention efforts and empirical evidence shows that college athletes are a group at risk for both aggressive behaviors (Dean & Rowan, 2014, O'Brien et al., 2012) and alcohol misuse (Yusko, Buckman, White & Pandina, 2008a, 2008b).

During the past 70 years, scientists have conducted numerous empirical investigations of the relationship between aggression and alcohol misuse, and findings support the existence of an enduring connection between the two behaviors. The majority of studies, however, have taken a variable-centered approach that only gives us partial information by focusing on linear relationships between the variables. Every college athlete who consumes alcohol, however, does not behave aggressively. There is vast heterogeneity among them. Therefore, this study used a person-centered approach to determine if a sample of college athletes could be clustered into mutually exclusive homogeneous groups with distinct profiles of aggressive behaviors and alcohol use. The presence of subsets within the population may point to the possibility of tailoring prevention and intervention strategies to the specific needs of each group. Another aim was to determine if the identified groups also had distinct demographic profiles. Prior research has found significant differences in the demographic characteristics of individuals with varying levels of aggressive behavior and alcohol use. Examining this line of inquiry may further contribute to the customization and effectiveness of prevention and intervention efforts targeting violence and alcohol misuse.

Summary of Findings

The results of the study confirmed the hypothesis that a latent profile analysis would identify multiple independent groups of athletes who differed in their overall profile of aggression and alcohol use. An analysis of the 276 college athletes in the sample identified six conceptually interpretable groups that were observed to represent a spectrum of behavioral severity. The first and largest group (58% of the sample), were characterized by low aggressive behavior and low alcohol use scores. The students-

athletes in this group were primarily middle-class, White, non-Hispanic/Latino, females in their first-year of college. The second group (22% of the sample) reported moderately aggressive behavior, moderate alcohol use and a similar demographic profile as the low aggressive/low drinkers. It is not surprising that a majority of students in the sample were clustered into low and moderate groups. Most individuals do not engage in problematic aggressive behaviors or misuse alcohol and are not a target for prevention or intervention activities.

The third group (11% of the sample), however, had a notably different profile than the first two groups. They drank more frequently and engaged in binge-drinking more often than the low and moderate alcohol users. They were classified as moderately aggressive/emerging drinkers. The National Institute on Alcohol Abuse and Alcoholism (NIAAA) estimates that 19% of college students meet the criteria for alcohol use disorder (more than twice as much as the general population) (NIAAA, 2015). As such, focusing both prevention and intervention efforts on this group is imperative. This group of students are also prime targets for violence prevention efforts. Annually, an estimated 696,000 college students report being assaulted by another student who had been drinking (NIAAA, 2015). As such, although moderately aggressive/emerging drinkers may not self-report high trait aggressive tendencies, prior research supports the assertion that some of them may exhibit alcohol facilitated aggressive behaviors. The moderately aggressive/emerging drinkers had similar demographic profile as the first two groups with gender as an exception. Beginning with this group males outnumber females. The students who clustered into groups with more severe scores were mostly male.

Although there was a clear trend of increasing aggression and drinking scores across the first three groups, beginning with the fourth group (2% of the sample), there was a noteworthy break in the trajectory of the behavior scores. The fourth group was classified as highly aggressive/low drinkers because they had the highest aggression scores among the groups, but the second lowest alcohol use scores. Most of them were second-year students, and they were predominantly male. This group requires extensive efforts in multiple areas to address their aggressive tendencies. In the area of violence prevention, group counseling sessions would be one way to deliver programming to forestall future incidents of interpersonal aggression perpetration. On average NCAA Division I schools have 500 student-athletes (NCAA, 2015). Based on the findings of this study, 10 of them (2%) would be classified as highly aggressive/low drinkers. In the area of intervention, small numbers facilitate individualized attention. These athletes report being the most aggressive. As such, an in-depth understanding of their personal triggers—and inhibiting factors—is crucial. Such information is best gained and utilized for intervention in individual sessions. Also, although these athletes report low alcohol use, they would benefit from alcohol prevention activities for both patterns of drinking so that they do not escalate and become frequent and/or heavy drinkers.

The fifth group (5% of the sample) was comprised of highly aggressive/frequent drinkers. They had the second highest numbers for both drinking patterns, the third highest scores for both physical and verbal aggression, were almost evenly split between first-year and second-year students and were predominantly male. This group requires equal attention to their aggressive behaviors and alcohol use. Interventions that address both verbal and physical aggression and both patterns of drinking – daily drinking and

binge drinking – with a primary focus on days drinking are recommended. The number of athletes in this group is slightly higher than in the fourth group. As such, individual counseling sessions may not be feasible. A different delivery approach should be investigated. For example, since they have an almost equal numbers of first-year and second-year athletes dividing the groups by school-year for group sessions may be an effective strategy. Research indicates that alcohol use increases between the first and second year of college (Borsari et al., 2007; Turrise et al., 2006). A use prevention strategy may be better suited for first-year students. Whereas, an alcohol harm reduction strategy that focuses on protective drinking behaviors may be best for second-year students.

The final, and sixth group (2% of the sample), were the highly aggressive/high drinkers. This group reported the most troubling combination of alcohol use and aggression among their peers. They consumed alcoholic beverages on more than half of the past 30 days and engaged in heavy drinking (5 or more drinks for males and 4 or more drinks for females) on 85% of those days. They also reported aggression scores that were twice as high as the lowest scoring group. Although prevention strategies were recommended for most of the prior groups, athletes classified as highly aggressive/high drinkers require an intensive level of sustained intervention efforts. Similar to the highly aggressive/low drinkers (Group 4) their numbers are small enough to make individual counseling sessions feasible. Unlike Group 4, whose members may only require alcohol use prevention strategies, the individual sessions for this sixth group should focus on *both* aggressive behavior and alcohol use, and the way the two interact. These individuals require continuous interactions with behavioral health practitioners who are equally

skilled in anti-violence and alcohol misuse interventions to reduce the damage they may cause to themselves and others.

The findings of the study also showed significant differences among some of the groups in school-year and gender composition. These results confirmed the hypotheses that among the five demographic characteristics captured by the questionnaire (gender, school-year, race, ethnicity and SES) gender and school-year would be the only variables that significantly predicted group differences. The gender composition of each of the low and moderate aggression and drinking groups (Groups 1-3) was significantly different from each of the high aggression and drinking groups (Groups 4-5). In addition, significant differences were also identified between first-year and second-year students in many of the group pairings. Special attention should be paid to these factors in the tailoring of prevention and intervention initiatives. It is quite compelling that 80% of the highly aggressive/high drinkers were male and 80% of them were second-year students, whereas the low aggressive/low drinkers group was primarily composed of first-year students (76.88%) and was more evenly distributed between males and females (45% and 55% respectively). (Appendix I contains the mean scores for the aggression and alcohol use variables by gender and school-year category). This information suggests that targeting males and second-year students in the higher aggression groups for extensive prevention and intervention programming may be an effective approach for reducing interpersonal aggression and alcohol misuse among student-athletes.

Limitations

The findings from this study should be interpreted with consideration to several limitations. One concern is that self-reported data were used for the aggression and

alcohol use measures, and bias threatens the internal validity of a study when asking participants to divulge information about themselves (Trochim, 2007). Their responses are subject to recall bias (provision of inaccurate information due to the unreliable nature of memory) and social desirability bias (a tendency to provide responses that will make a favorable impression). A number of factors exacerbated the potential influence of social desirability bias for the self-reporting of alcohol use. First, almost all of the student-athletes (97.46%) were under the legal drinking age of 21-years old. Reporting alcohol use on the study's questionnaire is tantamount to admitting to engaging in illegal activity. Second, the questionnaire was administered at the same time that student-athletes were being evaluated by medical staff to assess their general health and to "clear" (i.e., approve) the athlete to participate in competitive athletics. Although they were assured by members of the research team that their answers were confidential, the students may still have underreported their alcohol use to mitigate the perceived risk of not gaining clearance to be a member of the university's sports teams. This likely conservative level of reporting is a substantial limitation; however, given the conservative estimates, the findings are even more compelling.

