Unplanned Drinking and Alcohol-Related Problems: A Preliminary Test of the Model of Unplanned Drinking Behavior

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Abstract

Much research links impulsivity with alcohol use and problems. In two studies, unplanned (or impulsive) drinking is assessed directly to determine whether it has direct effects on alcohol use and alcohol-related problems. In study 1, we examined whether unplanned drinking serves as a proximal mediator of the effects of impulsivity-like traits on alcohol-related outcomes. With a sample of 211 college student drinkers, we found that the Unplanned Drinking Scale was significantly related to alcohol use, and perhaps more importantly, had a direct effect on alcohol-related problems even after controlling for frequency and quantity of alcohol use. Further, unplanned drinking partially mediated the effects of negative urgency on alcohol-related problems. In study 2, we examined whether unplanned drinking accounts for unique variance in alcohol-related outcomes when controlling for use of protective behavioral strategies. With a sample of 170 college students, we replicated the findings of Study 1 in that the Unplanned Drinking Scale had a significant direct effect on alcohol-related problems even after controlling for alcohol use; further, this effect was maintained when controlling for use of protective behavioral strategies. Limitations include the modest sample sizes and the cross-sectional design. Future directions for testing the Model of Unplanned Drinking Behavior are proposed.

Keywords

alcohol use; alcohol consequences; college students; impulsivity; unplanned drinking; protective behavioral strategies

Alcohol misuse among college students has multiple deleterious impacts, including injuries, assaults, and in extreme cases, death. Moreover, despite many prevention and intervention efforts, there is evidence that these problems are increasing (Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002; Hingson, Zha, & Weitzman, 2009). Clearly, it is important that innovative strategies for reducing negative alcohol consequences be explored and adopted. In order to develop new successful harm-reduction strategies, pioneering models of drinking need to be rigorously tested and developed. The present research seeks to examine a new model of college drinking entitled the Model of Unplanned Drinking Behavior (MUDB).

Model of Unplanned Drinking Behavior (MUDB)

The Theory of Planned Behavior (TPB; Ajzen, 1991) has been previously applied to the study of a variety of risky/addictive behaviors including alcohol use (Marcoux & Shope,

1997). The current conceptualization of TPB posits that attitudes, subjective norms, descriptive norms, and perceived behavioral control affect one's behavioral intentions, which in turn predicts actual behavior (Ajzen, 2011). Behavioral intentions are viewed as the most proximal antecedent to actual behavior. Consistent with other health behaviors, behavioral intentions usually account for much less than 50% of the variance in actual behavior (Armitage & Conner, 2001), presumably because actual control over one's behavior moderates the relationship between behavioral intentions and actual behavior. In other words, there should be a very strong relationship between one's intentions and behavior only when one has full control of their own behavior. In contrast, when control over one's behavior is low, the intention-behavior relationship should be much weaker. Given the modest relationship between intentions and behavior, other models like the Prototype Willingness Model (PWM) have included additional predictors of behavior, namely, behavioral willingness (Gibbons, Gerrard, Blanton, & Russell, 1998).

Whereas the TPB and PWM are focused on drinking behavior as the outcome of interest, the MUDB that we introduce in the present studies situates *drinking consequences* as the outcome of interest (see Figure 1). We introduce this model to illustrate that not only is the drinking intention- behavior relationship relatively modest, but also the drinking behavior-negative consequences relationship is likewise relatively modest. In fact, alcohol use variables tend to account for less than 50% of the variance in alcohol-related consequences (Pearson, Kite, & Henson, in press). The MUDB model posits that unplanned drinking is likely to lead to negative alcohol-related consequences, because lessening these negative consequences requires a certain level of planning and impulse control.

Although it is well known that frequency/quantity of alcohol consumption is positively related to alcohol-related problems, the MUDB aims to explain why individuals who drink similar quantities of alcohol with similar frequency experience a different number of alcohol-related problems. All else being equal, one would expect an individual who binge drinks to experience more problems than one who drinks moderately. Similarly, all else being equal, the MUDB predicts that the individual who intends (i.e., plans) to binge drink will be more prepared to do so in a relatively safe manner compared to one who did not intend to binge drink (or drink at all) and drinks more than intended.

The present studies are the first to examine the MUDB. This model posits that unplanned drinking is likely to lead to negative consequences, because minimizing these consequences requires a certain level of planning and impulse control. Although it is fully expected that frequency/quantity of alcohol consumption is positively associated with alcohol-related consequences, the present studies are concerned with explaining why individuals who drink similar quantities of alcohol with similar frequency experience a different number of alcohol-related problems. It is reasoned that an individual who *intends* to binge drink is likely to be prepared to do so in a relatively safe manner (e.g., plan a designated driver, drink with responsible friends), whereas an individual who drinks beyond what one intends to drink is likely to be unprepared to handle the consequences of their drinking (e.g., driving home from a bar). In fact, recent research on protective behavioral strategies has found that the use of specific behavioral strategies is important for avoiding negative alcohol-related problems (Martens et al., 2005; Martens, Pederson, LaBrie, Ferrier, & Cimini, 2007).

