

Running Head: PERSONALITY, MOTIVES, AND PROTECTIVE BEHAVIOURAL STRATEGIES

Personality, Drinking Motives, and Protective Behavioural Strategies Among Undergraduates

Alexandra S. Kruse

Lakehead University, Thunder Bay, Ontario

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Supervisor: Christopher J. Mushquash, Ph.D.

Committee Member #2: Dwight Mazmanian, Ph.D.

Committee Member #3: Aislin R. Mushquash, Ph.D.

External Examiner: Mirella L. Stroink, Ph.D.

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Abstract

There is a high level of both heavy episodic drinking and related problems among Canadian undergraduates. Four personality traits and five motives for alcohol consumption place students at risk for experiencing increased levels of alcohol-related problems. Protective behavioural strategies represent a novel, harm reduction approach to ameliorating the negative consequences that individuals experience as a result of their drinking behaviour. In order to explore the relationships between personality traits, motives for drinking, protective behavioural strategies and alcohol-related problems, a 2-wave longitudinal study was conducted to examine two hypotheses: 1) Does PBS use at wave 1 moderate the relationship between personality traits at wave 1 and alcohol outcome at wave 2?, and 2) Does PBS use at wave 1 moderate the relationship between motives for alcohol use at wave 1 and alcohol outcome at wave 2? Results indicated that PBS do not moderate the relationship between any personality traits and problems, but do moderate the relationship between two motives for use (coping with anxiety and coping with depression) and alcohol-related problems, however, relationships did not emerge as predicted. For those who drink to cope with anxiety or depression, increased PBS usage was related to increased alcohol-related problems, demonstrating that PBS may not provide a protective effect at high levels of these drinking motives. Unique aspects of undergraduate lifestyle may impact the usefulness of PBS for this population, and more directive or intensive strategies to reduce related harms may be required.

Personality, Drinking Motives, and Protective Behavioural Strategies Among Undergraduates

Heavy episodic drinking (HED), defined as the consumption of four or more drinks for women and five or more drinks for men on one occasion (Wechsler, Nelson, & Weitzman, 2000), is problematic among undergraduates (Smythe & Caverson, 2013). Recent Canadian statistics show that while almost 86% of post-secondary students have consumed alcohol in the past 30 days (Smythe & Caverson, 2013), over 60% report HED in the past 2 weeks (Mushquash, Stewart, Sherry, Sherry, Mushquash, & McKinnon, 2013). Most individuals spend their post-secondary years both away from home and with friends, and increased amount of time spent in this environment results in increased alcohol consumption (Mohr, Armeli, Tennen, Temple, Todd, Clark, & Carney, 2005). Therefore, students who have moved away from home for their education and spend the majority of their time with friends are likely to drink more than their peers at home (Mohr et al., 2005). Engaging in HED places students at increased risk for developing alcohol-use disorders and acute alcohol related problems such as interpersonal difficulties, academic and vocational issues, driving under the influence, alcohol poisoning, physical or sexual assault, and involvement in violent crime (Centers for Disease Control, 2010; Hingston, Edwards, Heeren, & Rosenbloom, 2009; Knight, Wechsler, Buo, Seibring, Weitzman, & Schuckit, 2002; Nelson, Xuan, Lee, Weitzman, & Wechsler, 2009).

The Canadian Campus Survey (CCS; Adlaf, Demers, & Glikson, 2005) examined the rate at which students experience problems as a result of drinking. Over half of students surveyed reported having a hangover (53.4%) and a quarter (25.4%) experienced memory loss as a result of drinking. Poor academic performance and risky sexual behaviour are also linked to heavy drinking with 18.8% reporting missing a class due to a hangover, 14% engaging in unplanned sexual relations (e.g., spontaneous sexual relations with a stranger), and 6% engaging in unsafe

sexual practices (e.g., not using contraception during a previously planned sexual encounter).

Despite much effort to discourage driving following excessive drinking, 7.4% conceded to doing so and 3.8% reported consuming alcohol while they operated a vehicle (Adlaf et al., 2005).

Furthermore, it appears that students experience multiple problems concurrently. A 2009 meta-analysis demonstrated that over 25% of students surveyed experienced 5 or more of these alcohol related problems simultaneously (Nelson et al., 2009). These findings demonstrate that heavy episodic drinking, particularly amongst university students, constitutes a major concern that requires further understanding and effective interventions.

Personality Traits Related to Alcohol Use

Individual difference variables such as personality traits differentially predict alcohol use and problematic drinking (Comeau, Stewart, & Loba, 2001; Conrod, Stewart, Pihl, & Dongier, 2000; Pihl & Peterson, 1995). There are at least four unique personality traits that place an individual at increased risk for heavy drinking and related problems: anxiety sensitivity, sensation seeking, impulsivity, and hopelessness (Conrod et al., 2000). Variations in the motivational systems of the brain cause individuals to seek out alcohol for different reasons and serve to produce each unique personality trait (Pihl & Peterson, 1995). These personality traits predict both motives for drinking as well as the likelihood of suffering problems as a result of alcohol use (Comeau et al., 2001; Conrod et al., 2000).

Anxiety sensitivity is defined as the fear of anxious arousal symptoms (e.g., racing heart, shortness of breath; Pihl & Peterson, 1995). Individuals high in anxiety sensitivity fear that when they experience anxiety and the accompanying physical arousal they will suffer a variety of negative outcomes, such as sickness or embarrassment, or deleterious health outcomes (Comeau et al., 2001; DeMartini & Carey, 2011). This trait differs from normative anxiety. For example,

an individual high in anxiety sensitivity would be very attuned to physical symptoms of anxiety such as increased heart rate and shallow breathing, experiencing these symptoms as intolerable (Pihl & Peterson, 1995). An anxious individual may be more prone to experience these symptoms than the average person, but is not necessarily troubled by the symptoms themselves (Pihl & Peterson, 1995). This disposition towards anxiety places anxiety sensitive individuals at five times greater risk for developing panic disorder and increased risk for alcohol and anxiolytic use disorders (Conrod, Pihl, & Vassileva, 1998; Stewart, Peterson, & Pihl, 1995; Stewart, Zvolensky, & Eifert, 2001).

Sensation seeking is conceptualized as a lack of inhibition and a tendency to search for novel experiences (Zuckerman, 1994). This personality trait is linked to risky behaviour and therefore also linked to higher risk for alcohol related problems (Arnett, 1994). Sensation seeking persons are sensitive to the psychostimulant rewards of alcohol and drink alcohol due to its intoxicating effects (Conrod et al., 2000; Conrod, Stewart, Comeau, & Maclean, 2006; Pihl & Peterson, 1995). These individuals have the potential to suffer from alcohol use disorders in the absence of any other risk factors because they enjoy the euphoric experience of consuming large amounts of alcohol during a drinking occasion (Conrod et al., 2000).

Impulsive individuals are characterized by a need for immediate gratification and experience difficulty postponing responses to stimuli in their environment. As a result, these individuals often do not carefully plan responses and rely on maladaptive coping strategies that provide short-term relief from a problem (e.g., alcohol use; Conrod et al., 2000; Pihl & Peterson, 1995; Magid, MacLean, & Colder, 2007). Unable to resist the negatively reinforcing properties of substances or foresee problems potentially caused by heavy alcohol or substance use, these individuals are at increased risk for alcohol use disorders (Conrod et al., 2000).

Lastly, hopeless individuals suffer from depressive cognitions and consume alcohol to self-medicate and reduce these cognitions (Conrod et al., 2000). These persons are attracted to the analgesic (i.e., pain-reducing) properties of alcohol and other substances which decrease their psychological pain and are highly negatively reinforcing (Conrod et al., 2000; Pihl & Peterson, 1995).

Motives for Alcohol Use

Individuals consume alcohol and other substances for a variety of reasons. These reasons, or drinking motives, are theorized as the most proximal predictor of substance use (Cooper, 1994). Motivational models of drinking operate under two assumptions (Cox & Klinger, 1988). First, individuals consume alcohol to reach a desired outcome. This can involve attaining a positive outcome (i.e., experiencing the euphoria of being drunk) or avoiding a negative outcome (i.e., coping with negative feelings; Cox & Klinger, 1988). Second, individuals' pattern of alcohol use stems from their unique personal experiences, both preceding and following alcohol use (Cutter & O'Farrell, 1984). Assessment and treatment that follow a motivational model is able to target when an individual is likely to consume alcohol, and in what frequency, as well as identify and facilitate their unique needs (Cooper, 1994).

Cox and Klinger (1988) proposed a framework for understanding the motivations underlying alcohol use. They suggest that incentive motivation and affective change both contribute to an individual's decision regarding whether or not to drink. Incentive motivation refers to an individual's reason for seeking a positive stimulus or avoiding a negative stimulus. Affective change is simply a deviation in an individual's current emotional state. Together, these two concepts form the framework for a motivational model of alcohol use: Individuals pursue alcohol (an incentive) due to the belief that it will induce a positive affective change in them

(Cox & Klinger, 1988). Cooper (1994) further adapted this into a motivational model for alcohol use that crossed source (i.e., internal or external) and valence (i.e., positive or negative) dimensions, yielding four unique motives for drinking: social, enhancement, conformity, and coping (Cooper, 1994; Cox & Klinger, 1988).

Social motives (external source, positive valence) involve drinking to achieve social rewards, such as social affiliation (Cooper, 1994). Enhancement (internal source, positive valence) motives entail consuming alcohol to enhance affect and to simply get drunk (Cooper, 1994). Conformity (external source, negative valence) motives involve consuming alcohol to evade rejection in social situations (Cooper, 1994). Lastly, coping (internal source, negative valence) motives represent drinking to manage negative emotions, such as sadness and anxiety (Cooper, 1994).