Measurement error is another potential limitation to the interpretation of the findings of the study. The internal validity of the study may be compromised by weaknesses in the measures (DeVellis, 2011). The data for the study were collected from various sources, many of them previously used and validated by other researchers. Still there is always the possibility that the items did not accurately capture the constructs they were intended to measure. For example, several studies have supported the psychometric validity of the aggression measure (the BPAQ-SF), but the proposed factor

structure was not replicated in this study. In addition, the subscales each had only three items, and it is likely that more items would be required to capture fully the latent constructs. For the alcohol use variables, an item regarding of the average quantity of drinks consumed on drinking days does not appear in the questionnaire administered to the student-athletes, so a quantity-frequency calculation was not possible. Items regarding binge-drinking (5 or more for men and 4 or more for women) were included but investigating differences based on additional drinking patterns was not possible.

Another threat to internal validity is the differing methods of implementing the questionnaire. First-year students recorded their answers amid a long, computer-assisted questionnaire. Second-year students recorded their answers on a paper-and-pencil questionnaire that included far fewer items. As such, measurement error due to respondent fatigue is more likely for the first-year students than the second-year students. First-year students may have been more prone to skip questions or provide hasty answers.

Another limitation of the study is the small sample size and lack of representation of geographic and demographic diversity. These restrictions on the study population diminish the generalizability of the findings. Participants in the study were limited to incoming student-athletes at one Northeastern university during a period of one year. As such, the study's findings cannot be generalized to other athletes (including those attending other schools, in different age groups, or playing professional sports). For example, it is unknown if the increased aggression and drinking that was reported by second-year students would further increase for third and fourth year students. Also related to the small sample size is the fact that some of the analyses of differences in demographics among the group were underpowered (see Appendix J). As such, the

probability of finding significant differences among the groups may have been compromised. Even with the lack of power, the study detected important, significant differences in group composition by gender and school-year.

Implications

Despite the limitations specified, this exploratory study has several implications for social work policy and practice. Data analysis of the study sample identified subsets of college athletes with differing levels of aggressive behaviors and alcohol misuse—some of whom reported highly aggressive behaviors and problematic alcohol use patterns. These findings support the continued focus of colleges and universities on the problems of violence and alcohol misuse among students, in general, and among athletes in particular. In the area of policies and procedures, social work professionals can play a pivotal role in assisting institutions of higher education in their efforts to address these problems, and advocating for additional programs. Currently, many institutions partner with social work professionals to ensure the safety of students. One example, of many, is the collaboration between the Rutgers University School of Social Work and the university's administrators to conduct a campus climate assessment regarding student experiences, attitudes, and beliefs about sexual violence and to contribute to a national resource guide of model policies and procedures (The White House Task Force to Protect Students From Sexual Assault, 2014). There are also partnerships between social work professionals and university administrators that seek to address alcohol misuse among students. For example, the School of Social Work at San Diego State University has a Center for Alcohol and Drug Studies and Services that spearheads several alcohol and drug related research initiatives and also provides education and counseling services for

individuals convicted of driving under the influence of alcohol and drugs (Center for Alcohol and Drug Studies and Services, n.d.). Many colleges and universities have violence prevention programming and alcohol misuse initiatives, but most efforts operate on separate tracks. By demonstrating that aggressive behavior and alcohol use can be used conjointly to create behavioral profiles, the findings of this study support the argument for an integration of programming efforts. Joining forces may be a wise approach for the effective and efficient use of college and university resources.

Although campus-wide violence prevention and alcohol misuse intervention efforts are endorsed and supported by many colleges and universities, programs that address athlete-specific risk factors for these behaviors are sparse. As such, a major implication of this study's findings is in the area of social work practice. There is persistent concern regarding off-field aggressive behavior and alcohol misuse among athletes, but partnerships between administrators of athletic departments and social work professionals are mostly limited to a narrow area (i.e., social work professionals are mainly relied on for individual treatment of designated athletes after specific incidents of alcohol misuse or aggressive behaviors). The findings of this study indicate that there is an opportunity for social work professionals to address these problems on a scale larger than individual treatment. The results of the study could be used to inform customization of prevention and intervention programming. Individuals could be identified earlier for more, or less, intense prevention and intervention efforts based on their group membership. Customization can occur at two important stages: risk-assessment and program development. Information from this study may be useful for creating off-field aggression screening tools to assess violence risk for college athletes specifically.

Further, prevention specialists may be able to use findings from this study to design new programs, or justify adapting existing ones, that not only cater to the college athlete population but also to the specific behavior groups identified in the study. Finally, the findings that some of the groups differed significantly by gender and school-year is additional information that can be used to refine programming. By targeting assessments and interventions properly, programs will make the best use of what are typically scarce economic resources.

These suggestions for the customization of athlete-specific prevention and intervention efforts are predicated, however, on successful collaborations between athletic departments and social work professionals. Athletic directors, coaches and trainers should view social workers as their partners in maintaining the safety, health and well-being of athletes. This necessitates giving social work professionals access to college-athletes beyond the confines of one-on-one counseling sessions. Also, social work professionals should increase their efforts to make athlete-specific practice and research a priority. For example, one step would be to include a learning module on athlete-specific behavioral health issues in general practice courses and to offer continuing education credits on this topic. As previously stated, athletics is a substantial part of American culture. Addressing the specific behavioral needs of this highly influential group has beneficial ripple effects for the rest of our society.

Future Research

Findings from this exploratory study can be used as the basis for two areas of future research—1) research that aims to expand the depth and breadth of empirical information regarding aggression and alcohol use among athletes and 2) research that

aims to investigate the effectiveness of prevention and intervention strategies that attend to these behaviors. To address the aim of the first research area, this study should be replicated with a larger number of participants and with college athletes who attend institutions with different demographic profiles. For example, studies could be conducted that examine aggression and alcohol use among college athletes attending schools classified as NCAA Division II or Division III, at schools in different geographic locations, or schools that cater to special populations such as military colleges or historically black colleges and universities. One limitation of this study is its small sample size and a population restricted to one university. Replicating the study would provide more generalizable findings.

Another line of research should further explore the gender and school-year differences revealed in the findings of this study. If a larger number of participants is obtained, it would be possible to separate the sample by gender and by school-year to ascertain if different profiles of aggressive behavior and alcohol use are produced with the isolated samples. Another benefit of increasing the sample size is the possibility that significant differences for other demographic variables may be uncovered. The findings of this study showed no significant differences by ethnicity, race or SES. These results, however, may not reflect a lack of significant differences. Instead, they may be due to low statistical power which compromises the ability of the test to detect the effect.

Future research can also explore the influence of other athlete characteristics on group membership. For example, one line of inquiry could explore whether participating in contact vs. non-contact sport influences the rate of off-field aggression among athletes. Another consideration is the effect of multiple substance use (both legal and illegal) on

aggressive behaviors. In fact, some research has found a connection between the use of Selective Serotonin Reuptake Inhibitors (SSRIs)—a medication commonly prescribed for depression and anxiety—and violent crime perpetration (Molero, Lichtenstein, Zetterqvist, Gumpert & Fazel, 2015). Serious investigation of these and other extraneous variables is highly recommended.

Future research should also delve deeper into the specific aggressive behaviors and alcohol use patterns that are endorsed by individuals with differing profiles. For example, the physical aggression subscale of the questionnaire used in this study had three items: (1) given enough provocation, I may hit another person, (2) there are people who pushed me so far that we came to blows and (3) I have threatened people I know. It is possible that there are differences in alcohol use between people who endorsed past behavior of physical aggression (item 2) and those who endorse a future intention (item 1).

