

Athletic Participation and Heavy Episodic Drinking among Canadian Undergraduates

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Abstract

While physical activity generally promotes health and well-being (WHO, 2010), competitive athletes at the varsity level have been shown to engage in heavy episodic drinking more frequently than non-athletes (defined as 4 or more drinks for women, or 5 drinks or more for men, on one occasion; Leichliter, Meilman, Presley, & Cashin, 1998). This study examined relations between heavy episodic drinking and athletic participation in the context of individual personality (i.e. sensation seeking, impulsivity, anxiety sensitivity, and hopelessness) and motivational variables (i.e. enhancement, coping-depression, coping-anxiety, conformity, and social). Athletic participation was measured according to level of competition (varsity or intramural), type of sport (team or individual), and general physical activity level. Cross-sectional data from 137 undergraduate student participants was analyzed. Hierarchical regression revealed that varsity and intramural status predicted heavy episodic drinking frequency even after controlling for personality and motives for alcohol use. While physical activity was not associated with heavy episodic drinking frequency, vigorous minutes per week significantly predicted average number of drinks typically consumed, and also explained a significant portion of the variance. For every 100 minutes of vigorous physical activity per week, half an alcohol beverage was typically consumed. The results of this study may assist future strategies aimed to enhance student health, particularly for those student-athletes at risk of engaging in heavy episodic drinking.

Keywords: athletics, heavy episodic drinking, personality, drinking motives

Athletic Participation and Heavy Episodic Drinking among Canadian Undergraduates

Heavy episodic drinking, defined as the consumption of 4 or more drinks for females, or 5 or more drinks for males, on one occasion, has become increasingly studied among undergraduates and is recognized as a major public health concern (Ham & Hope, 2003; Jackson, Sher, & Park, 2005; Wechsler, Lee, Hall, Wagenaar, & Lee, 2002). While alcohol consumption is common to all ages, youth 18 to 24 exhibit the greatest prevalence of alcohol use, the highest rates of heavy episodic drinking, and the most alcohol-related disorders compared to any other age group (Dawson, Grant, Stinson, & Chou, 2004; Grant et al., 2004). According to the 2004 Canadian Campus Survey reported by the Centre for Addiction and Mental Health, over 84% of students attending university or college in Ontario reported having used alcohol at least once in the past year (Adlaf, Demers, & Gliksman, 2005). Of these students, 19% reported heavy episodic drinking and nearly half (45.1%) reported harmful consequences due to their alcohol consumption. Other studies report even greater rates of heavy episodic drinking among undergraduates, ranging from 40% to two-thirds of students (Ham & Hope, 2003; Jackson et al., 2005; Mushquash et al., 2011).

Some research has focused on the rates of heavy episodic drinking among varsity or collegiate athletes. While physical activity generally promotes health and well-being (WHO, 2010), competitive athletes at the varsity or collegiate levels have been shown to engage in heavy episodic drinking more frequently than non-athletes (Ford, 2007; Leichliter et al., 1998; Lisha & Sussman, 2010; Martens, Dams-O'Connor, & Beck, 2006a; Nelson & Wechsler, 2001; Wechsler, Davenport, Dowdall, Grossman, & Zanakos, 1997). A two-year study of over 51,000 students from 125 American institutions examined heavy episodic drinking, alcohol use, and related consequences among students with various levels of athletic participation (Leichliter et

al., 1998). They found that both male and female athletes engaged in heavy episodic drinking more often, consumed significantly more alcohol per week, and suffered more negative consequences compared to non-athletes (Leichliter et al., 1998). The few studies that failed to find this relationship generally possessed limitations, including small sample sizes, disparate population groups (such as adolescent rather than undergraduate athletes), measures of athletic involvement that were confounded by general physical activity, and outcomes based solely on alcohol use rather than heavy episodic drinking (Anderson, Albrecht, McKeag, Hough, & McGrew, 1991; Elder, Leaver-Dunn, Wang, Nagy, & Green, 2000; Kokotailo, Henry, Koscki, Fleming, & Landry, 1996; Lisha & Sussman, 2010; Overman & Terry, 1991; Thorlindsson & Bemburg, 2006).

Engaging in heavy episodic drinking behaviour often entails various negative consequences to self, including academic difficulties, relationship problems, unprotected sex, blackouts, impaired driving, legal repercussions, suicide, or death (Martens, Cox, Beck, & Heppner, 2003b; Nelson & Wechsler, 2001; Perkins, 2002). With respect to academic performance, Wechsler et al. (1998) found that males and females involved in heavy episodic drinking once or twice per two-week period were three times more likely to report getting behind in schoolwork compared to moderate drinkers. Of particular relevance to athletic performance is the pronounced incidence of injury among athletes who engage in heavy episodic drinking. The incidence of injury among athletes who drink alcohol at least once per week is estimated to be 54.8%, compared to 23.5% among non-drinking athletes (O'Brien & Lyons, 2000).

Furthermore, the consumption of alcohol 24 hours prior to athletic participation can reduce aerobic performance by up to 11.4% (O'Brien, 1993). Even small quantities of alcohol that would not result in a "hangover" can be detrimental to aerobic performance (O'Brien, 1993).

While anaerobic performance seems to be unaffected by a hangover, visual-motor impairments have been found in aviation pilots as a result of hangover (Gibbons, 1988; Yesavage & Leirer, 1986).

The long-term consequences of heavy episodic drinking are also serious. These three to five years of undergraduate education are typically very formative as many of the lifestyle habits developed during this time are retained indefinitely (Bell & Lee, 2005, 2006; Williams, Holmbeck, & Greenley, 2002). Heavy episodic drinkers are predisposed to other alcohol use disorders. Youth who engage in heavy episodic drinking are at 19 times greater odds of developing alcohol dependence and are at 13 times greater odds of future alcohol abuse (Knight et al., 2002). Heavy episodic drinking is also associated with increased risk for various other health-related disorders, including hepatitis C, coronary heart disease, osteoporosis, and Alzheimer's disease (NIAAA, 2001). A meta-analysis of over 200 cancer studies found that alcohol use was most strongly associated with an increased risk for cancer of the digestive and reproductive systems (Bagnardi, Blangiardo, La Vecchia, & Corrao, 2001). Furthermore, the consequences of heavy episodic drinking extend beyond the individual-level and include consequences to peers (i.e., sleep disruption, property damage, violence), academic institutions (i.e., legal fees, lower perception of academic rigour, student attrition), and communities (i.e., noise, vandalism; Perkins, 2002; Wechsler et al., 2002; Wechsler, Moeykens, Davenport, Castillo, & Hansen, 1995). The prevalence of heavy episodic drinking, especially among athletes, and the impact of heavy episodic drinking on the athletes and others clearly demonstrate that the study of heavy episodic drinking in this population is both necessary and warranted.