Drinking for social motives reliably produces the least harmful pattern of drinking, such that it is infrequent and results in lower levels of alcohol consumption. Individuals who use alcohol for social motives are less likely to exhibit a problematic pattern of drinking than those drinking for enhancement or coping motives (Karwacki & Bradley, 1996). Despite high levels of problematic alcohol use amongst college students (CAMH, 2008), social motives are consistently the most endorsed of the four motives (Kairouz, Gliksmann, Demers, & Adlaf, 2002).

Although consuming alcohol for enhancement motives is also linked to heavier patterns of drinking, problems only arise indirectly from the consumption of alcohol and not direct influences (Cooper, 1994). Direct influences emerge when alcohol use is controlled for, demonstrating that certain motives cause alcohol related problems regardless of the amount of alcohol consumed by the individual (Cooper, 1994). Enhancement motives are problematic when drinking heavily, but often not when drinking a small amount. Those who endorse enhancement

motives for drinking are more likely to engage in heavy episodic drinking (Feldman, Harvey, Holowaty and Shortt, 1999).

Research on drinking for conformity motives has yielded mixed results; some studies reveal a pattern of light and infrequent drinking, similar to social motives (Cooper, 1994; Magid et al., 2007), while others find no relationship between conformity motives and alcohol use (Karwacki & Bradley, 1996). However, the majority of studies have found that there is an increased risk of alcohol problems for those drinking to conform, regardless of their pattern of drinking (Cooper, 1994; Magid et al., 2007). Conformity motives are more often endorsed in younger adolescents and related to earlier age of initiation (Magid et al., 2007). This is because adolescents who start drinking at a younger age usually begin during a time that adapting to social norms is viewed as a valuable skill, therefore, these adolescents also learn to adapt to the drinking habits of their peers (Magid et al., 2007).

Coping motives for drinking are associated with heavy, problematic drinking and an increased risk of direct and indirect alcohol-related problems (Cooper, 1994). These individuals lack adaptive coping strategies and turn to substances (Cooper, Frone, Russell, & Mudar, 1995). Coping motives are related to drinking in isolation (Cooper, 1994; Schelleman-Offermans, Kuntsche, & Knibbe, 2011) and are predicted by a high negative affect (Arbeau, Kuiken, & Wild, 2011) and social anxiety (Blumenthal, Leen-Feldner, Frala, Badour, & Ham, 2010). In general, those consuming alcohol for negative valence motives (coping and conformity) experience more problems as a result of their drinking, even after controlling for the amount of alcohol consumed (Cooper, 1994).

Cooper's (1994) model was further adapted through the separation of coping into two distinct coping motives: coping-depression and coping-anxiety (Grant, Stewart, & Mohr, 2009;

Grant, Stewart, O'Connor, Blackwell, & Conrod, 2007). This five-factor model is validated and demonstrates better fit for undergraduates identified as drinkers than the previously developed four-factor model (Cooper, 1994; Grant et al., 2007). In a study examining the two coping motives through the relationship between affect and alcohol consumption, Grant et al. (2009) found that coping-depression motives moderated the relationship between depressed mood and drinking, while coping-anxiety motives moderated the relationship between anxiety and drinking. That is, when the coping-depression motive was entered into the relationship between daily depressed mood and alcohol consumption, and when the coping-anxiety motive was entered into the relationship between daily anxious mood and alcohol consumption, alcohol consumption varied in relation to respective daily mood (Grant et al., 2009). This finding is important in understanding coping motives as previous process-oriented studies (Mohr et al., 2005; Park, Armeli, & Tennen, 2004) attempting to clarify the relationship between emotion, coping motives and alcohol consumption have produced mixed findings. Grant and colleagues (2009) believe these mixed findings have resulted from the use of generic coping motives that do not truly account for the intricacies of coping motives for alcohol consumption and that by dividing coping motives into coping-depression and coping-anxiety, researchers can more accurately capture this relationship.

Personality Traits and Motives for Alcohol Use

Personality traits and motives for alcohol use are not independent predictors of alcohol related problems; in fact, personality traits are predictive of motives for alcohol use. Individuals high in anxiety sensitivity are inclined to consume alcohol for its anxiety reducing properties and often self-medicate with alcohol (Conrod et al., 2000). Anxiety sensitive people are also likely to drink for negative valence motives (i.e., conformity and coping), specifically coping-anxiety

(Conrod et al., 2000; DeMartini & Carey, 2011). Sensation seeking persons are likely to endorse enhancement motives for drinking and this is related to high levels of alcohol consumption (Arbeau et al., 2011; Magid et al., 2007; Woicik, Stewart, Pihl, & Conrod, 2009). Individuals high on impulsivity are expected to use alcohol for all five motives and often experience an increase in alcohol-related problems (Magid et al., 2007; Conrod et al., 2000). Individuals high on hopelessness consume alcohol for coping-depression motives, which is linked to higher levels of alcohol consumption (Grant et al., 2007; Kuntsche, Knibbe, Gmel, & Engels, 2005).

Protective Behavioural Strategies

Protective behavioural strategies (PBS) are “active strategies and behaviours that individuals can engage in while drinking alcohol in order to limit the negative alcohol-related problems” (Martens, Taylor, Damann, Page, Mowry, & Cimini, 2004, p. 390). PBS broadly falls within a harm reduction approach that seeks to reduce problems associated with alcohol misuse rather than focus on obtaining abstinence. PBS are categorized on three dimensions: limiting/stopping drinking, manner of drinking, and serious harm reduction (Martens, Ferrier, Sheehy, Corbett, Anderson, & Angela, 2005). Limiting/stopping drinking strategies include setting a predetermined number of drinks for the occasion, alternating between alcoholic beverages and nonalcoholic beverages, and adding extra ice to a drink to dilute it. Examples of manner of drinking strategies include avoiding drinking games and not trying to “keep up” with other drinkers. Some serious harm reduction strategies are identifying a designated driver, going home with a friend, and knowing where one’s drink is at all times (Martens et al., 2005).

Students who do not engage in PBS characteristically consume greater amounts of alcohol and have more alcohol related problems (Benton, Schmidt, Newton, Shin, Benton, & Newton, 2004). Furthermore, individuals that use PBS not only diminish their level of

consumption, but also the likelihood of experiencing alcohol related problems (Benton, Downey, Glider, & Benton, 2008; Lewis, Patrick, Lee, Kaysen, Mittman, & Neighbours, 2012; Martens et al., 2005; Martens, Pedersen, LaBrie, Ferrier, & Cimini, 2007; Ray, Turrissi, Abar, & Peters, 2009). Using PBS is related to reduced alcohol related problems, even when drinking remains heavy, demonstrating that PBS are useful tactics amongst individuals that frequently engage in HED, such as undergraduate students. Even amongst those who in engage in HED, the use of PBS decreases the relationship between alcohol consumption and related problems (Borden, Martens, McBride, Sheline, Bloch, & Dude, 2011).

The Relationship Between Motives for Alcohol Use and Protective Behavioural Strategies

Motives for drinking are highly influential in the use (or lack of use) of protective behavioural strategies (Martens et al., 2007). PBS use partially mediates the relationship between positive valence motives (social and enhancement) and alcohol use and related problems (Martens et al., 2007). That is, individuals who drink for social or enhancement motives and employ PBS are less likely to suffer from problems as a result of their drinking, regardless of the amount of alcohol consumed. However, these individuals are generally less likely to engage in PBS use - PBS use reduces alcohol consumption and therefore, dampens the subjective experience of drinking, which these individuals find highly reinforcing (Patrick, Lee, & Larimer, 2011). Even when controlling for the number of drinks per week, these individuals still utilize less PBS (Patrick, et al., 2011). Those drinking for positive valence motives generally have higher levels of alcohol consumption and resulting problems (Patrick, et al., 2011; Schelleman-Offermans et al., 2011).

Those drinking for conformity motives are more likely to use PBS, specifically, those that fall into the limiting/stopping drinking subscale (Patrick et al., 2011). This finding supports

the notion that even though these individuals are still consuming alcohol, their motivation is to conform to social norms and appear that they have been drinking, not to experience the subjective feeling of intoxication (Patrick et al., 2011). This increase in PBS is also related to a decrease in alcohol related problems for individuals drinking for conformity motives (Patrick et al., 2011).

Despite relatively clear findings regarding the relationship between motives for drinking and PBS use thus far, research on the coping motive is more inconclusive. For example, some research shows that drinking for coping motives is not related to PBS use at all (Martens et al., 2007). However, a study by Patrick et al. (2011) discovered that after controlling for alcohol consumption, there is a negative relationship between coping motives and PBS use and that individuals that drink to cope are more likely to experience alcohol related problems (Patrick et al., 2011). PBS use also partially mediates the relationship between depressive symptoms (drinking for coping motives) and alcohol related problems, but not alcohol use (Martens, Martin, Hatchett, Fowler, Fleming, Karkashian, & Cimini, 2008). The researchers offered two unique explanations for this finding: 1) depressed individuals do not possess the cognitive capacity or motivation to use PBS and 2) many PBS are conceptualized in a social context, and those who drink for coping motives drink alone, so they are unlikely to engage in many PBS such as assigning a designated driver or not engaging in drinking games (Martens et al., 2008). Overall, these findings seem to support the notion that coping motives are related to decreased PBS use and enhanced alcohol related problems.