To address the second research area—investigation of the effectiveness of prevention and intervention strategies—findings from this study can be used to inform the design, implementation and evaluation of prevention and intervention programs. As mentioned previously most colleges and universities have alcohol misuse and violence prevention initiatives, but rarely do they integrate these efforts. Additionally, programs that are tailored to the needs of student-athletes are scarce. Although the field of athlete-specific intervention research is largely unexplored, the possibility of devising customized and effective solutions that meet the needs of student-athletes is promising. This optimistic outlook is largely due to the fact that the building blocks for such strategies already exist. Intervention researchers who choose to focus on aggression and

alcohol use among college athletes can utilize evidence-based practices as a foundation for their work. Such practices include, but are not limited to, conflict resolution training, anger management techniques, motivational interviewing and personalized normative feedback tools that target alcohol misuse (Borsari et al., 2007; Feindler & Engel, 2011; Waithaka, Moore-Austin & Gitimu, 2015). The key task for social work professionals is to match the appropriate strategies to the behavioral profile of the athlete. For example, conflict resolution training and personalized normative feedback may be effective prevention strategies for moderately aggressive/emerging drinkers. They may, however, have no effect on highly aggressive/ high drinkers. Instead, continuous one-on-one counseling sessions with a highly skilled practitioner may better serve their needs. Addressing the behavioral health problems of student-athletes in the areas of aggression and alcohol use requires a coordinated effort of scientific inquiry and innovative practice strategies. Creating customized, effective and efficient behavioral health programs that meet the needs of student-athletes will undoubtedly enhance their well-being and elevate their potential for positive contributions to the communities they inhabit.

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Appendix A

Data Use Agreement

To ensure the integrity and security of information and to permit appropriate uses of the data, Dr. Jennifer Buckman, on behalf of her collaborators and co-owners of this data, and Fiona Conway enter into this agreement.

1. This agreement is by and between Dr. Buckman and Fiona Conway, herein termed "User."
2. The terms of this agreement can be changed only by written modification to this agreement or by the parties adopting a new agreement.
3. The parties mutually agree that Dr. Buckman retains all ownership rights to all of the data and that the User does not obtain any right, title, or interest in any of the data furnished by Dr. Buckman.
4. The User represents and warrants, and in furnishing the data, Dr. Buckman and colleagues rely upon such representation and warranty, that the data will be used solely for the following purpose:

To conduct data analyses on the variables represented in the data sets, present findings from the data analyses at various conferences, and to develop manuscripts and publish findings in scholarly journals, all under the direction of Dr. Buckman.

5. The following data file(s) is/are covered under this Agreement:

Athlete Health Behavior Data 2014 to 2015

6. The parties agree that the aforesaid file(s) (and/or any derivative file(s)) may be retained by the User until September 1, 2020. Thereinafter, User will return all copies of such data, unless Dr. Buckman agrees to execute a new data use agreement before that time. If Dr. Buckman elects to have the User destroy the data, the User agrees to certify the destruction of the files in writing within 30 days of receiving Dr. Buckman's instruction. A statement certifying this action must be sent to Dr. Buckman. The User agrees that no data or any parts thereof shall be retained when the aforementioned file(s) are destroyed unless Dr. Buckman authorizes the retention of the files in writing to User.
7. The User agrees to establish appropriate administrative, technical, and physical safeguards to protect the confidentiality of the data and to prevent unauthorized use or access to the data. The User agrees that the data will remain in the User's possession on the User's own personal laptop and neither the data nor any oral or written reports based on these data will be transmitted to any other individual without approval from

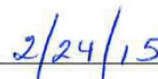
Dr. Buckman. It will not be maintained on any publicly accessible equipment or data storage space and will not be transferred to any other computer unless authorized by Dr. Buckman.

8. In the event that Dr. Buckman determines or has a reasonable belief that the User has permitted access to the aforesaid file(s) that is not authorized by this Agreement, Dr. Buckman may require User to: (a) investigate and report to Dr. Buckman the User's determinations regarding alleged or actual unauthorized access, (b) promptly resolve any problems identified by the investigation; (c) if requested by Dr. Buckman, submit a formal response to an allegation of unauthorized access; (d) if requested by Dr. Buckman, submit a corrective plan with steps designed to prevent any future unauthorized access, and (e) if requested by Dr. Buckman, return data files to them or destroy data files.
9. As the User, the undersigned individual hereby attests that he or she is authorized to enter into this Agreement and agrees to all the terms specified herein.

Fiona Conway



(Signature)



(Date)

10. The undersigned individual(s) attests that they are authorized to enter into this agreement. They support the User's request for and use of the data specified in paragraph #5, and agree to all the terms of this Agreement.

Dr. Jennifer Buckman



(Signature)

2/24/15

(Date)

Appendix B

RUTGERS UNIVERSITY
Office of Research and Sponsored Programs
ASB III, 3 Rutgers Plaza, Cook Campus
New Brunswick, NJ 08901

November 7, 2013

P.I. Name: Buckman
 Protocol #: 12-607M

Jennifer E. Buckman
 Center for Alcohol Studies
 Smithers Hall
 607 Allison Road
 Busch Campus

Dear Jennifer Buckman:

(Initial / Amendment / Continuation / Continuation w/ Amendment)

Protocol Title: "Substance Use Behaviors in Student Athletes"

This is to advise you that the above-referenced study has been presented to the Institutional Review Board for the Protection of Human Subjects in Research, and the following action was taken subject to the conditions and explanations provided below:

Amendment Approval Date: 11/05/2013 **Expiration Date:** 2/14/2014 **Expedited Category(s):** 7

This approval is based on the assumption that the materials you submitted to the Office of Research and Sponsored Programs (ORSP) contain a complete and accurate description of the ways in which human subjects are involved in your research. The following conditions apply:

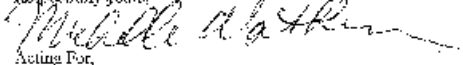
- **This Approval:** The research will be conducted according to the most recent version of the protocol that was submitted. **This approval is valid ONLY for the dates listed above;**
- **Reporting:** ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;
- **Modifications:** Any proposed changes **MUST** be submitted in the IRB as an amendment for review and approval prior to implementation;
- **Consent Form(s):** Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;
- **Continuing Review:** You should receive a courtesy e-mail renewal notice for a Request for Continuing Review before the expiration of this project's approval. However, it is your responsibility to ensure that an application for continuing review has been submitted to the IRB for review and approval prior to the expiration date to extend the approval period;

Additional Notes: Administratively Expedited Amendment Approval per 45 CFR 46.110(b)(2) on 11/05/2013/ for addition of Key Personnel: E. Conway, S. Waldenberg.

Failure to comply with these conditions will result in withdrawal of this approval.

Please note that the IRB has the authority to observe, or have a third party observe, the consent process or the research itself. The Federal-wide Assurance (FWA) number for the Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Respectfully yours,



Acting For,
 Dr. Beverly Tappin, Ph.D.
 Professor
 Chair, Rutgers University Institutional Review Board

Appendix C

Attachment 4

Invitation to Participate in a Survey Research Study - Health

Dr. Jennifer Buckman, Assistant Research Professor at Rutgers University, and her collaborators invite you to participate in a research study that is interested in understanding health behaviors that influence risk for or recovery from concussion and other sports-related injuries. Health behaviors include things such as sleeping and eating habits, alcohol and drug use, hydration and exercise. All varsity student athletes at Rutgers will be invited to participate.

The study will use information routinely collected by the Dept of Sports Medicine, including:

1. the data you have just provided on this survey
2. the basic physical, mental and cognitive health information you provided when you entered the Rutgers athletic program including the brief heart function experiment you make have participated in during your physical exam.
3. health information collected from you in the event that you are suspected of having a concussion.

You will be assigned an ID number. This ID number—not your name, net ID or student number—will be used on all data you provide to us. We take your confidentiality very seriously. If a report of this study is published, or the results are presented at a professional conference, only group results will be stated.

There are no anticipated risks or personal benefits from participating in this study, nor will you incur costs or be compensated for participation. Participation in Dr. Buckman's research study is voluntary and independent from the Dept of Sports Medicine's mandatory health and wellness assessments. You do not have to participate and you may withdraw your participation at any time.

If you have any questions about this study, you may contact Jennifer Buckman by phone at 848-445-0793, email at jbuckman@rutgers.edu, or by mail at Center of Alcohol Studies, 607 Allison Road, Rutgers University Piscataway, NJ 08854. If you have any questions or concerns about your rights as a research participant, contact the Rutgers Office of Research and Sponsored Programs by phone at 848-932-0150, by email at humansubjects@orsp.rutgers.edu, or by mail at Rutgers University Institutional Review Board for the Protection of Human Subjects, Office of Research and Sponsored Programs, 3 Rutgers Plaza, New Brunswick, NJ 08901-0559. If you would like, you will get a copy of this consent form to keep.