It is important to identify factors placing undergraduates at increased risk for heavy episodic drinking in order to develop effective intervention strategies. Overall, the greatest rates

of heavy episodic drinking have been found among Caucasians, 78% of whom are considered binge drinkers, while the lowest rates have been found among African Americans (Naimi et al., 2003). Low rates of heavy episodic drinking have also been observed among Asians, attributable to the unpleasant “flushing” response Asian drinkers may experience in response to alcohol (Cranford, McCabe, & Boyd, 2006). Many additional factors specific to athletes have been investigated.

Demographics

The literature has consistently shown male athletes to engage in heavy episodic drinking more frequently than female athletes (Brenner & Swanik, 2007; Nelson & Wechsler, 2001; Wechsler et al., 1997). For example, Ford (2007) found that male athletes (54%) were significantly more likely to report heavy episodic drinking than were female athletes (39%). Buscemi, Martens, Murphy, Yurasek, and Smith (2011) found a positive relation between physical activity and alcohol use for men who were of fraternity/sorority status, but not for females and non-fraternity/sorority status athletes.¹ (While this housing system is less common in Canada, athletes who identify themselves with a fraternity/sorority are at significantly greater risk for heavy episodic drinking compared to those athletes who do not, regardless of sex; Wechsler et al., 1997). In general, being female has been associated with fewer instances of heavy episodic drinking (Martha, Grelot, & Peretti-Watel, 2009). Proposed explanations include sex differences in gastric alcohol metabolism (20% greater in men), and differences in stress-coping tendencies (externalization in men and internalization in women; Wechsler, Dowdall, Davenport, & Rimm, 1995; Cooper, Russell, Skinner, Frone, & Mudar, 1992).

Team versus Individual Sport

Athletes involved in team-sports demonstrate the highest rates of heavy episodic drinking, whereas those involved in individual-sports demonstrate the lowest (Ford, 2007; Green, Uryasz, Petr, & Bray, 2001; Martha et al., 2009). Brenner and Swanik (2007) surveyed 720 athletes from a range of National Collegiate Athletic Association Division I, II, and III institutions. Among team-sport athletes, 84% were classified as “high-risk” drinkers, and 16% as “low-risk” drinkers or “abstainers.” In comparison, 57.2% of individual-sport athletes were classified as “high-risk” drinkers, and 42.8% as “low-risk” drinkers or “abstainers.” Using data from the 1999 Harvard School of Public Health College Alcohol Study ($N = 2,316$), Ford (2007) investigated rates of heavy episodic drinking among specific teams, finding that male hockey (75.4%), men’s baseball (64.6%), and female soccer players (46.9%) were the most likely to report binge drinking, while cross-country/track athletes reported the lowest levels (40.9% male, 26.6% female).

Level of Athletic Involvement

Athletes who demonstrate greater investment in their sport have been found to engage in heavy episodic drinking more often (Martens et al., 2006a). Team leaders have been found to engage in heavy episodic drinking more often than team members, and experience more alcohol-related harms (Leichliter et al., 1998). Rates of heavy episodic drinking among undergraduates also increase according to past history of athletic involvement: 31.7% among those who have never having participated in athletics, 49.1% of those who have participated in high school athletics only, and among 53.0% of college athletes (Hilderbrand, Johnson, & Bogle, 2001). Even university students involved in organized recreational sport appear to be at a greater risk of heavy episodic drinking compared to non-athletes (Ward, & Gryczynski, 2007). However, risk of heavy episodic drinking does not increase linearly with athletic involvement in general.

Hazardous drinking has been observed at highest rates among elite-provincial athletes (such as collegiate athletes), followed by social or club athletes, and finally elite-international athletes (O'Brien, Ali, Cotter, O'Shea, & Stannard, 2007).

Time of Season

Athletes in their non-competitive season engage in heavy episodic drinking more frequently than those in their traditional competitive season (Bower & Martin, 1999; Brenner & Swanik, 2007; Green et al., 2001; Martin, 1998; Selby, Weinstein, & Bird, 1990). Over half (56%) of college athletes report heavy episodic drinking out of competitive season, whereas 35% report heavy episodic drinking during their competitive season (Martin, 1998). However, since most of these studies are based on single-occasion self-report data, these results should be taken with caution.

Individual Expectations and Responsivity to Alcohol

An individual who expects positive outcomes as a result of their alcohol use is more likely to engage in heavy episodic drinking than those who expect negative outcomes (Blume, Schmaling, & Marlatt, 2003; Cooper et al., 1992). These expectations may form vicariously, as a result of growing up in a household where alcohol use was common, for example. They can also result from personal experience. For instance, individual responsivity to alcohol, or how an individual responds to changes in BAC (blood alcohol concentration), has been shown to influence alcohol expectancies. Individuals who show a biphasic response, that is, enhanced subjective euphoria and a lack of negative effects during the rising of BAC, and decreased sensitivity to the sedative-like effects during the descent of BAC, are at greatest risk for alcohol-related problems (Holdstock, King, & de Wit, 2000). Other risk factors have been examined such as individual tolerance and perceived drunkenness (Courtney & Polich, 2009).

Proposed Explanations of the Athlete-Heavy Episodic Drinking Relationship

Social Norms

Drinking is often considered a social phenomenon (Brenner & Swanik, 2007). Drinking with others has been found to entail enhanced euphoria and greater alcohol consumption than drinking alone (Courtney & Polich, 2009). In fact, peer attitudes and behaviours towards alcohol use have been found to significantly predict an individual's pattern of use (Perkins, 2002). Moreover, undergraduates tend to overestimate the frequency and volume of alcohol consumption among their peers (Martens, Dams-O'Connor, Duffy-Paiement, & Gibson, 2006b). Peer influence is especially relevant among varsity athletes, whose social group consists mainly of their teammates (Nelson & Wechsler, 2001; Yusko, Buckman, White, & Pandina, 2008). For instance, Turrisi, Mastroleo, Mallett, Larimer, & Kilmer (2007) found that athletes perceive more peer drinking, greater peer approval of drinking, enhanced alcohol availability, and experience more direct drink offers, all of which were related to higher rates of heavy drinking. Athletes are more likely to drink for social reasons than non-athletes, with male athletes endorsing this motivation most often (Wilson, Pritchard, & Shaffer, 2004).