Motives for drinking not only predicts whether one will engage in PBS use, but also which strategies an individual is likely to employ. The positive reinforcement motives, social and enhancement, are both associated with less frequent use of strategies that would dampen one's

subjective experience of being drunk, such as pacing drinks throughout the evening and avoiding drinking games. Individuals consuming alcohol for social motives also choose not to drink less frequently (Patrick et al., 2011). Coping motives are reliably connected to decreased use of strategies specifically related to reducing the serious harms associated with alcohol consumption (i.e., choosing not to drink or assigning a designated driver; Patrick et al., 2011). Lastly, conformity motives are the sole category that demonstrates an increase in PBS use. Those consuming alcohol for conformity motives may attempt to appear as though they are drinking more heavily than in reality and are likely to use strategies from the limiting/stopping drinking subscale that reduce their consumption like eating food before or during drinking and alternating alcoholic and nonalcoholic drinks (Patrick et al., 2011). While pursuing post-secondary education, many individuals are subjected to peer pressure and concede to drinking because their friends are (which constitutes a conformity motive).

The Current Study

This study used a two-wave longitudinal design to examine the relationships between motives for drinking at wave 1, protective behavioural strategy usage at wave 1, and alcohol-related problems at wave 2.

All four personality traits are related to problematic drinking behaviour (Comeau et al., 2001; Conrod et al., 2000; DeMartini & Carey, 2011; Magid et al., 2007; Pihl & Peterson, 1995). We hypothesized that PBS use at wave 1 would moderate the relationship between personality traits at wave 1 and alcohol-related problems at wave 2 such that an increase in PBS use would weaken the relationship between personality traits and alcohol-related problems.

Some motives for alcohol use are related to high levels of alcohol consumption and/or alcohol-related problems (Patrick, et al., 2011; Martens et al., 2008; Schelleman-Offermans et

al., 2011). We hypothesized that PBS use at wave 1 would also moderate the relationships between motives for drinking at wave 1 and alcohol-related problems at wave 2 such that increased PBS use would weaken this relationship. For example, individuals drinking for a coping-depression motive would experience a greater number of alcohol-related problems (Cooper, 1994), however those in this group who engaged in greater PBS use would derive a protective effect and the relationship between motive for use and alcohol-related problems for them would be diminished.

Method

Participants

Two hundred and forty two participants were recruited and 231 completed all waves of the study, representing a 4.5% attrition rate. Of those who completed all waves, 93.7% met eligibility criteria (had ever consumed alcohol and completed relevant measures). The majority (77.3%) of the final sample was female, with an average age of 21.6 ($SD = 6.41$). Most participants were completing the first year of an undergraduate degree (58.5%; second year [15.9%], third year [14%], fourth year [9.2%], fifth or sixth year [1.5%]), with psychology being the most declared major (32%). The average age at which participants first consumed alcohol was 14.71 years old ($SD = 2.58$) and 67.4% first consumed alcohol between age 13 and 17.

Procedure

Recruitment of participants occurred through posters displayed on the Lakehead University campus, brief class presentations, emails sent to a variety of undergraduate classes and advertisement on the Sona Systems "Experiment Management System". Participants were scheduled for an initial laboratory session where they were provided with details of the study and informed consent was acquired. Participants completed paper-and-pencil versions of the study

measures on average, within 45-60 minutes. Upon completion, participants were scheduled for a subsequent laboratory session, two weeks following the initial session. This subsequent session was similar to the first, in that participants were asked to complete the same measures at all time points. Following completion of the final session, participants were debriefed and provided with resources should they require mental health services. Participants were offered up to three bonus points in an undergraduate level Psychology course or entry into a draw for \$100 cash.

Measures

Demographics. A demographic questionnaire was included to obtain information regarding age, sex, ethnicity, physical and emotional health characteristics, and information regarding academics, occupation and income.

Alcohol Use (National Institute on Alcohol Abuse and Alcoholism, 2003). Items in this questionnaire refer to whether or not one has ever consumed alcohol, the age at which alcohol was first consumed, frequency of alcohol consumption, and amount consumed (maximum, average and minimum) per occasion. This questionnaire operationalizes the definition of one drink: one bottle of beer, one cooler, one 4-ounce glass of wine, one 1-ounce shot or one mixed drink containing 1-ounce of hard alcohol.

Heavy Episodic Drinking Severity (HED-S; Mushquash et al., 2013). This single item measure asked, “What is the greatest number of drinks you consumed in a 2-hour period in the past 7 days?” and served as the measure of HED. Participants answer in a space provided.

Substance Use Risk Profile Scale (SURPS; Woicik et al., 2009). The SURPS is a 23-item measure that assesses the four risky personality traits: anxiety sensitivity, sensation seeking, impulsivity, and hopelessness. Participants answer on a four point Likert-type scale that ranges from 1 (*strongly disagree*) to 4 (*strongly agree*). Four subscale totals are calculated by summing

five items for the anxiety sensitivity and impulsivity subscales, six items for the sensation seeking subscale, and seven items for the hopelessness subscale, Psychometrically, the SURPS has adequate to good internal consistency, good convergent, discriminant, structural, concurrent, and predictive validity and good test-retest reliability over a 6-week interval (Woicik et al., 2009; Krank, Stewart, O'Connor, Woicik, Wall, & Conrod, 2011).

Modified Drinking Motives Questionnaire Revised (MDMQR; Blackwell & Conrod, 2003). The MDMQR assesses the five motives for drinking using twenty-eight items. Participants rate how often they drink for certain reasons such as “To relax” and “Because it helps me when I am feeling nervous” on a 5-point Likert-type scale. Anchors range from 1 (*almost never/never*) to 5 (*almost always/always*). The MDMQR is a revision of an earlier version that included four motives for drinking, but considering expanding literature on the topic, it now assesses five motives for drinking. Five items make up the social, enhancement and conformity motives each, four items make up the coping-anxiety motive, and nine items make up the coping-depression motive. Psychometric evaluations show good to excellent test-retest reliabilities with undergraduate alcohol consumers (Grant et al., 2007).

Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989). This 23-item measure assesses how often an individual has experienced negative alcohol related problems over the past three years such as “Went to work or school high or drunk” and “Felt that you had a problem with alcohol”. Responses were recorded on a 4-point Likert-type scale with answers ranging from 0 (*none*) to 3 (*more than five times*). The RAPI has good convergent and discriminant validity and good internal consistency (White & Labouvie, 1989).

Protective Behavioural Strategies Scale (PBSS; Martens et al., 2005). The PBSS assesses frequency of PBS use and features three subscales: manner of drinking (MOD; 7 items),

stopping/limiting drinking (SLD; 5 items) and serious harm reduction (SHR; 3 items). The MODS subscale includes items regarding reducing dangerous consumption (“Avoid drinking games”), the SLD subscale involves items related to stopping or limiting the amount of alcohol consumed (“Alternate alcoholic and nonalcoholic drinks”) and the SHR subscale features items about evading harmful problems of drinking (“Use a designated driver”). Participants respond on a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*always*). Confirmatory factor analysis supports the structure of the PBSS (Martens et al., 2007). The PBSS also has high convergent validity with alcohol problems measures (Pearson, Kite, & Henson, 2012). All subscales of the PBSS are correlated in the expected negative direction with several measures of alcohol use and related problems (Martens et al., 2005; Martens et al., 2007).

Data Analysis

The moderated paths described were tested with hierarchical regression analyses. To investigate the impact that PBS use has on the relationships between both personality traits and motives for drinking and alcohol outcomes, the slopes of the regression at varying levels of PBS use were analyzed. Recommendations by Aiken and West (1991) were followed.

Results

Individuals in this study appear to be moderate users of PBS, with an average score of 45.31 (of a potential 75; $SD = 9.71$) and experienced an average of 10.46 (of a possible 69; $SD = 11.97$) alcohol-related problems over the past several years. Of the sample, 32.5% drank at least one time per week and these individuals reported an average of 5.44 drinks ($SD = 2.55$) per occasion; when considering the total sample, the average number of drinks per occasion dropped to 4.14 ($SD = 2.44$). Over a one-week period, 18.6% of females and 14.6% of males in our sample had engaged in HED.

Mean, standard deviation, and Cronbach's alpha for the personality measures, motives for alcohol use measures, and total protective behavioural strategy use measure are comparable to published norms for undergraduates (Martens et al., 2005; Woicik et al., 2009; see Table 1). Cronbach's alpha for the alcohol-related problems measure is acceptable, however mean and standard deviation were somewhat increased compared to published norms (LaBrie et al., 2012; Tomaka, Morales-Monks, & Shamaley, 2013).

Men endorsed significantly greater impulsivity personality items and conformity motives than women, but no other sex differences in personality traits or motives for alcohol use emerged.

Bivariate Correlations

Bivariate correlations were computed between personality traits, motives for alcohol use, total PBS use, and alcohol-related problems (see Table 1). Alcohol-related problems experienced by participants was positively correlated with sensation seeking, impulsivity, and hopelessness personality traits and all five motives for alcohol use, indicating that an increase on these three personality traits and five motives was related to a higher level of problems. Alcohol-related problems were also significantly correlated with total PBS use, such that an increase in PBS use was related to a decrease in alcohol-related problems. Total PBS use was negatively correlated with impulsivity and hopelessness personality traits and coping-anxiety, coping-depression, and enhancement motives – an increase on these personality traits and motives was related to a decrease in PBS use. HED was positively correlated with the sensation seeking personality trait and all five motives for drinking, confirming these factors are related to increased engagement in HED. Alcohol-related problems was positively correlated with HED, indicating that engagement in HED was associated with a greater likelihood of experiencing alcohol-related problems, and

negatively correlated with PBS use – an increase in PBS use was related to a decrease in alcohol-related problems.

Hierarchical Multiple Regression

To test if wave 1 personality traits and motives for alcohol use predicted wave 1 PBS use and wave 2 alcohol-related problems, hierarchical regression analyses for each trait and motive were computed. Sex was entered in Step 1 for all regression analyses to control for differences that have been established between males and females (Martens et al., 2005; Woicik et al., 2009).

Analyses demonstrated that sex significantly predicted PBS use, indicating that females are more likely than males to endorse strategy use. In addition, wave 1 impulsivity and hopelessness personality traits and wave 1 coping-anxiety, coping-depression, and enhancement motives predicted decreased wave 1 PBS use over and above the influence of sex (see Table 2).