If you sign below, it means that you understand the information given in this consent form and would like to be a volunteer in this study.

Participant Signature _____ Date _____

Subject Name _____

Study Personnel Signature _____ Date _____

APPROVED

MAY 21 2014

Approved by the
Rutgers IRB

EXPIRES

FEB 20 2015

Approved by the
Rutgers IRB

NUTREAT In a typical week, how often did you eat:

	Not at all (1)	A little (2)	Some (3)	Quite a bit (4)	A lot (5)
At a fast food restaurant (1)	☐	☐	☐	☐	☐
Fruits (not juice) (2)	☐	☐	☐	☐	☐
Candy, cookies, or sweet bakery goods (3)	☐	☐	☐	☐	☐
Pre-made low-cal or diet meals (4)	☐	☐	☐	☐	☐
Vegetables other than potatoes (5)	☐	☐	☐	☐	☐
Frozen food meals (6)	☐	☐	☐	☐	☐
Salad as a meal (7)	☐	☐	☐	☐	☐
Chips or salty snacks (8)	☐	☐	☐	☐	☐

NUTRHYDR In a typical week, how often did you drink:

	Not at all (1)	A little (2)	Some (3)	Quite a bit (4)	A lot (5)
Plain water (1)	☐	☐	☐	☐	☐
Sports drinks (like Gatorade, Powerade) (2)	☐	☐	☐	☐	☐
Energy drinks (like Red Bull, Monster, Rockstar) (3)	☐	☐	☐	☐	☐
Caffeinated soda (4)	☐	☐	☐	☐	☐
Other caffeinated beverages (tea, coffee) (5)	☐	☐	☐	☐	☐

NUTRPROT In a typical week, how often did you eat the following sources of protein:

	Not at all (1)	A little (2)	Some (3)	Quite a bit (4)	A lot (5)
Vegetarian protein (beans, soy, nuts, seeds) (1)	☐	☐	☐	☐	☐
Red meat (2)	☐	☐	☐	☐	☐
Fish or seafood (3)	☐	☐	☐	☐	☐
Chicken, turkey, or other lean meats (4)	☐	☐	☐	☐	☐
Eggs or dairy foods (yogurt, cheese) (5)	☐	☐	☐	☐	☐
Ham, bacon, hot dogs, lunch meat (6)	☐	☐	☐	☐	☐
Protein shakes / supplements (7)	☐	☐	☐	☐	☐

NUTRATTN In a typical week, how much attention did you pay to:

	Not at all (1)	A little (2)	Some (3)	Quite a bit (4)	A lot (5)
Making sure you ate healthy proteins and fats (1)	☐	☐	☐	☐	☐
The amount of sugar you ate (2)	☐	☐	☐	☐	☐
The amount of fatty or deep-fried foods you ate (3)	☐	☐	☐	☐	☐
Making sure you ate fruits and vegetables (4)	☐	☐	☐	☐	☐
The number of calories you consumed (5)	☐	☐	☐	☐	☐

EATDIS In the past 30 days, did you do any of the following to lose weight or to keep from gaining weight?

	No (1)	Yes (2)
Go without eating for 24 hours or more (also called fasting) (1)	☐	☐
Take any diet pills, powder, or liquids without a doctor's advice (do NOT count replacement products such as Slim Fast) (2)	☐	☐
Vomit or take laxatives (3)	☐	☐

FBINTR Please select the best answer for each of the following questions.

FBEXER Exercising in hot, humid conditions can dehydrate you in as little as:

- ☐ 30 minutes (1)
- ☐ 45 minutes (2)
- ☐ 1 hour (3)
- ☐ 2 hours (4)

FBSOD You should avoid drinks and snacks with sodium when you're trying to rehydrate.

- ☐ True (1)
- ☐ False (2)

FBDIET Have you ever seen a dietician or nutritionist for advice on eating habits?

- ☐ No (1)
- ☐ Yes (2)

FBFSCHED Do you typically use a schedule for drinking fluids during practice/competition?

- ☐ No (1)
- ☐ Yes (2)

FBESCHED Do you typically use a schedule for planning what you eat?

- ☐ No (1)
- ☐ Yes (2)

WGTPERC How do you describe your weight?

- ☐ Very underweight (1)
- ☐ Slightly underweight (2)
- ☐ About the right weight (3)
- ☐ Slightly overweight (4)
- ☐ Very overweight (5)

WTACT Which of the following are you trying to do about your weight?

- ☐ Lose weight (1)
- ☐ Gain weight (2)
- ☐ Stay the same weight (3)
- ☐ I am not trying to do anything about my weight (4)

SLPINTR The next set of questions asks about your general energy levels and sleep behaviors.

FATIGUE Select what best describes how you typically feel:

	Not at all (1)	A little (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
Energetic (1)	☐	☐	☐	☐	☐
Fatigued (2)	☐	☐	☐	☐	☐
Exhausted (3)	☐	☐	☐	☐	☐
Weary (4)	☐	☐	☐	☐	☐
Full of pep (5)	☐	☐	☐	☐	☐
Vigorous (6)	☐	☐	☐	☐	☐

SLPTIMEF In the past 30 days, how long did it usually take you to fall asleep?

- ☐ 0-15 min (1)
- ☐ 16-30 min (2)
- ☐ 31-45 min (3)
- ☐ 46-60 min (4)
- ☐ more than 1 hour (5)

SLPHRS In the past 30 days, how many hours did you typically sleep each night?

- ☐ 1 (1)
- ☐ 2 (2)
- ☐ 3 (3)
- ☐ 4 (4)
- ☐ 5 (5)
- ☐ 6 (6)
- ☐ 7 (7)
- ☐ 8 (8)
- ☐ 9 (9)
- ☐ 10 (10)
- ☐ 11 (11)
- ☐ 12 or more hours (12)

SLPAIDS In the past 30 days, what sleep aids have you used?

- ☐ I have not used sleep aids. (1)
- ☐ I have a prescription for a sleep medication (like Ambien, Lunesta, Prosom). (2)
- ☐ I have used someone else's sleep medication prescription. (3)
- ☐ I have used herbal teas or supplements (like melatonin) as a sleep aid. (4)
- ☐ I have used over-the-counter sleep aids. (5)

STRESS In the last month, how often have you felt:

	Never (1)	Almost Never (2)	Sometimes (3)	Fairly Often (4)	Very Often (5)
That you were unable to control the important things in your life? (1)	☐	☐	☐	☐	☐
Confident about your ability to handle your personal problems? (2)	☐	☐	☐	☐	☐
That things were going your way? (3)	☐	☐	☐	☐	☐
Difficulties were piling up so high that you could not overcome them? (4)	☐	☐	☐	☐	☐

BSIINTR Below is a list of problems people sometimes have. Please read each one carefully, and select the item that best describes how much that problem has distressed or bothered you during the PAST 7 DAYS including today. Select only one answer for each problem and do not skip any items. How much were you distressed by:

	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
Faintness or dizziness (1)	☐	☐	☐	☐	☐
Feeling no interest in things (2)	☐	☐	☐	☐	☐
Nervousness or shakiness inside (3)	☐	☐	☐	☐	☐
Pains in heart or chest (4)	☐	☐	☐	☐	☐
Feeling lonely (5)	☐	☐	☐	☐	☐
Feeling tense or keyed up (6)	☐	☐	☐	☐	☐
Nausea or upset stomach (7)	☐	☐	☐	☐	☐
Feeling blue (8)	☐	☐	☐	☐	☐
Suddenly scared for no reason (9)	☐	☐	☐	☐	☐
Trouble getting your breath (10)	☐	☐	☐	☐	☐
Feelings of worthlessness (11)	☐	☐	☐	☐	☐
Spells of terror or panic (12)	☐	☐	☐	☐	☐
Numbness or tingling in parts of your body (13)	☐	☐	☐	☐	☐
Feeling hopeless about the future (14)	☐	☐	☐	☐	☐

Feeling so restless you couldn't sit still (15)	☐	☐	☐	☐	☐
Feeling weak in parts of your body (16)	☐	☐	☐	☐	☐
Thoughts of ending your life (17)	☐	☐	☐	☐	☐
Feeling fearful (18)	☐	☐	☐	☐	☐

BPAGG Please rate each of the following statements in terms of how much they are like you.