Social Norm Theory postulates that drinking serves as a vehicle through which peer affiliation and approval is sought (Martha et al., 2009; Perkins, 2002). As evidence of this, members within groups exhibiting greater cohesiveness or group-identification have been found to more readily adopt group norms, and an association between perceived athletic identity and alcohol consumption has been observed (Grossbard, Geisner, Mastroleo, Kilmer, & Turrisi, 2009; Perkins, 2002; Rockafellow & Saules, 2006). Moreover, it has been noted that the social norms at play amidst the athletic environment are unique, and perhaps more intense, compared to those in other groups or teams (Martens et al., 2006a; Lechlitter et al. 1998). One study

compared the benefits and risks of high-school participation in various types of activities: pro-social, team sport, school involvement, performing arts, and academic club (Eccles & Barber, 1999). They found that participation in team sports, although related to positive educational trajectories, was linked to high rates of alcohol consumption. Differences in peer associations and activity-based identities helped explain the group differences observed. The role of drinking games and hazing practices as moderators of this peer relationship has also been explored, especially with respect to establishing social hierarchy among males, however team-drinking motivations have not been identified (Martens et al., 2006a; Grossbard, Geisner, Neighbors, Kilmer, & Larmier, 2007).

Sport Culture

The sporting environment often approves and encourages alcohol consumption (Martens et al., 2006a). Campuses that have sport teams have been shown to exhibit greater alcohol use, especially surrounding large competitions. Thus, an indirect relationship among sport culture and athletes may exist, however the nature of this relation is unclear. Lechliter et al. (1998) have speculate about the “work hard, play hard” attitude espoused by many athletes, which may result in intensified heavy episodic drinking between competition or during the off-season in reaction to the abstinence or moderation exercised during competition.

Performance Pressure and Anxiety

Various athlete-specific pressures have been identified in the literature, which might lead athletes to cope with these pressures by means of heavy episodic drinking (Martens et al., 2006a). Examples of some stressors that have identified include pressures to perform, emotionality of successes/failures, public scrutiny, physical pain or injury, and retirement (Marcello, Danish, & Stolberg, 1989; Tricker, Cook, & McGuire, 1989). However, the

motivation to cope with anxiety has not been strongly supported in the literature (Martens et al., 2006a). Ironically, this apparent goal for athletic excellence is clearly not always matched by moderation in alcohol consumption (Martens et al., 2006a).

Personality

Research has shown that certain personality traits place people at risk for heavy episodic drinking, among other disorders (Cassin & von Ranson, 2005; Conrod, Phil, Stewart, & Dongier, 2000). Specifically, four predisposing personality traits are: anxiety sensitivity (i.e., a fear that anxiety-related sensations will lead to negative outcomes), sensation seeking (i.e., a propensity to seek out novel and intense experiences), impulsivity (i.e., a tendency to value immediate reward and a decreased ability to anticipate punishment and delay behavioral responses accordingly), and hopelessness (i.e., a predisposition toward depressive and pessimistic thoughts). Each personality trait is characterized by different drinking motivations. Individuals who possess anxiety sensitivity tend to drink to self-medicate through alcohol's anxiolytic effects (Pihl & Peterson, 1995). Sensation seeking is related to a lack of threat salience, and the desire to drink to experience intoxication (Conrod et al., 2000b). Hopelessness is associated with a desire to drink to alleviate emotional pain (Conrod et al., 2000b). Lastly, impulsivity is a tendency to drink to enjoy the present moment, without considering possible consequences.

While ample research links specific personality traits to heavy episodic drinking in general, less is known about the role of personality traits in contributing to heavy episodic drinking among athletic individuals. Sensation seeking has been the most studied trait. In athletes compared to non-athletes, sensation seeking was found to be more highly associated with frequency of heavy episodic drinking (Yusko et al., 2008). Schroth (1995) has found sensation seeking to be more prevalent among athletes, especially among those athletes involved

in contact sports. Athletes have been found to engage in risky behaviours more frequently, and perceive fewer related harms (Schroth, 1995; Wetherill & Fromme, 2007). Likewise, athletes have also been found to implement protective behaviours (i.e. counting drinks, alternating alcoholic with non-alcoholic beverages) less often, which contributes to greater instances of heavy episodic drinking (Yusko, Buckman, White & Pandina, 2008).

Drinking Motives

Cox and Klinger (1990) propose that everyone is motivated to consume alcohol because they believe, whether conscious or unconsciously, that the benefits of drinking will outweigh the costs. Cooper (1994) described these motives along two axes: valence (positive or negative reinforcement) and sources (internal or external). According to valence, individuals may be motivated to seek a positive outcome (i.e., positive reinforcement), or avoid a negative outcome (i.e., negative reinforcement). By source, individuals may be motivated to achieve an internal reward, or an external reward. These two axes have been crossed to form a four-factor model. The four resulting drinking motives are enhancement, social, conformity, and coping (Cooper, 1994). More recently there is empirical support for five drinking motives where coping is subdivided into coping-anxiety and coping-depression (Grant, Stewart, & Mohr, 2009),.

Each drinking motive has been related to a distinct pattern of alcohol use (Conrod, Pihl, & Vassileva, 1998; Conrod, 2000b; Stewart, Karp, Pihl, & Peterson, 1997; Stewart, Loughlin, & Rhyno, 2001; Stewart & Zeitlin, 1995). Enhancement is defined as drinking to enhance positive emotions (internal, positive reinforcement). Drinking for enhancement reasons has been related to heavy alcohol use and is the best predictor of heavy episodic drinking frequency and quantity (Cooper, 1994). Social motives involve drinking to socialize with others and seek affiliation (external, positive reinforcement). Drinking for social reasons has been related to light,

infrequent, and non-problematic use. Conformity motives are related to drinking to avoid negative social judgment, or drinking to reduce social sensor (external, negative reinforcement). Conformity has been related to alcohol-related problems, but not heavy use. The coping-anxiety motive is related to drinking to cope with anxious feelings (internal, negative reinforcement). The coping-depression motive is defined as drinking to cope with negative mood (internal, negative reinforcement). Both coping motives are related to heavy alcohol use and drinking alone. Overall, coping and enhancement motives are most strongly related to problematic use. Assessing an individual's motivations for drinking is crucial in order for an intervention to successfully address appropriate issues.

Moreover, certain personality traits predict motives for use (Woicik, Stewart, Pihl, & Conrod, 2009). Anxiety sensitivity is associated with conformity and coping-anxiety motives. Sensation seeking is associated with enhancement motives. Impulsivity is associated with all drinking motives. Finally, hopelessness is associated with conforming, and coping-depression motives.