Sex did not predict alcohol-related problems, denoting that males and females experience similar levels of these issues. All wave 1 personality traits and motives for alcohol use predicted increased wave 2 alcohol-related problems over and above sex demonstrating that higher levels of these risky personality traits and motives result in increase alcohol-related problems (see Table 3).

Personality traits (i.e., impulsivity and hopelessness) and motives (i.e., coping-anxiety, coping-depression, and enhancement) that predicted both PBS use and alcohol-related problems were selected for moderation analyses. To determine the moderating effect of PBS use, personality traits, motives for use, and total PBS scores were centered (Aiken & West, 1991). The mean for each variable was calculated and a new variable was computed by subtracting this mean from the individual scores, setting the mean of the new variable at zero. Interaction terms

between the significant wave 1 personality traits and wave 1 motives for alcohol use were computed by multiplying the two relevant, centered variables.

Hierarchical multiple regressions were computed and sex, wave 1 personality trait (impulsivity and hopelessness), wave 1 PBS use, and the personality trait x PBS use interaction term were entered simultaneously, with wave 2 alcohol-related problems serving as the outcome variable (see table 4; Aiken & West, 1991). In the impulsivity analysis, a significant main effect of wave 1 PBS use emerged such that increased PBS use resulted in reduced alcohol-related problems, however no significant main effects of sex or wave 1 personality traits were observed. The interaction term did not emerge as significant. In the hopelessness analysis, significant main effects of wave 1 personality traits and wave 1 PBS use were observed such that increased hopelessness resulted in increased alcohol-related problems and increased PBS use resulted in a reduction alcohol-related problems. No significant main effect of sex or significant interaction effect of wave 1 personality trait x PBS use emerged.

Hierarchical multiple regressions were computed and sex, wave 1 motive (coping-anxiety, coping-depression, and enhancement), wave 1 total PBS use, and the motive x PBS use interaction term were entered simultaneously, with wave 2 alcohol-related problems serving as the outcome variable (see table 4; Aiken & West, 1991). In the coping-anxiety analysis, a significant main effect of wave 1 motive emerged demonstrating that increased coping-anxiety motives predicted increased alcohol-related problems, however no significant main effects of sex or wave 1 PBS use were observed. In the coping-depression analysis, significant main effects of both wave 1 motives and wave 1 PBS use were observed such that increased coping-depression motives resulted in greater levels of alcohol-related problems and increased PBS use resulted in decreased alcohol-related problems. No significant main effect of sex emerged in this analysis.

Significant interaction effects of motive x PBS use were also observed, indicating that PBS use significantly influenced the relationship between coping motives for alcohol use and alcohol-related problems.

The regressions that indicated a moderating effect of PBS on the relationship between motives and alcohol-related problems were plotted in order to interpret the directions of the interaction effects (see Fig. 1 and 2). To determine the strength of the relationship between PBS use and alcohol-related problems a simple slopes analysis was performed for individuals with low ($-1 SD$) and high ($+1 SD$) levels of both coping-anxiety and coping-depression motives. Slopes were significant for both levels of coping-anxiety (low $t = 4.562, p < .001$ and high $t = 2.885, p < .05$) and coping-depression (low $t = 7.955, p < .001$ and high $t = 5.910, p < .001$) motives.

To further understand results of the moderation analyses, coping-depression and coping-anxiety motivated drinkers were separated into high- and low-groups. The median for each motive was calculated and scores less than or equal to the median composed a low motive group, while scores greater than the median composed a high motive group.

Hierarchical multiple regressions were computed. To isolate low and high motive groups, cases were selected for based on their relationship to the median. Separate regressions were computed for both PBS use and alcohol-related problems, with sex entered in step 1 followed by the motive for use in step 2. These analyses revealed that high levels of both coping-anxiety and coping-depression motives were predictive of PBS use and alcohol-related problems, but low levels of motives were not (see Tables 5 and 6).

Discussion

The purpose of this study was to examine whether protective behavioural strategies (PBS) moderate the relationships between personality traits and alcohol-related problems, and motives for alcohol use and alcohol-related problems among undergraduates. Results demonstrated that impulsivity and hopelessness personality traits, as well as drinking to cope or to enhance affect were all related to increased alcohol-related problems and alcohol consumption, as well as decreased use of PBS. The hypothesis regarding the relationships between personality traits and PBS use were not supported - PBS use was not a moderator of the relationships between any of the four personality traits (i.e., anxiety sensitivity, hopelessness, impulsivity, and sensation seeking) and alcohol-related problems. The hypothesis that PBS would weaken the relationship between some motives for alcohol use and alcohol-related problems was not supported. PBS use did not diminish these relationships, but did moderate the relationships between coping-anxiety and coping-depression motives and alcohol-related problems by strengthening them.

Individuals in the sample who were high on impulsivity and hopelessness personality traits were less likely to use protective behavioural strategies while drinking. Impulsive individuals often engage in unhelpful coping strategies, such as heavy alcohol use, due to difficulty in delaying reactions to their environment, desire for instant satisfaction and the inability to predict consequences of their actions (Conrod et al., 2000; Pihl & Peterson, 1995; Magid et al., 2007). PBS are conceptualized as purposeful strategies that require some planning on the part of the individual to implement, which impulsive individuals are likely to find challenging. Those high on impulsivity may experience difficulty regulating their behaviour (and, therefore, consumption) when presented with immediately positively reinforcing stimuli,

such as alcohol (Conrod et al., 2000). The sole sex difference in regard to personality traits in the current sample showed men reporting significantly higher levels of impulsivity than women, indicating that there is a sex difference in terms of delaying responses in drinking situations. Typically sexes do not differ in terms of impulsivity; in the literature men report significantly greater levels of sensation seeking and females report significantly greater levels of anxiety sensitivity, but those sex differences did not emerge in the current study (Woicik et al., 2009).

Those who are high on hopelessness experience depressive cognitions and are thought to use analgesic substances (e.g., alcohol) to reduce these cognitions (Conrod et al., 2000; Pihl & Peterson, 1995). Hopeless individuals hold negative expectations about the future and their ability to alter the likelihood of these expected negative situations from occurring (e.g., helplessness; Abramson, Metalsky, & Alloy, 1989). The majority of PBS require planning and confidence in one's ability to execute the strategy to ensure success. For example, implementing the strategy "Use a designated driver" requires several steps: contacting an eligible individual, setting a place and time to be picked up, ensuring that the driver is compensated for their mileage, etc., as well as the belief that all steps in this strategy will go as planned. A hopeless individual may discount the usefulness of these strategies and assume that they are unlikely to be able to successfully implement them. Another difficulty for hopeless individuals is that PBS are often also social in nature; that is, if an individual is consuming alcohol in isolation, they may only be able to endorse some of the PBS as they are not presented with the opportunity to use them (e.g., "Have a friend let you know when you've had enough" requires a friend to implement). These challenges may have contributed to the negative correlation between hopelessness and PBS use.

Neither anxiety sensitivity nor sensation seeking were significantly related to PBS use, despite hypotheses to the contrary. Undergraduate students are a relatively high-achieving group, and the stress of maintaining a sufficient standard of academic performance may increase levels of anxiety and cause those who are anxiety sensitive to make attempts to reduce this anxiety. If these individuals have a limited repertoire of coping strategies to draw upon, they may instead use alcohol to manage negative affect. Due to the anxiolytic properties of alcohol, those who are anxiety sensitive are likely to experience relief from the anxious symptoms that cause them distress, reinforcing the use of this coping strategy (Pihl & Peterson, 1995). A study by Conrod et al. (2000) demonstrated that anxiety sensitive women preferentially used substances that retain anxiolytic properties, including alcohol. These individuals may be particularly unlikely to utilize PBS that reduce alcohol consumption as use of PBS may reduce alcohol levels to a point where they no longer derive an anxiolytic effect.

Individuals high on sensation seeking tend to seek out new experiences (Zuckerman, 1994), which can lead to risky behaviour (Arnett, 1994). Sensation seekers consume alcohol in large quantities due to the euphoria it provides (Conrod et al., 2000) and PBS use may limit the amount of alcohol consumed and, therefore the euphoric effects of alcohol. Female sensation seekers are at elevated risk for developing alcoholism, with symptoms first appearing on average around the age of 24 years (Conrod et al., 2000). The mean age in our sample was 21.6, and our sample was predominantly female, so it is possible that the individuals in our study who are at higher risk of developing an alcohol-related disorder (DSM-5; American Psychiatric Association, 2013) have begun exhibiting initial symptoms or are already experiencing symptoms sufficient to diagnose. Due to the desire to obtain euphoric experiences from alcohol, perhaps individuals who suffer from alcohol-related disorders are unlikely to utilize PBS.

The findings of the current study suggest that PBS, at least as measured by the Protective Behavioural Strategies Scale (Martens et al., 2005) may represent an intervention strategy that is not sufficiently robust to moderate the influence these risky personality traits have on drinking behaviour (e.g., heavy episodic drinking) and subsequent alcohol-related problems. Previous research regarding personality-targeted interventions has established that standardized interventions consisting of psychoeducation and both behavioural and cognitive coping skills training were effective in reducing alcohol-related problems for adolescents (mean age = 16; Conrod et al., 2006). Despite PBS typifying the behaviour of some individuals when they drink alcohol, perhaps those at greatest risk (i.e., highest levels of risky personality traits and/or alcohol-related problems) require more formalized education on both how to implement PBS while drinking and the benefits of doing so.