I have trouble controlling my temper. (9)	☐	☐	☐	☐	☐	☐
At times I feel I have gotten a raw deal out of life. (10)	☐	☐	☐	☐	☐	☐
Other people always seem to get the breaks. (11)	☐	☐	☐	☐	☐	☐
I wonder why sometimes I feel so bitter about things. (12)	☐	☐	☐	☐	☐	☐

FTURLKL Think about your future: How likely do you think that you will do these things after graduation?

	Very unlikely (1)	Unlikely (2)	Not Sure (3)	Likely (4)	Very likely (5)
Become a professional athlete (1)	☐	☐	☐	☐	☐
Get a job in athletics, but not as an athlete (2)	☐	☐	☐	☐	☐
Get a job, but not in athletics (3)	☐	☐	☐	☐	☐
Go to graduate school (4)	☐	☐	☐	☐	☐

FTURCHC If you could do anything after graduation, what would be your first choice?

- ☐ Become a professional athlete (1)
- ☐ Get a job in athletics, but not as an athlete (2)
- ☐ Get a job, but not in athletics (3)
- ☐ Go to graduate school (4)

SEXINTR The following questions ask about sexual behaviors.

SEXEVER Have you ever had sex?

- ☐ No (1)
- ☐ Yes (2)

If No Is Selected, Then Skip To How often have you made a sexual deci...

SEXAGE How old were you when you had sex for the first time?

- ☐ 11 years old or younger (1)
- ☐ 12 years old (2)
- ☐ 13 years old (3)
- ☐ 14 years old (4)
- ☐ 15 years old (5)
- ☐ 16 years old (6)
- ☐ 17 years old or older (7)

SEXNUMB During your life, with how many people have you had sex?

- ☐ 1 person (1)
- ☐ 2 people (2)
- ☐ 3 people (3)
- ☐ 4 people (4)
- ☐ 5 people (5)
- ☐ 6 people or more (6)

SEXCOND The last time you had sex, did you or your partner use a condom?

- ☐ No (1)
- ☐ Yes (2)

SEXPREGP The last time you had sex, what one method did you or your partner use to prevent pregnancy? (Select only one response)

- ☐ No method was used to prevent pregnancy (1)
- ☐ Birth control pills (2)
- ☐ Condoms (3)
- ☐ An IUD (such as Mirena or ParaGuard) or implant (such as Implanon or Nexplanon) (4)
- ☐ A shot (such as Depo-Provera), patch (such as Ortho Evra), or birth control ring (such as NuvaRing) (5)
- ☐ Withdrawal or some other method (6)
- ☐ Not sure (7)

SEXREGA How often have you made a sexual decision when intoxicated that you have later regretted?

- ☐ Never (1)
- ☐ 1-2 times (2)
- ☐ 3-5 times (3)
- ☐ More than 5 times (4)

SEXREGNA How often have you made a sexual decision when NOT intoxicated that you have later regretted?

- ☐ Never (1)
- ☐ 1-2 times (2)
- ☐ 3-5 times (3)
- ☐ More than 5 times (4)

ALCINTR The following questions ask about drinking alcohol.

ALCEVER Have you ever drank alcohol in your life (more than a few sips)?

- ☐ No (1)
- ☐ Yes (2)

If No Is Selected, Then Skip To End of Block

ALCAGE How old were you when you had your first drink of alcohol?

- ☐ 8 years or younger (2)
- ☐ 9 or 10 years old (3)
- ☐ 11 or 12 years old (4)
- ☐ 13 or 14 years old (5)
- ☐ 15 or 16 years old (6)
- ☐ 17 years or older (7)

ALCDAYHS In an average month during your senior year of high school, how many days did you drink alcohol?

- ☐ 0 days (1)
- ☐ 1-2 days (2)
- ☐ 3-5 days (3)
- ☐ 6-9 days (4)
- ☐ 10-19 days (5)
- ☐ 20-29 days (6)
- ☐ all 30 days (7)

ALCINTR2 The next 4 questions ask about drinking alcohol in the past 30 days (month):

ALCPTDYS In the past 30 days, how many days did you have at least one drink of alcohol?

- ☐ 0 days (1)
- ☐ 1-2 days (2)
- ☐ 3-5 days (3)
- ☐ 6-9 days (4)
- ☐ 10-19 days (5)
- ☐ 20-29 days (6)
- ☐ All 30 days (7)

If 0 days Is Selected, Then Skip To How many times did the following thin...

Answer If Gender: Male Is Selected

ALCPTBM In the past 30 days, how many days did you have 5 or more drinks of alcohol within a couple of hours?

- ☐ 0 days (1)
- ☐ 1 day (2)
- ☐ 2 days (3)
- ☐ 3-5 days (4)
- ☐ 6-9 days (5)
- ☐ 10-19 days (6)
- ☐ 20 or more days (7)

Answer If Gender: Female Is Selected Or Gender: Intersex Is Selected

ALCPTBF In the past 30 days, how many days did you have 4 or more drinks of alcohol within a couple of hours?

- ☐ 0 days (1)
- ☐ 1 day (2)
- ☐ 2 days (3)
- ☐ 3-5 days (4)
- ☐ 6-9 days (5)
- ☐ 10-19 days (6)
- ☐ 20 or more days (7)

ALCPTPK In the past 30 days, what is the largest number of alcoholic drinks you had in a row, that is, on one occasion?

- ☐ 1-2 drinks (1)
- ☐ 3 drinks (2)
- ☐ 4 drinks (3)
- ☐ 5 drinks (4)
- ☐ 6-7 drinks (5)
- ☐ 8-9 drinks (6)
- ☐ 10-14 drinks (7)
- ☐ 15-19 drinks (8)
- ☐ 20 or more drinks (9)

ALCGET In the past 30 days, how did you usually get the alcohol you drank?

- ☐ I bought it in a store (such as a liquor store, convenience store, supermarket, discount store, or gas station) (1)
- ☐ I bought it at a restaurant, bar, or club (2)
- ☐ I bought it at a public event (such as a concert or sporting event) (3)
- ☐ I gave someone else money to buy it for me (4)
- ☐ Someone gave it to me (5)
- ☐ I took it from a store or family member (6)
- ☐ I got it some other way (7)

RAPI How many times did the following things happen to you while you were drinking alcohol or because of your alcohol use during the past year?

	0 times (1)	1-2 times (2)	3 or more times (3)
Not able to do your homework or study for a test (1)	☐	☐	☐
Had a fight or argument with friends, relatives, or strangers (2)	☐	☐	☐
Missed out on other things because you spent too much money on alcohol (3)	☐	☐	☐
Went to work, school, or practice drunk (4)	☐	☐	☐
Caused shame or embarrassment to someone (5)	☐	☐	☐
Neglected your responsibilities (6)	☐	☐	☐
Friends, neighbors, teammates, or relatives avoided you (7)	☐	☐	☐
Felt that you needed more than you used to in order to get the same effect (8)	☐	☐	☐
Tried to control your drinking by trying to use only at certain times of the day or in certain places, that is, tried to change your pattern of drinking (9)	☐	☐	☐
Had withdrawal symptoms, that is, felt sick because you stopped or cut down on drinking (10)	☐	☐	☐

Noticed a change in your personality (11)	☐	☐	☐
Felt that you had a problem with alcohol (12)	☐	☐	☐
Missed a day (or part of a day) of school, work, or training (13)	☐	☐	☐
Suddenly found yourself in a place that you could not remember getting to (14)	☐	☐	☐
Passed out or fainted suddenly (15)	☐	☐	☐
Kept drinking when you promised yourself not to (16)	☐	☐	☐
Felt physically or psychologically dependent (17)	☐	☐	☐
Was told by a friend, neighbor, teammate, or relative to stop or cut down on your drinking (18)	☐	☐	☐
Drove a car when you knew you had too much to drink to drive safely (19)	☐	☐	☐
Got into trouble for violating, School, Resident Hall, or Athletic Alcohol Policy (20)	☐	☐	☐
Was taken to the hospital (either by friend or EMS) after drinking too much alcohol (21)	☐	☐	☐

Got into trouble with law enforcement (22)	☐	☐	☐
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DRUGINTR The following questions ask about drug use behaviors.