Students participating in both intercollegiate and recreational athletics at the undergraduate level demonstrated these five general drinking motives in both non-sport and sport-specific contexts (Martens, Pedersen, Smith, Stewart, & O'Brien, 2011). Various studies examining athletes have found that drinking for enhancement reasons is related with alcohol problems, and drinking to cope predicts alcohol-related consequences (Martens et al., 2011; Martens, Cox, & Beck, 2003a; Martens et al., 2003b; Martens, Watson, Royland, & Beck, 2005b; Yusko et al., 2008). Martens et al. (2003b) found that drinking motives accounted for 17% - 21% of the variability in experience of negative consequences due to alcohol use. Additionally, Wilson et al. (2004) found that male athletes were most likely of all students, and

more likely than female athletes, to drink to “get high” (enhancement). Female athletes on the other hand were least likely of all students to drink to “get high.” Instead, female athletes were more likely to drink to “feel better” or to “get through it” (coping) compared to non-athletes, but not at a level that differed significantly from male athletes.

Physical Activity, Alcohol Consumption, and Heavy Episodic Drinking

Physical activity, or exercise, can be considered as distinct from athletic membership. As an athlete on a varsity or intramural team, team membership is an important factor. However, one can be very physically active without belonging to a team or club. In former literature, the two have been used interchangeably or no distinction was made at all. However, more recent research has indicated that these are two unique classifications (Dunn & Wang, 2003; Terry-McElrath, O'Malley, & Johnston, 2011). Given this distinction, the relation between physical activity and heavy episodic drinking should be considered separately.

It is well-accepted that physical activity promotes health and well-being (Warburton, Nicol, & Bredin, 2006; WHO, 2010). Penedo and Dahn (2005) performed a literature review examining the relationship between physical activity and various physical and mental health outcomes. They included studies published over the years 2004-2005, analyzing across different methodologies and diverse populations (ethnicity, age, gender). Their review provided cumulative evidence that physical activity is beneficial to physical and mental health, and is associated with better quality of life. Likewise, cumulative evidence indicates that men and women who are physically active are 35% less likely to die from cardiovascular disease, and experience a 33% reduction in mortality from all causes, when compared to people who live sedentary lives (Manley, 1999; Nocon et al., 2008; Warburton et al., 2006). Furthermore, physical activity has beneficial effects on depression, anxiety, and mood (Manley, 1996; Salmon,

2001). On the other hand, physical inactivity has been shown to cause chronic disease, disability, and death (Health Canada, 2011; Penedo & Dahn, 2005; Public Health Agency of Canada, 2011). Moreover, healthy lifestyles factors and unhealthy lifestyle factors tend to cluster together within individuals (Keller, Maddock, Hannover, Thyrian, & Basler, 2008; Ma, Betts, & Hampl, 2000; Poortinga, 2007; Pronk et al., 2005).

As such, it would be natural to assume that university students who are physically active would have lower rates of heavy episodic drinking. Martha et al. (2009) studied over 1,350 French university students and found that engagement in physical activity was negatively correlated with heavy episodic drinking, regardless of the context in which it took place. However, other studies have found a positive association between physical activity and heavy episodic drinking (Dunn & Wang, 2003; Vickers et al., 2004). Although these studies controlled for some factors shown to influence this relationship (such as peer norms and GPA), personality and motivational variables were not accounted for. In addition, physical activity was confounded athletic membership.

More broadly, evidence suggests that undergraduate engagement in physical activity is associated with greater overall alcohol consumption (Buscemi et al., 2011; Dunn & Wang, 2003; Moore & Werch, 2008; Rockafellow & Saules, 2006). Musselman and Rutledge (2010) found that the likelihood of a student being more physically active increased as their alcohol consumption increased, even after considering other variables such as gender, ethnicity, age, college GPA, fraternity/sorority membership, and sports participation. This relationship is evident in adults in general; drinkers are more likely to be physical active, and tend to spend more time exercising (French, Popovici, & Maclean, 2009; Kunz, 1997). The opposite trend has been found in adolescents, with physical activity being associated with less overall use of

alcohol, despite the fact that adolescent participation in team sports has been associated with higher rates of heavy episodic drinking (Terry-McElrath et al., 2011).

The Present Study

The influence of personality traits and drinking motives on the relationship between athletic participation and heavy episodic drinking has received little attention in the research. In fact, Martens et al. (2011) state that they are unaware of any study that has studied this relationship in college athletes. Their study examined the relation between trait urgency (similar to impulsivity), drinking motives, and alcohol use among varsity athletes. The current study will examine relations between drinking and athletic participation in the context of individual personality (i.e. sensation seeking, impulsivity, anxiety sensitivity, and hopelessness) and motivational (i.e. enhancement, coping-depression, coping-anxiety, conformity, and social) variables. Athletic participation is examined according to level of competition (varsity or intramural), type of sport (team or individual), and general physical activity level. The relations between athletic participation and heavy episodic drinking will be analyzed. It is hypothesized that, after controlling for risky personality and motives for use, physical activity will act as a protective factor against heavy episodic drinking. In addition, it is hypothesized that physical activity will be related to increased overall alcohol consumption.

Method

Participants

Participants consisted of 137 undergraduate students from a Canadian university with an overall enrolment of about 7,900 students. Of this sample, 110 (81%) were female, and 26 (19%) were male. The mean age of the sample was 22.15 years ($SD = 6.25$), ranging from 18 to

57. Participants were required to be at least 18 years of age. Most of the participants were currently enrolled in their first year of undergraduate education (46%), and the remaining were pursuing either their second year (21%), third year (15%), fourth year (15%), or fifth year (3%) undergraduate education. Participants' reported ethnicity was primarily Caucasian (83%), some First Nations (7%), as well Asian (3%), African (2%), and others (5%). Athlete status was determined by participant's self-reported involvement in either varsity or intramural sport, and whether they consider their sport to be classified as team or individual (Grossbard et al., 2007). Only 3% ($n = 4$) of the sample identified themselves as a varsity athlete. However, 21% ($n = 29$) of participants reported intramural athlete status. Of both varsity and intramural athletes, 70% ($n = 23$) classified their sport as a team sport, and 27% ($n = 9$) classified their sport as an individual sport.

Procedures

Participants were recruited by use of posters placed throughout campus, through announcements to Introductory Psychology and upper year Psychology courses, and by means of advertisement through the SONA Systems "Experiment Management System." Informed consent was obtained from each participant and their data remained confidential and anonymous. Participants completed a paper-and-pencil questionnaire containing various behavioural, personality, and motivational measures, as well as basic demographic information. Questionnaire completion required less than one hour. In compensation for their time, participants were either awarded with academic credit (one bonus point), or were entered into a draw for \$100. This study was approved by the Research Ethics.

Measures

Demographics. Information was collected regarding participants' age, sex, and ethnicity, as well as current academic, relationship, employment, and financial status (Mushquash et al., 2011).