Research on the situational specificity of drug tolerance (Siegel, 2005; Siegel, Baptista, Kim, McDonald, & Weise-Kelly, 2000) may provide additional support for the MUDB. As Siegel (2005) describes, "[a]fter some pairings of the pre-drug conditional stimulus and pharmacological unconditional stimulus, conditional compensatory responses counteracting the drug effect develop, producing tolerance" (p. 297). In other words, through classical conditioning, internal and external cues that become associated with consuming substances

(e.g., consuming alcohol) can lead to both withdrawal symptoms and tolerance. Therefore, in the context of college drinking, planned binge-drinking episodes where the situational specificity is controlled by the drinker may lead to additional tolerance effects. In contrast, unplanned drinking may be associated with a lack of associated internal and external drinking cues, which may relate to less tolerance and higher intoxication. Specifically, when one finds themselves drinking 'all of a sudden,' the reduced presence of conditioned cues may reduce acute tolerance, which in turn can lead to greater intoxication and in turn alcohol-related problems.

Based on the simple assumption that unplanned drinking is problematic (i.e., likely to result in negative alcohol-related consequences), the MUDB has three basic premises/hypotheses. The first premise is that unplanned drinking will be directly related to higher alcohol-related consequences even after controlling for frequency and quantity of alcohol use. The second premise is that the effect of individual difference variables (i.e., impulsivity-like traits) that have direct effects on alcohol-related problems after controlling for alcohol use should be mediated by unplanned drinking. The third premise is that interventions that successfully decrease unplanned drinking or developmental processes that similarly decrease unplanned drinking (i.e., maturation) will be associated with a concomitant decrease in alcohol-related problems.

Impulsivity and Alcohol Outcomes

In an effort to identify individuals who are most at risk for experiencing alcohol-related consequences, many researchers have examined impulsivity as a primary predictor of increased consequences. According to traditional theories of personality, impulsivity is a stable trait associated with doing and saying things without careful consideration (Eysenck & Eysenck, 1977). Importantly, researchers who operationalize impulsivity as a unidimensional construct have found that impulsivity predicts alcohol-related problems even after controlling for alcohol use (Neal & Carey, 2007; Simons, 2003; Simons, Gaher, Correia, Hansen, & Christopher, 2005). Therefore, it is important to understand and characterize the specific mechanisms by which impulsivity predicts increased problems beyond that which is explained by heavy alcohol use.

According to more recent personality theories, impulsivity can be conceptualized as an outward behavioral consequence effected by the combination of several related personality traits (Whiteside & Lynam, 2001). Based on the Five-Factor Model of Personality (Costa & McCrae, 1992), Whiteside and Lynam (2001) proposed a four-factor model of impulsivity-like traits that includes (lack of) premeditation, (lack of) perseverance, sensation seeking, and (negative) urgency. Premeditation involves planning and deliberating on the consequences of one's behavior prior to action. Perseverance involves persistence, or the ability to complete tasks in the face of distractions or boredom. Sensation seeking refers to a tendency to seek out new and exciting activities even if they involve risk/danger. Although negative urgency tends to be defined as the tendency to act rashly when experiencing negative affect, it also encompasses general impulsive tendencies (i.e., "I have trouble controlling my impulses").

Using a four-factor model of impulsivity, Magid and Colder (2007) found that negative urgency and perseverance had direct effects on alcohol-related problems that could not be accounted for by alcohol use. Further, Smith et al. (2007) found that negative urgency had direct effects on alcohol-related problems, and Fischer and Smith (2008) found that premeditation and negative urgency had direct effects on problem drinking. Despite the heterogeneity in the assessment of impulsivity, much research demonstrates that impulsivity or impulsivity-like traits directly predict alcohol-related problems beyond that which can be

explained by their effect on overall drinking levels (Fischer & Smith, 2008; Magid & Colder, 2007; Neal & Carey, 2007; Simons, 2003; Simons, Gaher, Correia, Hansen, & Christopher, 2005).

Study 1

Purpose—In Study 1, the first two premises of the MUDB were tested. To test the first hypothesis that unplanned drinking would predict alcohol-related problems after controlling for alcohol use, a new self-report scale was developed called the Unplanned Drinking Scale for which we examined the factor structure using exploratory factor analysis. To test the second premise that unplanned drinking explains why some factors predict differences in alcohol-related consequences after controlling for consumption, we examined whether the effects of four impulsivity-like traits on alcohol-related problems is at least partially mediated by unplanned drinking. Consistent with previous research that has shown negative urgency to have the strongest and most consistent direct effect on alcohol-related problems, it is expected that this effect will be at least partially mediated by its relationship to unplanned drinking.