DRGEVRI Have you EVER in your lifetime used the following drugs?

	No (1)	Yes (2)
Marijuana (1)	☐	☐
Cocaine (2)	☐	☐
Heroin (3)	☐	☐
Party drugs (such as ecstasy, molly) (4)	☐	☐
Diuretics or other banned weight loss substances (5)	☐	☐
Peptide / growth hormones (6)	☐	☐
Blood doping agents (7)	☐	☐
Anabolic steroids (8)	☐	☐
Nutritional supplements that contain banned substances (9)	☐	☐

DRGEVRRX Have you EVER in your lifetime used the following drugs? If YES, check all responses that apply.

	No (1)	Yes, as prescribed by a doctor. (2)	Yes, to treat symptoms other than as prescribed. (3)	Yes, for recreational purposes. (4)
Benzodiazapines (such as Xanax, Ativan, Klonopin) (1)	☐	☐	☐	☐
Opiates (such as Oxycontin, Vicodin, Percocet) (2)	☐	☐	☐	☐
Stimulants (such as Adderall, Ritalin, Concerta, Vyvanse or other similar ADHD medications) (3)	☐	☐	☐	☐

DRGAGE How old were you the first time you tried a drug other than alcohol for recreational purposes?

- ☐ Never (1)
- ☐ 8 years old or younger (2)
- ☐ 9-10 years old (3)
- ☐ 11-12 years old (4)
- ☐ 13-14 years old (5)
- ☐ 15-16 years old (6)
- ☐ 17 years old or older (7)

DRGNRMRU What percent of RUTGERS ATHLETES do you think uses the following at least once a year? For each substance, choose a number from 0 to 100.

	% (1)
Alcohol (1)	
Performance enhancing substances (2)	
Marijuana (3)	
Benzodiazapines (such as Xanax, Ativan, Klonopin) (4)	
Opiates (such as Oxycontin, Vicodin, Percocet) (5)	
Stimulants (such as Adderall, Ritalin, Concerta, Vyvanse or other similar ADHD medications) (6)	

DRGNRMPA What percent of PROFESSIONAL ATHLETES do you think uses the following at least once a year? For each substance, choose a number from 0 to 100.

	% (1)
Alcohol (1)	
Performance enhancing substances (2)	
Marijuana (3)	
Benzodiazapines (such as Xanax, Ativan, Klonopin) (4)	
Opiates (such as Oxycontin, Vicodin, Percocet) (5)	
Stimulants (such as Adderall, Ritalin, Concerta, Vyvanse or other similar ADHD medications) (6)	

ALCBLFS What effect do you think ALCOHOL has on an athlete's:

	Very negative (1)	Slightly Negative (2)	None (3)	Slightly Positive (4)	Very Positive (5)
Athletic performance (1)	☐	☐	☐	☐	☐
Academic performance (2)	☐	☐	☐	☐	☐
Weight or appearance (3)	☐	☐	☐	☐	☐
Social life (4)	☐	☐	☐	☐	☐
Health (5)	☐	☐	☐	☐	☐

PESBLFS What effect do you think PERFORMANCE ENHANCING
SUBSTANCES have on an athlete's:

	Very negative (1)	Slightly Negative (2)	None (3)	Slightly Positive (4)	Very Positive (5)
Athletic performance (1)	☐	☐	☐	☐	☐
Academic performance (2)	☐	☐	☐	☐	☐
Weight or appearance (3)	☐	☐	☐	☐	☐
Social life (4)	☐	☐	☐	☐	☐
Health (5)	☐	☐	☐	☐	☐

MJBLFS What effect do you think MARIJUANA has on an athlete's:

	Very negative (1)	Slightly Negative (2)	None (3)	Slightly Positive (4)	Very Positive (5)
Athletic performance (1)	☐	☐	☐	☐	☐
Academic performance (2)	☐	☐	☐	☐	☐
Weight or appearance (3)	☐	☐	☐	☐	☐
Social life (4)	☐	☐	☐	☐	☐
Health (5)	☐	☐	☐	☐	☐

DRGGET If you wanted to, how difficult would it be to get the following within 24 hours?

	Impossible (1)	Very Difficult (2)	Fairly Difficult (3)	Fairly Easy (4)	Very Easy (5)
Alcohol (1)	☐	☐	☐	☐	☐
Marijuana (2)	☐	☐	☐	☐	☐
Cocaine (3)	☐	☐	☐	☐	☐
Heroin (4)	☐	☐	☐	☐	☐
Performance enhancing substances (5)	☐	☐	☐	☐	☐
Benzodiazapines (such as Xanax, Ativan, Klonopin) (6)	☐	☐	☐	☐	☐
Opiates (such as Oxycontin, Vicodin, Percocet) (7)	☐	☐	☐	☐	☐
Stimulants (such as Adderall, Ritalin, Concerta, Vyvanse or other similar ADHD medications) (8)	☐	☐	☐	☐	☐

DRGEASE How easy do you think it is to use the following without getting caught?

	Impossible (1)	Very Difficult (2)	Fairly Difficult (3)	Fairly Easy (4)	Very Easy (5)
Alcohol (1)	☐	☐	☐	☐	☐
Marijuana (2)	☐	☐	☐	☐	☐
Cocaine (3)	☐	☐	☐	☐	☐
Heroin (4)	☐	☐	☐	☐	☐
Performance enhancing substances (5)	☐	☐	☐	☐	☐
Benzodiazapines (such as Xanax, Ativan, Klonopin) (6)	☐	☐	☐	☐	☐
Opiates (such as Oxycontin, Vicodin, Percocet) (7)	☐	☐	☐	☐	☐
Stimulants (such as Adderall, Ritalin, Concerta, Vyvanse or other similar ADHD medications) (8)	☐	☐	☐	☐	☐

MENTSKLS Rate yourself ---with brutal honesty--- on all the mental skills listed below, using the scale provided. Use your ratings to improve your game.

	Totally unsatisfactorily (1)	Poor job (2)	All right, but could be better (3)	Good job (4)	Totally locked in (5)
1. I keep my sport effectively balanced with other important parts of my life. (1)	☐	☐	☐	☐	☐
2. I am honest with myself about my strong points and limitations; don't kid myself. (2)	☐	☐	☐	☐	☐
3. I set goals for my development as an athlete and I pursue them with enthusiasm. (3)	☐	☐	☐	☐	☐
4. I have a routine which prepares me to compete and I follow through with it. (4)	☐	☐	☐	☐	☐
5. I believe that I will execute and get the job done, between the lines. (5)	☐	☐	☐	☐	☐

6. I compete with effective energy and effort during competition. (6)	☐	☐	☐	☐	☐
7. I focus on the play at hand and do not get distracted or ahead of myself. (7)	☐	☐	☐	☐	☐
8. I remain poised and under emotional control, especially during pressure situations. (8)	☐	☐	☐	☐	☐
9. I interact productively with teammates and coaches. (9)	☐	☐	☐	☐	☐
10. I remain on an even personal keel, no matter how I perform. (10)	☐	☐	☐	☐	☐
11. I take responsibility for my results and use them to make adjustments. (11)	☐	☐	☐	☐	☐

12. I work hard and smart at getting better at my sport and at my life. (12)	☐	☐	☐	☐	☐
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MSSTRNG Which two skills above are your strongest? (list the numbers)

MSIMPRV Which two skills do you need to improve most? (list the numbers)

SESINTR The following questions are asking about your experiences WHEN YOU WERE GROWING UP.

SESFAM How would you best describe your family's economic situation?