Alcohol Use and Heavy Episodic Drinking Frequency (HED-F; National Institute on Alcohol Abuse and Alcoholism, 2003). Participants were asked if they had ever consumed alcohol, their age when they first consumed alcohol, how often they normally consumed alcohol (responding either per week, per month, or per year), and how much they typically drink when they consume alcohol (maximum, average, and minimum number of beverages per occasion; where one alcoholic drink = 12-ounce bottle or can of beer or cooler, a 4-ounce glass of wine, or a drink containing an ounce of hard liquor.) Frequency of heavy episodic drinking was measured with two continuous, sex-specific items. Participants were asked, "During the past 7 days, how often did you have 4 or more drinks (women) [or 5 or more drinks (men)] containing any kind of alcohol within a 2-hour period?" to which they could respond anywhere from "0 times" to "11 or more times." Brief and single-item self-report measures of alcohol use behaviours have demonstrated good to excellent test-retest reliability and good validity (Dollinger & Malmquist, 2009).

Peer Drinking Norms (PDN; Turrisi et al., 2007). Peer descriptive and injunctive norms were assessed through the PDN scale. Descriptive norms (norms that describe the typical behaviours of others) were examined with the following questions: "How many of your close friends drink alcohol?," "How many of your friends get drunk on a regular basis (at least once a month)?," and "How many of your close friends drink primarily to get drunk?" Response choices ranged from 0 "none" to 4 "nearly all." Injunctive norms (norms that describe behaviours expected by others) were assessed by the following question: "How would your close

friend feel if you had 5 or more drinks once or twice each weekend?” The item responses range from 1 “Strong approval” to 7 “Strong disapproval.” This scale has demonstrated good reliability (coefficient alpha = .79; Turrisi et al., 2007; Wood, Read, Palfai, & Stevenson, 2001).

Heavy Episodic Drinking Severity (HED-S; Mushquash et al., 2012). The severity of an individual’s drinking was assessed with this one-item scale: “What is the greatest number of drinks you consumed in a 2-hour period during the past 7 days?” The response is a reported number of drinks.

Modified Drinking Motives Questionnaire Revised (M-DMQ-R; Blackwell & Conrod, 2003). Motivations for using alcohol were assessed with the M-DMQ-R. This measure is based on Copper’s (1994) four-factor model of drinking motives, yet further subdivides coping into two unique drinking motives, producing a five-factor model (conformity, enhancement, social, coping-anxiety and coping-depression; Blackwell & Conrod, 2003; Grant et al., 2009). Participants were asked to respond to the question “How often would you say you drink for each of the following reasons” by ranking 28 items from 1 “almost never” to 5 “almost always.” Some sample items include “To forget my worries,” and “To be social.” The M-DMQ-R shows good internal consistency (subscales ranging from .61-.70), factorial validity, and criterion-related validity in predicting alcohol consumption and alcohol-related problems among adults and adolescents (Grant, Stewart, O’Connor, Blackwell, & Conrod, 2007; Loewenthal, 1996).

Substance Use Risk Profile Scale (SURPS; Woicik et al., 2009). Four specific personality traits which increase an individual’s risk for substance abuse were examined (anxiety sensitivity, hopelessness, impulsivity, and sensation Seeking). Participants were asked to rate their agreement with 23 statements concerning their personality, such as “I would like to skydive,” or “I get scared when I’m too nervous,” on a scale from 1 “strongly agree” to 5

“strongly disagree.” This scale has demonstrated adequate to good internal consistency, good convergent and discriminant validity, and good test-retest reliability over a 6-week period (Woicik et al., 2009). The SURPS has also been found to exhibit good structural, concurrent, and predictive validity (Krank et al., 2011), and good convergent and incremental validity with the NEO-FFI (Woicik et al., 2009).

International Physical Activity Questionnaire (IPAQ; Hagströmer, Oja, & Sjöström, 2006; Musselman & Rutledge, 2010). The International Physical Activity Questionnaire provides internationally comparable data on health-related physical activity. It is ideal for surveying the physical activity among populations of adults aged 15-69. The short-form of the International Physical Activity Questionnaire was used in this study, which consisted of seven questions where participants were asked to indicate how many days in the past week they had spent doing vigorous physical activity, moderate physical activity, walking, and sitting. Specific examples were given at each level related to leisure, domestic, work, and transportation. Participants were then asked to estimate the amount of time they had spent doing each of the activities (in terms of hours and minutes).

Physical activity was measured in terms of metabolic equivalent tasks (MET) expenditure (where MET is a multiple of the resting metabolic rate; Sjoström et al., 2005). Total minutes per week were scored by summing minutes per day and hours (expressed as minutes) per day and multiplying by days active per week. MET-minutes per week were calculated for each level of activity by multiplying the total minutes per week by the energy requirements of the activity in MET. A total physical activity score was calculated by combining all MET-minutes/week. Participants were also classified into three categories of physical activity (high, medium, low) based on their responses (Sjoström et al., 2005). The short-form of the International Physical

Activity Questionnaire has been widely used and has demonstrated acceptable psychometric properties with respect to test-retest reliability ($r = .76$), criterion validity ($r = .30$), and concurrent validity with the long form ($r = .67$; Craig et al., 2003; Hagströmer et al., 2006).

By assessing participants' general level physical activity level, exercise was distinguished from athletic membership (Musselman & Rutledge, 2010).

Protective Behavioural Strategy Scale (PBSS; Martens et al., 2005a). This scale assessed how often protective behavioural strategies were used. The items were rated on a 5-point Likert-type scale, ranging from 1 "never" to 5 "always." Responses were scored onto three subscales: Limiting/Stopping Drinking (5-items, e.g. "Alternate alcoholic and non-alcoholic drinks."), Manner of Drinking (7-items, e.g. "Avoid drinking games."), and Serious Harm Reduction (3-items, e.g. "Use a designated driver."). The scale demonstrated adequate concurrent validity, construct validity, and factor structure (Martens et al., 2005a; Martens et al., 2007; Pearson, Kite, & Henson, 2012).

Data Analysis

In order to investigate any associations between athletic membership, physical activity, personality traits, drinking motives, and heavy episodic drinking, Pearson product-moment correlation coefficients were examined. In addition, various single and multiple regressions were performed in order to analyze the proportion of variance in heavy episodic drinking accounted for by various variables. Finally, a hierarchical regression was executed in order to examine the contribution of athletic membership in the prediction of heavy episodic drinking frequency while controlling for personality and drinking motives.

Results

On average, the participants reported engaging in heavy episodic drinking .33 times ($SD = .65$) over the past week. On a typical occasion, participants reported consuming a maximum of 7.9 alcoholic beverages, an average of 4.3 alcoholic beverages, and a minimum of 1.6 alcoholic beverages. Females and males did not differ with respect to the frequency of heavy episodic drinking episodes over the past week, $t(130) = .23, p = ns$.