We hypothesized that PBS use would moderate the relationships between some motives for drinking, yet these results were not observed. Significant bivariate correlations and regressions between the coping-anxiety and coping-depression motives and PBS use served as rationale for completing moderation analyses, and while these were significant as well, the relationships did not emerge as predicted; for those with high coping-anxiety and coping-depression motives, PBS use appeared to be a risk factor for increased alcohol-related problems. On the surface, this finding is counterintuitive and may imply that by utilizing PBS in conjunction with high coping motives, individuals are potentially causing themselves increased harms, however, it is more likely that several other confounding variables influenced this relationship.

Secondary analyses revealed that only high scores on coping-anxiety and coping-depression motives (i.e., scores above the median) were predictive of PBS use and alcohol-

related problems. Low scores on both coping motives were not predictive of PBS use or alcohol-related problems. This indicates that when individuals consume alcohol to cope with high levels of anxious or depressive symptoms and feelings, their levels of both PBS use and alcohol-related problems can be predicted. The direction of the moderation analyses may be due to the fact that only half of the scores composing the independent variable are actually predictive of both the moderator and the outcome variable. Unfortunately, the minimum sample size required to perform moderation analysis was not met when the median split was performed, and therefore, additional moderation analyses utilizing only those high on coping motives cannot be computed.

Despite statistical explanations, PBS use may not represent an intervention powerful enough to reduce any associated problems for those undergraduates engaging in multiple heavy drinking episodes per week; these students may reach a threshold at which PBS is no longer effective in reducing alcohol-related problems (Borden et al., 2011). Bivariate correlations indicated that those in the current sample who experienced the highest levels of coping-anxiety and coping-depression motives also experienced the greatest number of problems as a result of their drinking. This is in contrast to those scoring low on both motives – those who experienced the greatest number of alcohol-related problems also consumed the most alcohol in a 2-hour period and, therefore, were most likely to engage in HED. Additional analyses confirmed that individuals high on coping motives engaged in heavy episodic drinking more than their peers with both low levels of coping motives and alcohol-related problems, which is consistent with the literature (Cooper, 1994).

The findings of previous studies have also demonstrated that undergraduates who complete interventions that teach strategies and encourage an increase in application of strategies do not decrease their alcohol use (Sugarman & Carey, 2009; and presumably, their alcohol-

related problems). This is compared to intervention efforts that encourage undergraduates to reduce their alcohol use by 50%; this second intervention actually results in a slight increase in strategy use as well as significantly decreased alcohol use (Sugarman & Carey, 2009). Despite not instructing students in PBS specifically, some of the strategies used by Sugarman and Carey (2009) overlap with the current study, suggesting that PBS and other harm reduction strategies may represent interventions that are too subtle to reduce alcohol use and thereby alcohol-related problems in undergraduates. Reduction in alcohol use may be a more appropriate and powerful goal for interventions aimed at undergraduates.

Previous research that has examined the relationship between coping motives for alcohol use and PBS has shown mixed results, but findings generally support that those high on coping motives are less likely to employ PBS, particularly strategies that would reduce alcohol use (Martens et al., 2008; Patrick et al., 2011). Findings from the current study do not support this relationship and indicate that increased coping motives predict increased PBS use, however this contradictory finding may be due to the unique lifestyle of undergraduates. Those who are experiencing significant anxious or depressive symptoms may have reduced cognitive capacity and motivation, which impacts their ability to properly implement PBS (Martens et al., 2008). The use of any strategies may not be a conscious effort to protect themselves from potential alcohol related harms and instead may be an attempt to do as peers or friends are doing or passively benefit from strategies put in place by others. For example, if an individual consumes a large amount of alcohol, but endorses items such as “Use a designated driver” because their friend arranged for a ride home or “Not engaging in drinking games” simply because drinking games were not available to them, this would artificially inflate their score on the measure of PBS and not reflect an attempt to reduce harm. While their symptomatology may be preventing

them from successfully using PBS, their friends are able to compensate for this and utilize strategies the anxious or depressed individual will also benefit from. When this individual is without the support of friends, they may still suffer alcohol-related harms (e.g., engaging in dangerous sexual practices or missing class due to a hangover), resulting in the relationship between high coping motives, high PBS use, and high alcohol-related problems in the current study.

Unfortunately, the questionnaire we used to assess PBS use in the current study (PBSS; Martens et al., 2005) does not differentiate between PBS actively put in place by the individual or passively accepted. In our sample individuals had higher average scores on the serious harm reduction subscale composed of three items: “Use a designated driver”, “Make sure that you go home with a friend”, and “know where your drink has been at all times”. The two first items may reflect passive rather than active PBS (i.e., simply accepting a ride from a friend) and the third item on this scale regarding the whereabouts of an individual’s drink may also not indicate an attempt to protect oneself from alcohol-related problems; a person may know where their drink is at all times, but that unfortunately does not ensure that the drink is not tampered with. Additionally, as an individual consumes more alcohol, they may not be as attentive to their drink, despite knowing its location. This supports the assumption that those with higher scores on PBS total may have artificially inflated scores and also still experience increased levels of alcohol-related problems.

The utility of certain PBS strategies, specifically those of the limiting/stopping drinking subscale, has been called into question by some (Martens et al., 2005; Napper, Kenney, Lac, Lewis, & LaBrie, 2014) as they do not appear to reduce an individual’s alcohol-related problems or alcohol use over time. Napper et al. (2014) suggested that this may be due to the vague

wording used in some items on this subscale, specifically, “determining not to exceed a set number of drinks” and “leaving a bar/party at a predetermined time.” These strategies require the individual to take responsibility for setting the predetermined number of drinks for the evening or time at which to leave the party, which may not necessarily be protective. For example, an individual may consistently set and not exceed a predetermined number of drinks for the evening, but if that number is in excess of five drinks for males or four drinks for females then they will still engage in HED and may experience related problems. Thus, despite a higher score on the measure of PBS, the individual is still experiencing alcohol-related problems.

Researchers have demonstrated that experiencing negative consequences as a result of drinking does not appear to motivate undergraduate students to adopt strategies to reduce the likelihood of experiencing these consequences in the future. Independent studies have shown that experiencing alcohol-related problems does not result in an increase in PBS use at a follow-up interval of three to four months (Luebbe et al., 2009; Napper et al., 2014). Additionally, almost half of undergraduates repeatedly experience three or more of the same severe alcohol-related problems that impact academic and social functioning such as hangover, blacking out, and being rude (Mallett, Marzell, Varvil-Weld, Turrisi, Guttman, & Abar, 2011).

These findings may reflect the fact that undergraduate students are not concerned about alcohol-related consequences they experience and that perhaps the paradigm of undergraduate lifestyle normalizes “more severe” consequences such as attending school while under the influence of alcohol or being unable to complete schoolwork due to alcohol use. These norms differ considerably from those of individuals who have more enduring responsibilities (e.g., a career or family). If these individuals were to attend work while drunk, the consequences may be the same as for an undergraduate who attended their part-time job while drunk (i.e., disciplinary

action, termination, etc.), but the consequences may be perceived as much more damaging and distressing for individuals who have additional responsibilities.

Considering that our sample consisted of predominantly first year students (59%), many are likely residing in dormitory-style accommodations and also living without their parents for the first time. Mohr and colleagues (2005) established that this living situation is related to increased alcohol use. This communal arrangement may also alter individuals' norms regarding drinking behaviour and alcohol-related problems, as they are living in close proximity to individuals who are experiencing alcohol-related problems and also possibly minimizing the negativity of these consequences.

Specific alcohol-related problems were actually infrequently rated as negative by a sample of undergraduates: experiencing a hangover, waking up in someone else's bed, leaving a party alone, binge-eating, and skipping an evening meal the day following drinking (Mallett, Bachrach, & Turrisi, 2008). Weekly alcohol use was also an important consideration in this sample; higher typical consumption was related to positive ratings of problems that were rated as negative by at least 50% of the sample (e.g., vomiting, regretted sexual experiences, being late for work or class, and blacking out; Mallett et al., 2008). It's possible that those who drink heavily on a regular basis (such as those in the current sample experiencing increased levels of coping motives) consider these problems to be an element of their overall drinking experience and offset by the positive consequences that drinking generates.

The measure of alcohol-related problems utilized in the current study may also have been influenced by undergraduates' perceptions of alcohol-related problems and the lack of clarity regarding valence of the problems. Items on the Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989) are all weighted equally, and not according to severity or impact in functioning;

an item such as “Not able to do your homework or study for a test” is weighted the same as items that may imply more serious consequences such as “Felt that you had a problem with alcohol.” Those in our sample who are experiencing a high level of milder alcohol-related problems would have a higher score on the RAPI than individuals who are experiencing a lesser level of more distressing problems, regardless of the impact in functioning they are experiencing as a result of the problems.

Many students completing the first year of an undergraduate degree are underage, and in fact, 30% of our sample was less than 19 years of age. Considering 30% of our sample cannot reliably access alcohol (i.e., legally purchase alcohol at a store or bar), it is unsurprising that they engaged in HED when they did have access to alcohol, and despite any PBS use, still suffered related consequences. The results of a study conducted in the United States demonstrated that underage students drank alcohol less frequently than their of-age counterparts, however, when they did drink, they consumed significantly more alcohol (Weschler, Kuo, Lee, and Dowdall, 2000). Despite the fact that a US sample was utilized (where the legal drinking age is 21), the finding and concept is still relevant to Canadian undergraduates and has been observed in Canadian research (Kuo, Adlaf, Lee, Gliksman, Demers, & Wechsler, 2002). When the drinking behaviour of American and Canadian undergraduates was compared, Canadian students drank significantly more in the past year, as well as over their lifetime than American students (Kuo et al., 2002). It appears that when access to alcohol is unreliable, students are more likely to engage in HED when it does become available.