- ☐ We had barely enough to get by. (1)
- ☐ We had enough to get by - but no more. (2)
- ☐ We were solidly middle class. (3)
- ☐ We had plenty of extras. (4)
- ☐ We had plenty of luxuries. (5)

SESSOCCL How would you categorize your family's social class?

- ☐ Poor (1)
- ☐ Working class / lower-middle class (2)
- ☐ Middle class (3)
- ☐ Upper-middle class (4)
- ☐ Upper class (5)

SESFREE Were you ever part of a free / reduced lunch program in school?

- ☐ No (1)
- ☐ Yes (2)

SESWRRYU Did you ever worry about a parent being unemployed?

- ☐ No (1)
- ☐ Yes (2)

SESWRRYM Did you ever worry about your family having enough money?

- ☐ No (1)
- ☐ Yes (2)

SCHLSHP Do you have a scholarship?

- ☐ No (1)
- ☐ Yes, I have a partial scholarship. (2)
- ☐ Yes, I have a full scholarship. (3)

If No Is Selected, Then Skip To What best describes your family's cur...

SCHLSPTP What type of scholarship do you have? (check all that apply)

- ☐ I have an athletic scholarship. (1)
- ☐ I have an academic scholarship. (2)

FAMFINSP What best describes your family's current financial support for you?

- ☐ They do not give me any financial support. (1)
- ☐ They help me when I really need it. (2)
- ☐ They give me whatever they can. (3)
- ☐ They pay for everything I need. (4)
- ☐ I am financially independent. (5)

SCHLSIZE How big was the high school you graduated from?

- ☐ I was home schooled (1)
- ☐ Less than 100 students total (2)
- ☐ 101-500 students (3)
- ☐ 500-1,000 students (4)
- ☐ More than 1,000 students (5)

SCHLTYPE Was your high school: (select all that apply)

- ☐ A public school (1)
- ☐ A private school (2)
- ☐ A religious-based school (3)
- ☐ A charter school (4)
- ☐ I was home schooled (5)

SCHLRPT Did you ever repeat a grade?

- ☐ No (1)
- ☐ Yes (2)

SCHLTUTR Were you tutored for help with class work during high school?

- ☐ No (1)
- ☐ Yes, the school provided me with a tutor. (2)
- ☐ Yes, my family paid for a private tutor. (3)

SCHLSPEC Have you ever received any special education or early intervention services?

- ☐ No (1)
- ☐ Yes (2)

SCHLTEAC Did you have a high school teacher that you could go to for advice or who was a particularly strong influence?

- ☐ No (1)
- ☐ Yes (2)

SCHLSIB Did you have a sibling in high school at the same time as you?

- ☐ No (1)
- ☐ Yes (2)

SCHLLD Have you ever been diagnosed with a learning disability or other learning disorder?

- ☐ No (1)
- ☐ Yes (2)

SCHLMOM What is the highest level of education completed by your mother?

- ☐ Some high school (1)
- ☐ High school degree or GED (2)
- ☐ Associate degree (3)
- ☐ Bachelor's degree (4)
- ☐ Graduate degree (5)

SCHLDAD What is the highest level of education completed by your father?

- ☐ Some high school (1)
- ☐ High school degree or GED (2)
- ☐ Associate degree (3)
- ☐ Bachelor's degree (4)
- ☐ Graduate degree (5)

SCHLAP Did you take any advanced placement (AP) classes during high school?

- ☐ No (1)
- ☐ Yes (2)

DEMTEAM What team do you play for?

- ☐ Baseball (1)
- ☐ Basketball (2)
- ☐ Cheerleading & Dance (3)
- ☐ Cross Country (4)
- ☐ Field Hockey (5)
- ☐ Football (6)
- ☐ Golf (7)
- ☐ Gymnastics (8)
- ☐ Lacrosse (9)
- ☐ Rowing (10)
- ☐ Soccer (11)
- ☐ Softball (12)
- ☐ Swimming & Diving (13)
- ☐ Track & Field (14)
- ☐ Tennis (15)
- ☐ Wrestling (16)
- ☐ Volleyball (17)

DEMPOS What position do you play OR activity do you specialize in?

DEMD1YRS How many years have you played in Division I athletics:

- ☐ 0, This will be my first year. (1)
- ☐ 1 (2)
- ☐ 2 (3)
- ☐ 3 (4)
- ☐ 4 (5)
- ☐ 5 (6)

DEMYRSCH How many years have you been in college?

- ☐ Incoming student (1)
- ☐ Less than 1 (2)
- ☐ 1 (3)
- ☐ 2 (4)
- ☐ 3 (5)
- ☐ 4 (6)
- ☐ 5 (7)
- ☐ 6 or more (8)

DEMTRANS Did you transfer to Rutgers?

- ☐ No, I am beginning college at Rutgers. (1)
- ☐ Yes, I transferred from another college. (2)

Q6 Where do you currently live?

- ☐ Residence Hall - Athlete roommates (1)
- ☐ Residence Hall - Non-athlete roommates (2)
- ☐ Off-campus apartment/house - Athlete roommates (3)
- ☐ Off-campus apartment/house - Non-athlete roommates (4)
- ☐ At home or with family (5)
- ☐ Other (6) _____

Appendix E

The Short-Form Buss-Perry Aggression Questionnaire (BPAQ-SF)

Please rate each of the following items in terms of how characteristic they are of you.

Use the following scale for answering these items.

1	2	3	4	5	6
extremely uncharacteristic of me					extremely characteristic of me

1. Given enough provocation, I may hit another person.
2. There are people who pushed me so far that we came to blows.
3. I have threatened people I know.
4. I often find myself disagreeing with people.
5. I can't help getting into arguments when people disagree with me.
6. My friends say that I'm somewhat argumentative.
7. I flare up quickly but get over it quickly.
8. Sometimes I fly off the handle for no good reason.
9. I have trouble controlling my temper.
10. At times I feel I have gotten a raw deal out of life.
11. Other people always seem to get the breaks.
12. I wonder why sometimes I feel so bitter about things.

Subscales

- 1-3 Physical Aggression
- 4-6 Verbal Aggression
- 7-9 Anger
- 10-12 Hostility

Bryant, F. B., & Smith, B. D. (2001). Refining the Architecture of Aggression: A Measurement Model for the Buss–Perry Aggression Questionnaire. *Journal of Research in Personality*, 35(2), 138-167. doi: 10.1006/jrpe.2000.2302

Appendix F

Coding Scheme			
Variable Name	Question	Survey Choices	Coding
Alcohol Measures			
AGE	Calculated from Sports Medicine Records	Range (18 to 23)	
DD (Days Drinking)	In the past 30 days, how many days did you have at least one drink of alcohol?	0 days	0
		1-2 days	1.5
		3-5 days	4
		6-9 days	7.5
		10-19 days	14.5
		20-29 days	24.5
		all 30 days	30
DBD (Days Binge-Drinking)	(FEMALES) In the past 30 days, how many days did you have 4 or more drinks of alcohol within a couple of hours? (MALES) In the past 30 days, how many days did you have 5 or more drinks of alcohol within a couple of hours?	0 days	0
		1 day	1
		2 days	2
		3-5 days	4
		6-9 days	7.5
		10-19 days	14.5
		20 or more days	25
Aggression Questionnaire: Please rate each of the following / statements in terms of how much they are like you.			
Q1	Given enough provocation, I may hit another person.	Extremely UNLIKE Me (1)	1
		2	2
		3	3
		4	4
		5	5
		Extremely LIKE Me (6)	6
Q2	There are people who pushed me so far that we came to blows.	Extremely UNLIKE Me (1)	1
		2	2
		3	3
		4	4
		5	5
		Extremely LIKE Me (6)	6
Q3	I have threatened people I know.	Extremely UNLIKE Me (1)	1
		2	2
		3	3
		4	4
		5	5
		Extremely LIKE Me (6)	6
AGGPHYS	Physical Aggression Subscale (Sum of Questions 1 - 3)	Extremely UNLIKE Me (3)	3
		6	6
		9	9
		12	12
		15	15
		Extremely LIKE Me (18)	18
Q4	I often find myself disagreeing with people.	Extremely UNLIKE Me (1)	1
		2	2
		3	3
		4	4
		5	5
		Extremely LIKE Me (6)	6
Q5	I can't help getting into arguments when people disagree with me.	Extremely UNLIKE Me (1)	1
		2	2
		3	3
		4	4
		5	5
		Extremely LIKE Me (6)	6
Q6	My friends say that I'm somewhat argumentative.	Extremely UNLIKE Me (1)	1
		2	2
		3	3
		4	4
		5	5
		Extremely LIKE Me (6)	6
AGGVERB	Verbal Aggression Subscale (Sum of Questions 4 - 6)	Extremely UNLIKE Me (3)	3
		6	6
		9	9
		12	12
		15	15
		Extremely LIKE Me (18)	18