Varsity athlete status was correlated with reported frequency of heavy episodic drinking over the past week, $r(130) = .18, p = .04$. Similarly, varsity athlete status significantly predicted reported frequency of heavy episodic drinking episodes over the past week, $\beta = .18, t(130) = 2.11, p = .04$, and also explained a significant portion of the variance, $R^2 = .03, F(1, 130) = 4.46, p = .04$. Varsity athlete status was also associated with heavy episodic drinking severity, $r(128) = .27, p = .001$. However, varsity athletes and non-varsity athletes did not differ significantly with respect to the frequency of heavy episodic drinking reported over the past week, $t(3) = .97, p = ns$ (equal variances not assumed). On average, varsity athletes reported one episode of heavy episodic drinking during the past week, whereas non-varsity athletes almost never reported engaging in heavy episodic drinking during the past week. Of note is that varsity athletes did differ significantly from non-varsity athletes with regards to protective behavioural strategies over the past seven days concerning manner of drinking, $t(8) = 3.74, p = .006$ (equal variances not assumed). Varsity athletes status was not correlated with peer drinking descriptive or injunctive norms, $r(129) = .13, p = ns$; $r(129) = -.10, p = ns$.

Likewise, intramural athlete status was correlated with heavy episodic drinking frequency, $r(130) = .19, p = .03$. Intramural athlete status significantly predicted frequency of heavy episodic drinking, $\beta = .19, t(130) = 2.16, p = .03$, and also explained a significant portion of the variance, $R^2 = .04, F(1, 130) = 4.68, p = .03$. Intramural athlete status was also associated

with heavy episodic drinking severity, $r(128) = .19, p = .02$. However, the actual difference in heavy episodic drinking frequency between intramural and non-intramural athletes was not significant; intramural athletes reported an average of .6 episodes of heavy episodic drinking over the past week, whereas non-intramural athletes reported an average of .3 episodes, $t(33) = 1.90, p = ns$ (equal variances not assumed). Intramural athlete status was also not associated with peer descriptive or injunctive norms, $r(129) = -.03, p = ns, r(129) = .12, p = ns$.

Among varsity and intramural athletics, team and individual sport athletes did not differ with respect to the frequency of heavy episodic drinking during the past week, $t(27) = .41, p = ns$.

Personality

No relations between personality traits and athletic membership were found. Varsity athletes did not differ in sensation seeking compared to non-varsity athletes, $t(133) = .32, p = ns$. Likewise, no difference in sensation seeking was found for intramural athletes compared to non-intramural athletes, $t(133) = 1.17, p = ns$. For all participants, impulsivity was the only personality trait that was associated with frequency of heavy episodic drinking, $r(130) = .17, p = .05$. The significant associations between personality traits and drinking motives are presented in Table 1.

Drinking Motives

There were no associations found between athletic membership and drinking motives.

The relationships between the drinking motives and heavy episodic drinking frequency were assessed. Drinking for social reasons and drinking for enhancement reasons were both significantly associated the heavy episodic drinking frequency; $r(129) = .24, p = .005$, and $r(129) = .29, p = .001$, respectively. However, drinking for enhancement reasons was the best predictor

of heavy episodic drinking frequency, as demonstrated in the results of the hierarchical regression.

The presence of any associations between the drinking motives and heavy use of alcohol was also examined by correlating each motive with average drink per week. Two of the motives were significantly associated with average consumption; enhancement ($r(98) = .36, p = .001$) and social ($r(98) = .35, p = .001$).

None of the drinking motives were associated with the experience of alcohol-related consequences over the past seven days. However, all of the drinking motives collectively predicted alcohol-related consequences experienced over the past three years, $R = .46, R^2 = .21, F(5, 120) = 6.54, p = .001$. Within the regression model, none of the coefficients for the individual motives were statistically significant. Nonetheless, all of the drinking motives were significantly associated with frequency of alcohol-related consequences over the past three years; drinking for social reasons ($r(128) = .25, p = .004$), drinking to cope with anxiety ($r(128) = .38, p = .001$), drinking to cope with depression ($r(128) = .40, p = .001$), drinking for enhancement ($r(128) = .36, p = .001$), drinking to conform ($r(128) = .21, p = .02$) were all associated with more frequent experience of alcohol-related consequences over the past three years. Coping and enhancement motives were most problematic, as seen in the strength of their correlations with reported consequences over the past three years. Varsity athletes did not differ from non-varsity athletes with respect to reported alcohol-related consequences over the past seven days years and the past three years. This was also the case for intramural athletes.

Physical Activity

The central tendency for physical activity data was expressed in terms of the median instead of the mean due to non-normal distribution of scores, which is typical of physical activity

data (Sjostrom et al., 2005). The median amount of total time participants spent exercising per week was about 7.5 hours (455 minutes, $SD = 922$). The median amount of time spent walking per week was about 1 hour 40 minutes (100 minutes, $SD = 696$). The median amount of time spent engaging in moderate physical activity per week was 40 minutes ($SD = 239$). The median amount of time spent engaging in vigorous physical activity per week was 2 hours (120 minutes, $SD = 221$).

In general, measures of physical activity level were not correlated with measures of heavy episodic drinking. Measures of physical activity derived from the International Physical Activity Questionnaire included minutes of walking per week, minutes of moderate physical activity per week, minutes of vigorous physical activity per week, total minutes of physical activity per week, and total MET-minutes of physical activity per week. However, minutes of vigorous physical activity per week was significantly correlated with average number of alcoholic beverages consumed on a typical occasion $r(99) = .20, p = .05$. Minutes of vigorous physical activity per week significantly predicted average number of drinks typically consumed, $\beta = .20, t(98) = 2.00, p = .05$. That is, for every 100 minutes of vigorous physical activity per week, half an alcohol beverage is typically consumed. Minutes of vigorous physical activity per week also explained a significant portion of variance in the average number of drinks typically consumed, $R^2 = .04, F(1, 99) = 3.97, p = .05$.

Hierarchical Regression

In order to determine if athletic membership (both intramural and varsity) predicted the frequency of heavy episodic drinking over and above personality and drinking motives, hierarchical regression analysis was performed. The results are displayed in Table 2. The four substance use-risk personalities was entered as a block first (sensation seeking, impulsivity,

hopelessness, anxiety-sensitivity), followed by drinking motives (coping-anxiety, coping-depression, social, conformity, enhancement), and then athletic membership (varsity and intramural), consistent with past literature which has identified personality and drinking motives as the most proximal predictors of heavy episodic drinking. The first step was not significant, $R = .25$, $R^2 = .06$, $F(4, 117) = 1.92$, $p = ns$. The second step was significant, $R = .43$, $R^2 = .19$, $F(9, 112) = 2.82$, $p = .005$. Two motives were significant predictors at this step: coping-depression ($\beta = .31$, $t = 2.01$, $p = .05$) and enhancement ($\beta = .30$, $t = 2.51$, $p = .01$). Addition of athletic membership in the third step significantly improved the prediction (R^2 change = $.07$, $F = 4.81$, $p = .01$). The best fitting model for predicting frequency of heavy episodic drinking included all three variables, $R = .50$, $R^2 = .25$, $F(11, 110) = 3.33$, $p = .001$. In the final model, only enhancement ($\beta = .30$, $t = 2.52$, $p = .01$) and intramural status ($\beta = .15$, $t = 1.78$, $p = .008$) predicted frequency of heavy episodic drinking.