Superficially, the findings of this study appear to suggest that PBS may represent an additional risk factor for undergraduates who drink heavily to reduce anxious and depressive symptoms through increasing alcohol-related problems. However, an examination of the

literature regarding personality traits, motives for alcohol use, PBS, and alcohol-related problems provides insight into additional factors affecting these relationships that are unique to the undergraduate paradigm. Undergraduates who have the greatest levels of alcohol use, coping motives for use, and alcohol-related problems may require more comprehensive, and perhaps directed, intervention to see reductions in alcohol use and harms. Additional analyses indicated that only scores considered to be high on coping motives were predictive of both PBS use and alcohol-related problems. Therefore, half of the sample utilized in the moderation analyses had no relation to the moderator or outcome variables, which likely contributed to the direction of the interaction effects.

Limitations and Future Directions

The results of this study must be interpreted while considering limitations. Limitations were inherent in the demographics of the sample, such as the predominantly female, first-year undergraduate representation. The self-report method of data collection represents a limitation of this study. Participants were assured that the data collected would be de-identified and also kept confidential, however responses bias may still have influenced reporting due to the sensitive nature of the information collected. Additional methods of assessment, such as informant reports, would be useful in authenticating self-report data. The time interval of two weeks between waves represents a potential limitation. In future research, it will be important to examine the impact that both shorter (e.g., every hour) and longer (e.g., six months) time intervals between waves have on the relationships and the moderating effect of PBS.

The relationships between personality traits, motives for alcohol use, PBS, and HED and alcohol-related problems in undergraduates are complex. The undergraduate lifestyle provides a unique testing paradigm and aspects of this lifestyle should be investigated in order to further

develop our understanding of how to best assist individuals in this population who are engaging in risky drinking behaviour. Qualitative studies could examine factors such as norm perception related to PBS use, alcohol-related problems, and alcohol-use.

Personality risk factors for alcohol-use disorders and related-problems remain an important area of investigation. Successful personality-targeted attempts at reducing alcohol-related problems in adolescents involved psychoeducation, skills training, and brief, personality-targeted interventions for undergraduates may help to reduce problematic alcohol use. Interventions with all undergraduates, possibly as part of a frosh week health seminar, and specifically those who have been identified as at greater risk (e.g., those who have committed an alcohol violation in residence) may result in reductions in alcohol-related problems.

Considering this study and the growing body of literature on PBS use and alcohol-related problems, it appears that research can refine measures utilized to assess these constructs. Future studies examining alcohol-related problems in undergraduate populations should include an assessment of the valence of alcohol-related problems; that is, not only have undergraduates complete a measure assessing how often they experience alcohol-related problems, but also how much distress they expect to experience as a result of each problems or how positively or negatively they view each problem (Mallett et al., 2008). This may allow researchers to weight the items on measures of alcohol-related problems and also provide clinicians the opportunity to modify intervention strategies. If an individual who considers several alcohol-related problems to be neutral or positive experiences, then they may reject intervention efforts that label these consequences as negative.

Modifying and assessing the PBS measures may also prove useful, as undergraduates scores on these measures may be inflated due to the social nature of their lives and living

situation. In addition to administration of these measures, researchers could assess aspects of an individual's social life, as well as include demographic questions about living on- or off-campus and with whom. It may also be interesting to qualitatively gather and examine information regarding strategies that undergraduates consider to be protective against alcohol-related harms. The development of the items on the PBSS (Martens et al., 2005) utilized literature on college-age drinkers, but did not include a qualitative or interview-based component and so, despite the items being endorsed by undergraduate drinkers, further explanation is required regarding when and where strategies are utilized or how useful undergraduates find them.

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Table 1

Means, Standard Deviations, Cronbach's Alpha, and Bivariate Correlations

Measure	M	SD	Alpha	1	2	3	4	5	6	7	8	9	10	11	12
1. SURPS.AS	11.61	2.71	.72												
2. SURPS.SS	16.39	3.58	.71	-.16*											
3. SURPS.I	10.27	2.73	.74	.08	.31***										
4. SURPS.H	12.48	3.34	.87	.27***	-.04	.22***									
5. MDMQR.S	3.04	.80	.68	.12	.13*	.11	-.15*								
6. MDMQR.CA	1.86	.84	.77	.08	.15*	.17*	.23**	.40***							
7. MDMQR.CD	1.41	.70	.94	.13	.09	.20**	.33***	.30***	.77***						
8. MDMQR.E	2.40	.95	.84	.13	.17*	.11	.02	.59***	.61***	.52***					
9. MDMQR.C	1.43	.62	.85	.20**	.01	.22**	.09	.40***	.39***	.43***	.33***				
10. RAPI	10.46	11.57	.94	.08	.14*	.14*	.13*	.26***	.42***	.46***	.37***	.18**			
11. PBSS	45.31	9.71	.78	.05	-.11	-.16*	-.17*	-.08	-.26***	-.23***	-.30***	-.00	-.22*		
12. HED	1.61	3.24		.02	.13*	.08	.06	.14*	.21**	.16*	.28***	.18*	.32**	-.11	

Note. SURPS.AS=Substance Use Risk Profile Scale Anxiety Sensitivity, SURPS.SS= Substance Use Risk Profile Scale Sensation Seeking, SURPS.I= Substance Use Risk Profile Scale Impulsivity, SURPS.H=Substance Use Risk Profile Scale Hopelessness, MDMQR.S=Modified Drinking Motives Questionnaire Revised Social, MDMQR.CA=Modified Drinking Motives Questionnaire Revised Coping Anxiety, MDMQR.CD=Modified Drinking Motives Questionnaire Revised Coping-Depression, MDMQR.E=Modified Drinking Motives Questionnaire Revised Enhancement, MDMQR.C=Modified Drinking Motives Questionnaire Revised Conformity, RAPI=Rutgers Alcohol Problem Inventory, PBSS=Substance Use Risk Profile Scale, HED=Heavy Episodic Drinking

*p < .05; **p < .01; ***p < .001

Table 2

Hierarchical Multiple Regression Analyses Predicting Protective Behavioural Strategies Use

Predictor	R^2	Adj. R^2	β	ΔR^2	ΔF	df
Step 1 Sex	.032	.027	.177	.032	6.646*	1, 204
Step 2 SURPS.AS	.032	.022	.006	.000	.007	1, 203
Step 1 Sex	.032	.027	.170	.032	6.646*	1, 204
Step 2 SURPS.SS	.037	.028	-.075	.006	1.171	1, 203
Step 1 Sex	.032	.027	.157	.032	6.646*	1, 204
Step 2 SURPS.I	.060	.051	-.170	.029	6.217*	1, 203
Step 1 Sex	.032	.027	.172	.032	6.646*	1, 204
Step 2 SURPS.H	.060	.051	-.170	.029	6.217*	1, 203
Step 1 Sex	.032	.027	.177	.032	6.646*	1, 204
Step 2 MDMQR.S	.039	.030	-.088	.008	1.631	1, 203
Step 1 Sex	.030	.025	.142	.030	6.280*	1, 203
Step 2 MDMQR.CA	.096	.087	-.258	.066	14.645***	1, 202
Step 1 Sex	.036	.031	.169	.036	7.474**	1, 203
Step 2 MDMQR.CD	.087	.078	-.228	.052	11.396**	1, 202
Step 1 Sex	.031	.026	.176	.031	6.483*	1, 202
Step 2 MDMQR.E	.132	.123	-.318	.101	23.398***	1, 201
Step 1 Sex	.032	.027	.184	.032	6.651*	1, 202
Step 2 MDMQR.C	.033	.023	.030	.001	.182	1, 201

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 3

Hierarchical Multiple Regression Analyses Predicting Alcohol-Related Problems

Predictor	R^2	Adj. R^2	β	ΔR^2	ΔF	df
Step 1 Sex	.001	-.004	-.025	.001	.139	1, 215
Step 2 SURPS.AS	.030	.021	.171	.029	6.452*	1, 214
Step 1 Sex	.001	-.004	-.025	.001	.139	1, 215
Step 2 SURPS.SS	.035	.026	.184	.034	7.522**	1, 214
Step 1 Sex	.001	-.004	-.025	.001	.139	1, 215
Step 2 SURPS.I	.030	.021	.174	.030	6.559*	1, 214
Step 1 Sex	.001	-.004	-.025	.001	.139	1, 215
Step 2 SURPS.H	.046	.037	.214	.045	10.119**	1, 214
Step 1 Sex	.001	-.004	-.025	.001	.139	1, 215
Step 2 MDMQR.S	.067	.058	.257	.066	15.155***	1, 214
Step 1 Sex	.001	-.004	-.034	.001	.244	1, 214
Step 2 MDMQR.CA	.173	.165	.418	.172	44.200***	1, 213
Step 1 Sex	.001	-.004	-.023	.001	.118	1, 214
Step 2 MDMQR.CD	.213	.205	.462	.212	57.352***	1, 213
Step 1 Sex	.001	-.004	-.031	.001	.211	1, 213
Step 2 MDMQR.E	.138	.130	.370	.211	33.736***	1, 212
Step 1 Sex	.001	-.004	-.022	.001	.102	1, 213
Step 2 MDMQR.C	.033	.023	.182	.032	7.039**	1, 212

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 4

Hierarchical Multiple Regression Analyses Testing the Moderating Effect of Protective Behavioural Strategies Use on the Relationship Between Personality Traits and Motives for Alcohol Use and Alcohol-Related Problems

Predictor	R^2	Adj. R^2	β	ΔR^2	ΔF	df
Step 1	.070	.052		.070	3.790	1, 204
Sex			.033			
SURPS.I			.126			
PBSS			-.210**			
PBSS x SURPS.I			-.022			
Step 1	.074	.055		.074	4.001	4, 201
Sex			.021			
SURPS.H			.141*			
PBSS			-.210**			
PBSS x SURPS.H			-.013			
Step 1	.205	.189		.205	12.910	4, 200
Sex			.028			
MDMQR.CA			.428***			
PBSS			-.113			
PBSS x MDMQR.CA			.138*			
Step 1	.308	.294		.308	22.226	4, 200
Sex			.012			
MDMQR.CD			.587***			
PBSS			-.124*			
PBSS x MDMQR.CD			.311***			
Step 1	.030	.025		.030	6.280*	4, 199
Sex			-.014			
MDMQR.E			.349***			
PBSS			-.107			
PBSS x MDMQR.E			.081			