Coding Scheme			
Variable Name	Question	Survey Choices	Coding
Demographic Variables			
ETHNIC	Ethnicity	Hispanic/Latino/Latina	1
		Not Hispanic/Latino/Latina	2
RACE	Race	American Indian/Alaskan Native	1
		Asian	2
		Black/African American	3
		Native Hawaiian/Other Pacific Islander	4
		White	5
		More than one race	6
		Other/Unkown	7
RACER	Race Recoded	White	1
		Black/African American	2
		Other	3
SCYR	School Year	Freshman 2014	1
		Juniors 2015	2
SEX	Gender	Male	1
		Female	2
SESSOCCL	How would you categorize your family's social class?	Poor	1
		Working/Lower-Middle	2
		Middle	3
		Upper-Middle	4
		Upper	5
SESSOCCLR	How would you categorize your family's social class? (Recoded)	Below Middle-Class	1
		Middle-Class	2
		Above Middle-Class	3

Appendix G

Exploratory Factor Analysis (SPSS Output)

Factor Analysis

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.860
Bartlett's Test of Sphericity	Approx. Chi-Square
	1540.687
	df
	66
	Sig.
	.000

Pattern Matrix^a

	Factor		
	1	2	3
BPAGG6	.911		
BPAGG5	.778		
BPAGG4	.729		
BPAGG7	.447		
BPAGG2		.894	
BPAGG1		.820	
BPAGG3		.643	
BPAGG8		.334	
BPAGG11			.876
BPAGG10			.773
BPAGG12			.584
BPAGG9		.295	.301

Extraction Method: Principal Axis Factoring.

Rotation Method: Oblimin with Kaiser Normalization.^a

a. Rotation converged in 6 iterations.

Appendix H

Latent Profile Models (Mean Scores)

2 PROFILE MODEL	3 PROFILE MODEL	4 PROFILE MODEL	5 PROFILE MODEL	6 PROFILE MODEL
Group 1 (N=258)	Group 1 (N=238)	Group 1 (N=219)	Group 1 (N=202)	Group 1 (N=160)
Aggression	Aggression	Aggression	Aggression	Aggression
PA 4.96	PA 4.48	PA 4.67	PA 4.49	PA 4.44
VA 5.64	VA 5.25	VA 5.44	VA 5.28	VA 5.24
Drinking	Drinking	Drinking	Drinking	Drinking
DD 2.77	DD 2.70	DD 2.24	DD 1.84	DD 1.12
DBD 1.47	DBD 1.37	DBD 0.77	DBD 0.79	DBD 0.56
Group 2 (N=18)	Group 2 (N=15)	Group 2 (N=42)	Group 2 (N=51)	Group 2 (N=60)
Aggression	Aggression	Aggression	Aggression	Aggression
PA 8.81	PA 9.25	PA 6.62	PA 5.56	PA 5.01
VA 8.68	VA 7.45	VA 6.70	VA 6.45	VA 5.74
Drinking	Drinking	Drinking	Drinking	Drinking
DD 13.77	DD 14.81	DD 6.13	DD 6.21	DD 3.99
DBD 8.01	DBD 8.17	DBD 3.90	DBD 3.68	DBD 2.00
	Group 3 (N=23)	Group 3 (N=10)	Group 3 (N=11)	Group 3 (N=31)
	Aggression	Aggression	Aggression	Aggression
	PA 10.26	PA 7.69	PA 8.29	PA 5.39
	VA 10.98	VA 8.09	VA 6.91	VA 6.39
	Drinking	Drinking	Drinking	Drinking
	DD 4.13	DD 10.99	DD 14.50	DD 7.50
	DBD 3.06	DBD 7.50	DBD 5.23	DBD 3.69
		Group 4 (N=5)	Group 4 (N=7)	Group 4 (N=7)
		Aggression	Aggression	Aggression
		PA 9.93	PA 14.41	PA 14.51
		VA 10.08	VA 11.70	VA 11.78
		Drinking	Drinking	Drinking
		DD 17.00	DD 2.35	DD 2.32
		DBD 14.50	DBD 2.27	DBD 2.25
			Group 5 (N=5)	Group 5 (N=13)
			Aggression	Aggression
			PA 9.71	PA 8.28
			VA 10.37	VA 6.91
			Drinking	Drinking
			DD 17.00	DD 14.50
			DBD 14.50	DBD 5.23
				Group 6 (N=5)
				Aggression
				PA 9.69
				VA 10.39
				Drinking
				DD 17.00
				DBD 14.50

Appendix I

Variable Means by Gender and School-Year

Mean Differences for Aggression and Alcohol Variables (by Gender)

	TOTAL		Males		Females	
	Mean	SD	Mean	SD	Mean	SD
Aggression						
Physical (PA)--(range 3-18)	5.23	2.95	6.28***	3.27	4.14***	2.11
Verbal (VA)--(range 3-18)	5.85	2.85	6.60***	3.30	5.07***	2.03
Alcohol Use						
Days Drinking (DD)--Past 30-Days	3.56	3.79	4.04	4.14	3.06	3.33
Days Binge Drinking (DBD)--Past 30-Days	2.01	2.62	2.40	3.06	1.59	1.99

* $p < .05$

** $p < .01$

*** $p < .001$

Mean differences for Aggression and Alcohol Variables (by School-Year)

	TOTAL		First-Years		Second-Years	
	Mean	SD	Mean	SD	Mean	SD
Aggression						
Physical (PA)--(range 3-18)	5.23	2.95	4.69***	2.53	6.44***	3.45
Verbal (VA)--(range 3-18)	5.85	2.85	5.42***	2.87	6.79***	2.59
Alcohol Use						
Days Drinking (DD)--Past 30-Days	3.56	3.79	3.11	3.11	4.39	4.71
Days Binge Drinking (DBD)--Past 30-Days	2.01	2.62	1.48***	1.88	3.00***	3.40

* $p < .05$

** $p < .01$

*** $p < .001$

Appendix J

Power Analyses

Power Analysis **Fisher's Exact Test - Gender**

Variable	Pair	Group Sizes	Power (1- β error probability)
Gender	Group 1 vs. Group 4	160/7	0.63
Gender	Group 1 vs. Group 5	160/13	0.89
Gender	Group 1 vs. Group 6	160/5	0.32
Gender	Group 2 vs. Group 4	60/7	0.49
Gender	Group 2 vs. Group 5	60/13	0.75
Gender	Group 2 vs. Group 6	60/5	0.25
Gender	Group 3 vs. Group 4	31/7	0.22
Gender	Group 3 vs. Group 5	31/13	0.41
Gender	Group 3 vs. Group 6	31/5	0.06

Power Analysis **Fisher's Exact Test -School-Year**

Variable	Pair	Group Sizes	Power (1- β error probability)
School-Year	Group 1 vs. Group 2	160/60	0.82
School-Year	Group 1 vs. Group 4	160/7	0.46
School-Year	Group 1 vs. Group 5	160/13	0.25
School-Year	Group 1 vs. Group 6	160/5	0.75
School-Year	Group 2 vs. Group 4	60/7	0.10
School-Year	Group 2 vs. Group 6	60/5	0.27
School-Year	Group 3 vs. Group 4	31/7	0.24
School-Year	Group 3 vs. Group 5	31/13	0.16
School-Year	Group 3 vs. Group 6	31/5	0.57
School-Year	Group 4 vs. Group 6	7/5	0.04
School-Year	Group 5 vs. Group 6	13/5	0.16