Discussion

It is widely accepted that physical activity promotes health and well-being (WHO, 2010). Yet competitive athletes at the varsity or collegiate levels have been shown to engage in heavy episodic drinking more frequently than non-athletes (Leichliter et al., 1998). Previous literature on the topic has struggled to distinguish the influence of athletic membership and physical activity on the frequency of heavy episodic drinking (Dunn & Wang, 2003; Terry-McElrath et al., 2011). In addition, no research has examined the contribution of athletic membership in predicting heavy episodic drinking frequency while controlling for personality and motivational variables, which have been identified as the most proximal predictors of alcohol use and alcohol-related consequences (Conrod et al., 2000a; Conrod, 2000b; Martens et al., 2011).

This study investigated relations between athletic participation and heavy episodic drinking among undergraduates, in the context of individual personality and motivational variables. Participants reported engaging in heavy episodic drinking .33 times ($SD = .65$) over the past week, which is a rate consistent with previous literature (Mushquash et al., 2011). Various measures of athletic participation were obtained: athletic membership (self-identification as varsity or intramural athlete), type of sport (team versus individual), and general level of physical activity (volume of physical activity per week, as assessed by the International Physical Activity Questionnaire). As expected, varsity and intramural athlete status each predicted frequency and severity of heavy episodic drinking (Lisha & Sussman, 2010). The finding that varsity athletes engaged in fewer protective behaviour strategies than non-varsity athletes with respect to manner of drinking may have contributed to the greater severity of heavy episodic drinking experienced by these athletes. The protective behaviour manner of drinking scale reflects the degree to which participants engage in the following behaviours when using alcohol or “partying”: avoiding drinking games, avoiding shots of liquor, avoiding mixing different types of alcohol, drinking slowly, and avoiding trying to “keep up” or out-drink others. This finding echoes previous literature which has shown varsity athletes to engage in protective behavioural strategies less often (Yusko et al., 2008). Interestingly, type of sport (team versus individual) did not predict heavy episodic drinking frequency, contrary to previous literature which suggests team-sport athletes tend to engage in heavy episodic drinking more often (Brenner & Swanik, 2007; Ford, 2007; Green et al., 2001; Martha et al., 2009).

The associations obtained between athletic membership and heavy episodic drinking frequency and severity are impressive given the smaller sample size of athletes, especially of varsity athletes ($n = 4$). While smaller sample size may limit the representativeness of the

sample, obtaining statistically significant results with a smaller sample indicates the strength of this association. However, direct comparisons of heavy episodic drinking frequency between athletes and non-athletes through *t*-test analyses were not significant. This may be due to the fact that equal variances could not be assumed (in part due to sample size discrepancy) which resulted in the use of more conservative *t*-tests.

The literature suggests that certain personality traits differentially predict motives for alcohol use (Martens et al., 2011; Woicik et al., 2009). Most of these empirically-supported predictive relations were replicated in the present study, as further confirmation of the validity of personality and motivational models. These results are displayed in Table 1. As expected, the personality trait hopelessness was associated with drinking motives coping-depression and coping-anxiety. Hopelessness was also associated with drinking for “social” reasons, which is inconsistent with previous literature. Anxiety sensitivity was associated with conformity, as expected. However, there was no relation found with coping-anxiety, as should be expected. Sensation seeking was not associated with any of the drinking motives, but it usually related to drinking for enhancement. Lastly, impulsivity, which is usually predicts all five drinking motives, was related with two of the drinking motives – social and coping-depression. There were no relations between personality traits and athletic membership, notably with regard to sensation seeking, as proposed in previous research (Schroth, 1995; Yusko et al., 2008).

The association between the drinking motives and average alcohol consumption was assessed. Consistent with previous literature, conformity and social motives are not associated with heavy use (Conrod, 2000b; Cooper, 1994). Enhancement and coping were not linked with heavier alcohol use (contrary to past literature) but they were the most problematic (consistent with past literature; Conrod, 2000b; Cooper, 1994). The fact that all the motives were correlated

with alcohol-related consequences over the past three years is an indication that alcohol use is generally problematic among undergraduates.

No association was found between physical activity and frequency of heavy episodic drinking. This lack of association was unexpected, at least not until personality, drinking motives, and athletic membership were controlled for. While some studies have found such an association, they have generally failed to distinguish physical activity from athletic membership, and have certainly not accounted for personality and drinking motives (Dunn & Wang, 2003; Martens et al., 2011; Vickers et al., 2004). The examination of various expressions of physical activity, including total minutes of physical activity per week and total MET-minutes per week (where activities are weighted according to their metabolic demand), still did not yield significant findings. Since no association was found between physical activity and heavy episodic drinking frequency, physical activity was not included in the hierarchical regression analysis, as was originally planned.

There are various possible explanations for this lack of association. The inclusion of two separate reliable measures for both physical activity and athletic membership may have sufficiently distinguished the two variables, eliminating any confounding. Another factor to consider is that the physical activity data obtained using the International Physical Activity Questionnaire is expected to demonstrate a non-normal distribution (Sjostrom et al., 2005). Indeed, the physical activity data obtained for this study exhibited a positively-skewed distribution, with many participants responding with “I don’t know/Not sure” instead of providing their best estimate of the time they have spent doing various physical activities over the past week. As a result of this attenuation in range, detecting any associations would have been quite challenging. However, consistent with the literature which suggests that physical

activity is associated with greater alcohol consumption in general, minutes of vigorous physical activity per week as positively correlated with average number of alcoholic beverages consumed on a typical occasion (Buscemi et al., 2011; Dunn & Wang, 2003; Ford, 2007; Moore & Werch, 2008; Musselman & Rutledge, 2010; Rockafellow & Saules, 2006).