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 5

Hierarchical Multiple Regression Analyses Predicting Protective Behavioural Strategies Use

Predictor	R^2	Adj. R^2	β	ΔR^2	ΔF	df
Step 1						
Sex	.028	.020	.168	.028	3.326	1, 115
Step 2						
Low MDMQR.CA	.055	.039	-.164	.027	3.262	1, 114
Step 1						
Sex	.030	.019	.174	.030	2.677	1, 86
Step 2						
High MDMQR.CA	.114	.093	-.297	.084	8.008**	1, 85
Step 1						
Sex	.027	.019	.165	.027	3.119	1, 111
Step 2						
Low MDMQR.CD	.046	.029	-.138	.019	2.190	1, 110
Step 1						
Sex	.048	.037	.219	.048	4.529*	1, 90
Step 2						
High MDMQR.CD	.132	.112	-.292	.084	8.604**	1, 89

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 6

Hierarchical Multiple Regression Analyses Predicting Alcohol-Related Problems

Predictor	R^2	Adj. R^2	β	ΔR^2	ΔF	df
Step 1						
Sex	.006	-.002	-.080	.006	.791	1, 122
Step 2						
Low MDMQR.CA	.017	.001	.103	.011	1.295	1, 121
Step 1						
Sex	.001	-.010	.033	.001	.098	1, 90
Step 2						
High MDMQR.CA	.103	.083	.328	.102	10.153**	1, 89
Step 1						
Sex	.000	-.009	-.001	.000	.000	1, 117
Step 2						
Low MDMQR.CD	.007	-.011	.081	.007	.783	1, 116
Step 1						
Sex	.001	-.010	-.029	.001	.078	1, 95
Step 2						
High MDMQR.CD	.137	.119	.372	.137	14.877***	1, 94

* $p < .05$; ** $p < .01$; *** $p < .001$

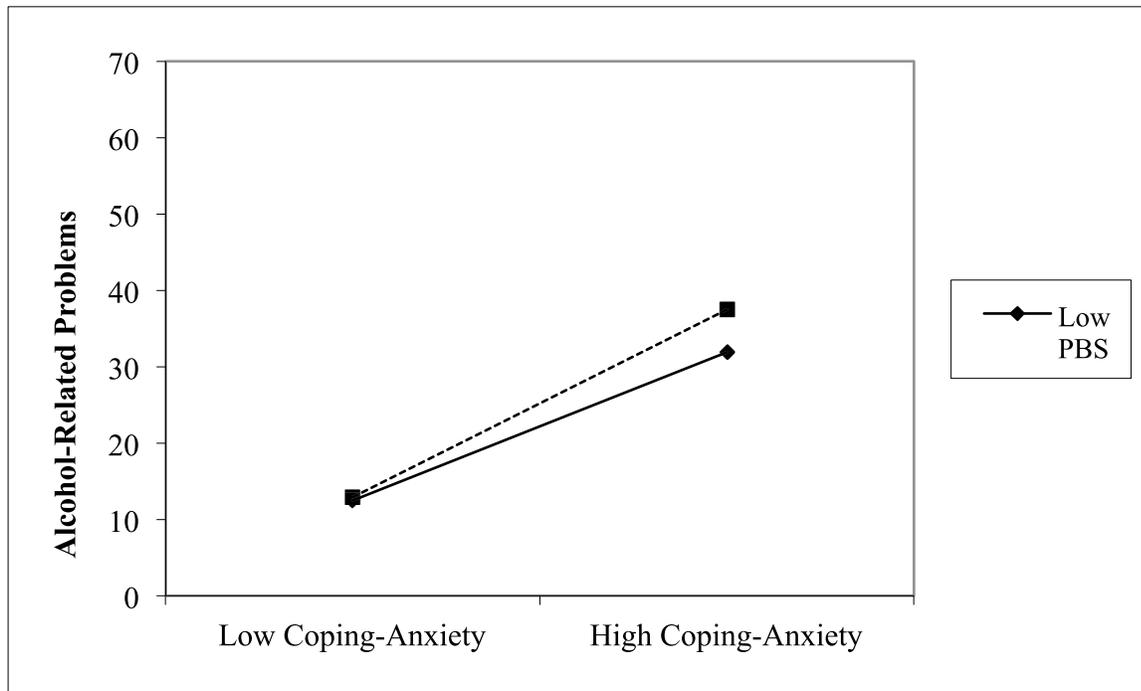


Figure 1. Moderating Effect of Protective Behavioural Strategy Use on the Relationship Between Coping-Anxiety Motives and Alcohol-Related Problems

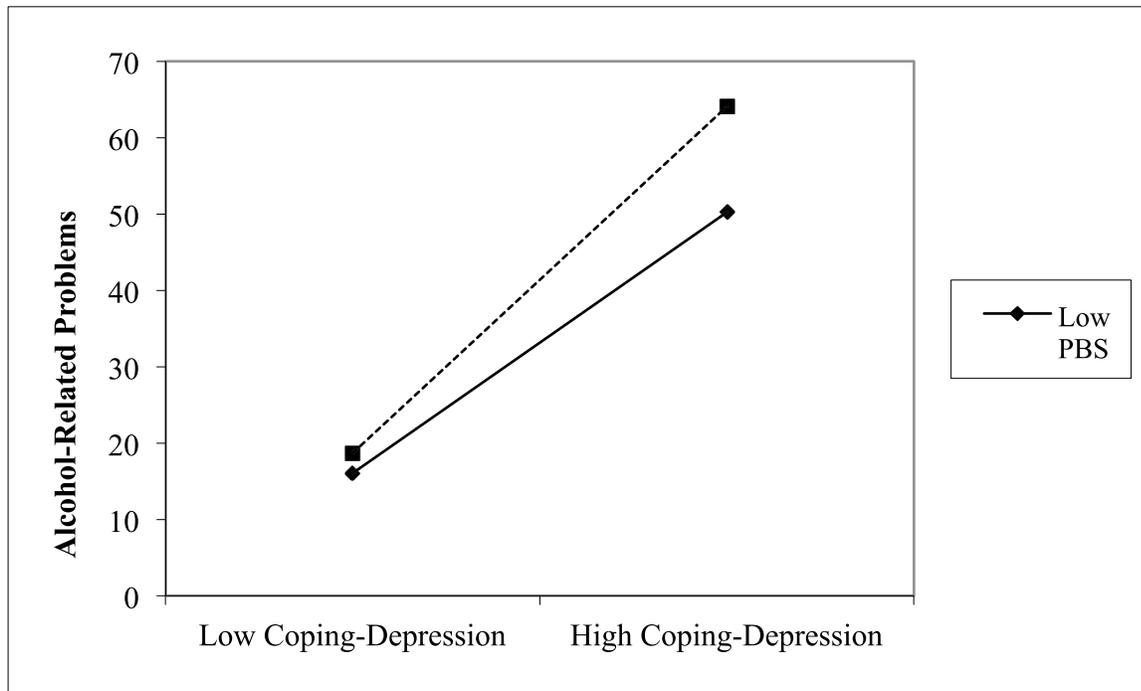


Figure 2. Moderating Effect of Protective Behavioural Strategy Use on the Relationship Between Coping-Depression Motives & Alcohol-Related Problems

APPENDIX A

Measures

Demographic Information

NOTE: IF YOU DO NOT KNOW THE EXACT ANSWER, PLEASE PROVIDE YOUR BEST ESTIMATE.

<p>1. Your age: _____ years</p> <p>2. Your sex: male _____ female _____ other _____</p> <p>3. Your ethnicity (e.g., Asian, Caucasian/White, First Nations, etc.): _____</p> <p>4. Your biological mother's ethnicity: _____</p> <p>5. Your biological father's ethnicity: _____</p> <p>6. Your country of birth: _____</p> <p>7. How long have you lived in Canada? _____ years</p> <p>8. Your relationship status: single _____ dating _____ separated _____ married _____ divorced _____ cohabiting (i.e., living with your partner) _____ widowed _____ other (please specify) _____</p> <p>9. Your year of study in university (e.g., 1st): _____</p> <p>10. Your major in university (e.g., Economics): _____</p> <p>Note: "undecided" or "undeclared" may be listed as a Major</p> <p>11. Your occupation (e.g., teacher): _____ Note: "student" may be listed as an occupation</p> <p>12. Check the option that best describes your employment situation: I work full-time _____ I work part-time _____ I am unemployed _____ I am a homemaker _____ I am retired _____ other (please specify) _____</p>	<p>13. Check the option that best describes your educational situation: I am a part-time student _____ I am a full-time student _____ other (please specify) _____</p> <p>14. Question 14 does <i>not</i> ask about your annual <u>personal income</u>. Instead, Question 14 asks about your annual <u>family income</u>. In other words, indicate how much money was earned last year in the household where you were raised. Check the option that best describes your annual <u>family income</u> in Canadian dollars (before taxes, deductions, etc.): \$0.00 - \$19 999 _____ \$20 000 - \$39 999 _____ \$40 000 - \$59 999 _____ \$60 000 - \$79 999 _____ \$80 000 - \$99 999 _____ \$100 000 - \$119 999 _____ \$120 000 - \$139 999 _____ \$140 000 - \$159 999 _____ \$160 000 - \$179 999 _____ \$180 000 - \$199 999 _____ greater than \$200 000 _____</p> <p>15. How many people are supported by your total annual <u>family income</u> (listed in question 14)? _____</p> <p>16. What is your current weight? Report either in pounds _____ or in kilograms _____</p> <p>17. What is your current height? Report either in feet/inches _____ or in meters/centimeters _____</p> <p>18. Are you a varsity athlete on a university team? _____ Yes _____ No</p> <p>19. Do you participate in intramural sports? _____ Yes _____ No</p> <p>20. If yes to # 18 or # 19 above, would you consider your sport a team sport or an individual sport? _____ Team _____ Individual</p>
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SURPS (Woicik et al., 2009)

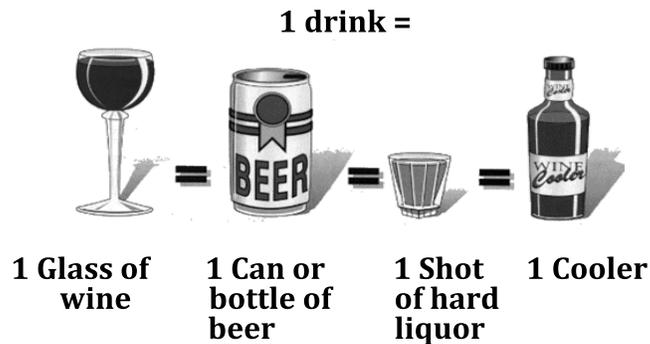
Please circle completely to show how much you agree or disagree with the following statements.