In order to determine if athletic membership (varsity and intramural status) significantly improved the prediction of heavy episodic drinking frequency, over and above personality and drinking motives, hierarchical regression was implemented. The main goal of a regression model is to develop a more accurate prediction of the dependent variable. Hierarchical regression permits an assessment of the variance accounted for by variables entered at each step, by controlling the variance accounted for by previously entered variables. The results of this study indicate that varsity and intramural status account for an additional 7% of the variance in heavy episodic drinking frequency, and that the additional prediction provided is statistically significant. Hierarchical regression analyses performed by Buscemi et al. (2011) in predicting alcohol use from athletic participation data reported changes in variance of smaller or equal value, indicating that the results found here make a relevant and important contribution to the existing literature (Buscemi et al., 2011). While step one (personality) was not significant in predicting heavy episodic drinking frequency, the literature suggests that personality actually best predicts drinking motives, which in turn predict patterns of use, rather than personality predicting heavy episodic drinking frequency directly (Martens et al., 2011; Woicik et al., 2009). Within the third and final step, the enhancement motive was the only variable with a statistically significant beta. This finding fit with current theory since enhancement, drinking in order to enhance positive internal emotions, has been identified as the best predictor of heavy episodic drinking frequency (Cooper, 1994).

These results suggest that being on a varsity or intramural sports team predisposes undergraduate athletes to more frequent and more severe heavy episodic drinking, even after controlling for the contributions of personality and drinking motives. Interestingly, neither varsity nor intramural athlete status was associated with greater peer norms with respect to alcohol use. That is, varsity and intramural status did not report greater peer drinking, nor greater peer approval of drinking, compared to non-varsity and non-intramural athletes. This finding contradicts those by Turrisi et al. (2007), who noted greater perceptions of peer drinking and greater peer approval among varsity athletes compared to non-athletes. However, this finding may reflect how widely-practiced and how strongly endorsed heavy episodic drinking has become for undergraduates, regardless if they are on a sports team or not. Furthermore, this finding may indicate that the role of athletic membership in predicting heavy episodic drinking frequency is more than group phenomena. That is, there is something unique about belonging to a sports team that cultivates heavy episodic drinking which would not necessarily exist among members of the chess club or school band. Eccles and Barber (1991) share this conclusion, pointing to differences in group-based identities and peer associations as possible explanations for different educational trajectories and alcohol-use associated with different high school extra-curricular activities.

Limitations and Future Directions

A few general limitations are noteworthy. There is a lack of generalizability due to the small number of athlete participants, especially varsity athletes. In addition, response bias may have occurred as a result of the smaller size of the university and a diminished sense of anonymity. Since the principle investigator was a current varsity athlete, extra efforts to specifically recruit this population were avoided.

Additional evaluation of athlete drinking habits may further the understanding of this relationship. The consideration of time of season could serve as valuable information, given that athletes have been shown to engage in heavy episodic drinking more frequently when outside of their competitive season (Brenner & Swanik, 2007; Green et al., 2001). Additionally, exploration into the sense of team-identification athlete perceive may assist in understanding the unique social factors at play within a varsity team (Eccles & Barber, 1999; Grossbard et al., 2009; Perkins, 2002; Rockafellow & Saules, 2006). Finally, evidence supporting the “work hard, play hard” mentality should be sought, especially with respect to the possible sense of recompense or entitlement athletes may sense at the culmination of major competitions (Leichliter et al., 1998).

The absence of more comprehensive physical activity data prohibited its inclusion in the hierarchical regression. As a result, any further analysis about the role of physical in this incongruous athlete-alcohol association was not undertaken (Musselman & Rutledge, 2010). With more complete physical activity data, the role of physical activity as a possible protective factor in the relation between athletic membership and heavy episodic drinking should be explored.

Implications

The results of this study may guide future strategies and interventions aimed to enhance student health, particularly those athletes at risk for engaging in heavy episodic drinking. It has been shown that simply providing varsity athletes with electronically-delivered personalized feedback regarding their drinking habits is effective in reducing number of alcohol beverages consumed per week while in-season (Martens, Kilmer, Beck, & Zamboanga, 2010). Furthermore, as demonstrated by Conrod et al. (2000b), matching an individual according to

their personality and drinking motives to an appropriate brief coping skills intervention leads to better outcomes for the client. They found that only participants who were appropriately matched demonstrated reduced frequency and severity in problematic drug and alcohol use as well as reduced use of medical services for the 6-months after therapy. Combining the benefits of personality and motive-specific interventions with feedback may lead to superior outcomes. Specifically targeting athletes in this way would serve to mitigate the short and long-term harms incurred from problematic heavy episodic drinking.

Summary

This study demonstrated that athletic membership – belonging to a varsity or intramural team – significantly predicted heavy episodic drinking frequency even after controlling for personality traits and drinking motives which place individuals at risk. Athletic membership was also associated with greater heavy episodic drinking severity. Varsity athlete status in particular was related to less frequent use of protective behavioural strategies with respect to manner of drinking, such as avoiding shots of liquor or avoiding drinking games. Furthermore, the lack of association between athletic membership and peer norms indicates that there is a unique component to being a varsity or intramural athlete, which drives this incongruous athlete-alcohol association, and which extends beyond the social influences of belonging to any group (Musselman & Rutledge, 2010). Even though vigorous exercise was related to greater alcohol consumption on average, no association was found between physical activity and heavy episodic drinking frequency. The role of physical activity in this relationship should be further elucidated with the availability of more complete physical activity data. Lastly, the generalizability of these findings could be improved with greater representation of varsity and intramural athletes.

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Footnotes

¹ More commonly referred to as “Greek status” in American heavy episodic drinking literature.

Table 1

Pearson correlation coefficients for personality traits and drinking motives (N=130)

	Coping- Anxiety	Coping- Depression	Social	Conformity	Enhancement
Hopelessness	.21*	.37**	.23**	.08	.01
Anxiety sensitivity	.24	.16	.14	.23**	.12
Sensation seeking	.06	.06	.07	.14	.09
Impulsivity	.13	.25**	.19*	.11	.10

Note: * $p < .05$, ** $p < .01$

Table 2

Hierarchical regression for frequency of heavy episodic drinking (N = 122)

Variable	Model 1			Model 2			Model 3		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Hopelessness	-.03	.02	-.13	-.01	.02	-.03	.01	.02	.03
Anxiety sensitivity	.02	.02	.10	.02	.02	.09	.01	.02	.04
Impulsivity	.04	.03	.15	.04	.03	.14	.04	.02	.16
Sensation seeking	.03	.02	.14	.02	.02	.13	.02	.02	.127
Social				.06	.10	.07	.06	.10	.07
Coping-anxiety				.16	.12	.20	.14	.11	.18
Coping-depression				-.34	.17	-.31*	-.32	.16	-.29
Enhancement				.22	.09	.30*	.22	.09	.30*
Conformity				-.18	.13	-.15	-.14	.13	-.12
Varsity athlete							.57	.32	.15
Intramural athlete							.39	.14	.24**
R^2	.06			.19**			.25**		
<i>F</i> change in R^2	1.92			3.37**			4.81**		

Note: * $p < .05$, ** $p < .01$.