These questions are about your personality, that is, about the kind of person you generally are. Please respond based on how you usually have felt or behaved **over the past several years**.

	Strongly Disagree	Disagree	Agree	Strongly Agree
1. I am content.	1	2	3	4
2. I often don't think things through before I speak.	1	2	3	4
3. I would like to skydive.	1	2	3	4
4. I am happy.	1	2	3	4
5. I often involve myself in situations that I later regret being involved in.	1	2	3	4
6. I enjoy new and exciting experiences even if they are unconventional.	1	2	3	4
7. I have faith that my future holds great promise.	1	2	3	4
8. It's frightening to feel dizzy or faint.	1	2	3	4
9. I like doing things that frighten me a little.	1	2	3	4
10. It frightens me when I feel my heart beat change.	1	2	3	4
11. I usually act without stopping to think.	1	2	3	4
12. I would like to learn how to drive a motorcycle.	1	2	3	4
13. I feel proud of my accomplishments.	1	2	3	4
14. I get scared when I'm too nervous.	1	2	3	4
15. Generally, I am an impulsive person.	1	2	3	4
16. I am interested in experience for its own sake even if it is illegal.	1	2	3	4
17. I feel that I'm a failure.	1	2	3	4
18. I get scared when I experience unusual body sensations.	1	2	3	4
19. I would enjoy hiking long distances in wild and uninhabited territory.	1	2	3	4
20. I feel pleasant.	1	2	3	4
21. It scares me when I'm unable to focus on a task.	1	2	3	4
22. I feel I have to be manipulative to get what I want.	1	2	3	4
23. I am very enthusiastic about my future.	1	2	3	4

Alcohol Use

Note: One alcoholic beverage = one bottle of beer, one cooler, one small [4-ounce] glass of wine, or one shot / mixed drink containing an ounce of hard liquor)



1. Have you EVER had a drink of alcohol in your life?

- No → Skip to page 22
- Yes
- Don't know
- Prefer not to answer

2. If YES: How old were you when you first drank alcohol?

Enter age in years _____

3. How often do you normally drink alcohol? (Please enter a number beside **one** of the following):

- _____ times per week (maximum = 7)
- _____ times per month (if less than once per week)
- _____ times per year (if less than once per month)

4. How much do you typically drink when you drink?

- _____ maximum number of beverages per occasion
- _____ average number of beverages per occasion
- _____ minimum number of beverages per occasion

MDMQR (Blackwell & Conrod, 2003)

Below is a list of reasons people sometimes give for drinking alcohol. Thinking of all the times you drink alcohol, how often would you say that you drink for each of the following reasons?

Please respond based on how you usually have felt or behaved <u>over the past several years</u> .	Almost never/ Never	Some of the time	Half of the time	Most of the time	Almost always/ Always
1. As a way to celebrate	1	2	3	4	5
2. To relax	1	2	3	4	5
3. Because I like the feeling	1	2	3	4	5
4. Because it is what most of my friends do when we get together	1	2	3	4	5
5. To forget my worries	1	2	3	4	5
6. Because it is exciting	1	2	3	4	5
7. To be social	1	2	3	4	5
8. Because I feel more self-confident or sure of myself	1	2	3	4	5
9. To get a high	1	2	3	4	5
10. Because it is customary on special occasions	1	2	3	4	5
11. Because it helps me when I am feeling nervous	1	2	3	4	5
12. Because it's fun	1	2	3	4	5
13. Because it makes a social gathering more enjoyable	1	2	3	4	5
14. To cheer me up when I'm in a bad mood	1	2	3	4	5
15. To be liked	1	2	3	4	5
16. To numb my pain	1	2	3	4	5
17. Because it helps me when I am feeling depressed	1	2	3	4	5
18. So that others won't kid me about not using	1	2	3	4	5
19. To reduce my anxiety	1	2	3	4	5
20. To stop me from dwelling on things	1	2	3	4	5
21. To turn off negative thoughts about myself	1	2	3	4	5
22. To help me feel more positive about things in my life	1	2	3	4	5
23. To stop me from feeling so hopeless about the future	1	2	3	4	5
24. Because my friends pressure me to use	1	2	3	4	5
25. To fit in with a group I like	1	2	3	4	5
26. Because it makes me feel good	1	2	3	4	5
27. To forget painful memories	1	2	3	4	5
28. So I won't feel left out	1	2	3	4	5

RAPI (White & Labouvie, 1989)

Different things happen to people while they are drinking ALCOHOL or because of their ALCOHOL drinking. Several of these things are listed below. Indicate how many times each of these things happened to you.

	In the past 3 years				In the past 7 days			
	None	1-2 times	3-5 times	More than 5 times	None	1 time	2 times	3 or more times
1. Not able to do your homework or study for a test	0	1	2	3	0	1	2	3
2. Got into fights, acted bad, or did mean things	0	1	2	3	0	1	2	3
3. Missed out in other things because you spent too much money on alcohol	0	1	2	3	0	1	2	3
4. Went to work or school high or drunk	0	1	2	3	0	1	2	3
5. Caused shame or embarrassment to someone	0	1	2	3	0	1	2	3
6. Neglected your responsibilities	0	1	2	3	0	1	2	3
7. Relatives avoided you	0	1	2	3	0	1	2	3
8. Felt that you needed <i>more</i> alcohol than you used to use in order to get the same effect	0	1	2	3	0	1	2	3
9. Tried to control your drinking by trying to drink only at certain times of the day or certain places	0	1	2	3	0	1	2	3
10. Had withdrawal symptoms, that is, felt sick because you stopped or cut down on drinking	0	1	2	3	0	1	2	3
11. Noticed a change in your personality	0	1	2	3	0	1	2	3
12. Felt that you had a problem with alcohol	0	1	2	3	0	1	2	3
13. Missed a day (or part of a day) of school or work	0	1	2	3	0	1	2	3
14. Tried to cut down or quit drinking	0	1	2	3	0	1	2	3
15. Suddenly found yourself in a place that you could not remember getting to	0	1	2	3	0	1	2	3
16. Passed out or fainted suddenly	0	1	2	3	0	1	2	3
17. Had a fight, argument, or bad feelings with a friend	0	1	2	3	0	1	2	3
18. Had a fight, argument, or bad feelings with a family member	0	1	2	3	0	1	2	3
19. Kept drinking when you promised yourself not to	0	1	2	3	0	1	2	3
20. Felt you were going crazy	0	1	2	3	0	1	2	3
21. Had a bad time	0	1	2	3	0	1	2	3
22. Felt physically or psychologically dependent on alcohol	0	1	2	3	0	1	2	3
23. Was told by a friend or neighbor to stop or cut down drinking	0	1	2	3	0	1	2	3

PBSS (Martens et al., 2005)

Indicate the degree to which you engaged in the following behaviours when using alcohol or “partying”.

	In general, over the last several years, I ...					During the past 7 days, I ...				
	Never				Always	Never				Always
1. Determine not to exceed a set number of drinks	1	2	3	4	5	1	2	3	4	5
2. Alternate alcoholic and nonalcoholic drinks	1	2	3	4	5	1	2	3	4	5
3. Have a friend let you know when you've had enough	1	2	3	4	5	1	2	3	4	5
4. Leave the bar/party at a predetermined time	1	2	3	4	5	1	2	3	4	5
5. Stop drinking at a predetermined time	1	2	3	4	5	1	2	3	4	5
6. Drink water while drinking alcohol	1	2	3	4	5	1	2	3	4	5
7. Put extra ice in your drink	1	2	3	4	5	1	2	3	4	5
8. Avoid drinking games	1	2	3	4	5	1	2	3	4	5
9. Drink shots of liquor	1	2	3	4	5	1	2	3	4	5
10. Avoid mixing different types of alcohol	1	2	3	4	5	1	2	3	4	5
11. Drink slowly, rather than gulp or chug	1	2	3	4	5	1	2	3	4	5
12. Avoid trying to “keep up” or out-drink others	1	2	3	4	5	1	2	3	4	5
13. Use a designated driver	1	2	3	4	5	1	2	3	4	5
14. Make sure that you go home with a friend	1	2	3	4	5	1	2	3	4	5
15. Know where your drink has been at all times	1	2	3	4	5	1	2	3	4	5

HED-S (Mushquash et al., 2012)

1. What is the greatest number of drinks you consumed in a 2-hour period **during the past 7 days**? Write your response below:

_____ drinks