Method

Participants and Procedure—Two hundred eleven students (140 women) participated at a large university in Southeast Virginia. The participants were mostly freshmen (37%) or sophomores (30.3%), with few juniors (18%), seniors (14.2%), and graduate students (.5%). Most of the sample self-identified their racial group as Caucasian or White (65.9%), 23.2% as African-American or Black, 4.3% as Latino or Latina, 2.8% as Asian or Pacific Islander, and 3.8% as a group other than those stated. The vast majority identified themselves as single (58.8%) or 'in a committed relationship' (34.1%), 4.7% as married, and 2.4% as divorced. Most participants reported living off-campus in a house or apartment (40.8%) or on-campus in a dormitory (39.8%); 19.4% reported living with family. Only 10.4% reported being a member or pledge of a social fraternity or sorority. Most participants were underage drinkers (70.3% between 18–20 years old; $M = 20.5$, $Median = 20$, $Mode = 19$, $SD = 3.78$).

Any participant whose first language was English, was at least 18 years of age, and reported drinking at least twice in the past 30 days was able to participate in this study in exchange for course credit. Participants signed up for a one-hour appointment and reported to a designated research lab on campus to participate in the study. Participants first read the notification statement that included the elements of informed consent and they provided consent by clicking 'Next' to proceed to the survey. To avoid priming alcohol-related concepts, the participants were told that the study concerned the relationship between processing speed and health behavior. All participants completed three computer tasks in a counterbalanced order followed by a battery of surveys. All data were kept anonymous. All procedures were approved by the human subjects committee at the participating university.

Measures

Impulsivity-like traits: Impulsivity-like-traits were assessed with the 45-item Urgency Premeditation Perseverance Sensation seeking Impulsive Behavior Scale (UPPS; Whiteside & Lyman, 2001). All items are measured on a 4-point Likert-type scale (*Strongly Disagree*, *Disagree*, *Agree*, and *Strongly Agree*). The UPPS assesses *Negative Urgency* (12 items), *Premeditation* (11 items), *Perseverance* (10 items), and *Sensation Seeking* (12 items). Higher scores on *Premeditation* and *Perseverance* represent less impulsivity, whereas higher scores on *Negative Urgency* and *Sensation Seeking* represent more impulsivity. All Cronbach's alphas for multi-item inventories are shown in Table 1.

Unplanned drinking: The purpose of the original study was to distinguish between deliberate (planned) and impulsive (unplanned) processes that lead to risky drinking. As there was no brief, direct measure of impulsive drinking per se in the literature, the first author generated seven items to assess unplanned (or impulsive) drinking behaviors. The items were checked for face validity, and several research assistants pilot-tested the survey with instructions to identify any items that were unclear or confusing. All items were measured on a 5-point Likert-type scale ranging from 1 = *almost never/never* to 5 = *almost always/always*. Four items were worded so that higher scores were indicative of unplanned drinking (e.g., "I drink when I do not plan to drink," "I drink more than I originally planned to," "I begin drinking without really thinking about it," "I find myself drinking 'all of a sudden'"), and three items were reverse-coded as they were indicative of planned drinking ("I drink after planning to drink," "I carefully plan how much I am going to drink before I drink," "I drink the same amount that I plan to drink").

Alcohol use: Alcohol use was measured using a modified version of the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985). Before measuring alcohol use, all participants viewed a page that defined a standard drink as 12 oz of beer, 4 oz of wine, or 1 oz of hard liquor straight or in a mixed drink. Four measures of alcohol use were examined: 1) quantity of alcohol use during a typical drinking week in the past 30 days, 2) quantity of alcohol use during the heaviest drinking week in the past 30 days, 3) frequency of alcohol use during a typical drinking week in the past 30 days, and 4) frequency of alcohol use during the heaviest drinking week in the past 30 days.

Alcohol problems: The most frequently used measure of alcohol-related problems is the Rutgers Alcohol Problems Index (RAPI; White & Labouvie, 1989). Participants are asked whether they experienced any of the given alcohol problems in the past 90 days (e.g., "neglected your responsibilities"). Although the original RAPI was measured on a Likert-type scale measuring frequency of occurrence of each alcohol-related problem, research has demonstrated the usefulness of scoring the RAPI items dichotomously (Martens, Neighbors, Dams-O'Connor, Lee, & Larimer, 2007). Therefore, the RAPI was administered as a checklist, and items were summed to create a composite score of total number of alcohol problems experienced in the past 90 days. More recently, a measure of alcohol-related problems was developed using item response theory called the Brief-Young Adult Alcohol Consequences Questionnaire (B-YAACQ; Kahler, Strong, & Read, 2005). This measure was meant to assess a wider range of alcohol-related problems than previous measures (including RAPI), as well as perform similarly across gender. Participants are asked whether they have experienced any of the alcohol problems in the past 90 days (e.g., "I have passed out from drinking"). The B-YAACQ was also administered as a checklist, scored dichotomously, and summed to create a composite score.

Results

Descriptive Statistics—Table 1 summarizes the descriptive statistics and correlations among all study variables. In the previous 30 days, the average participant in the present study consumed alcohol on about 8 days, binged between 5 and 6 days (5+ drinks on single occasion for men, 4+ drinks on single occasion for women) in the past month, consumed a little more than 12 drinks during the typical drinking week, and between 19 and 20 drinks during the heaviest drinking week. According to the RAPI, the average participant experienced nearly 4 alcohol-related problems in the previous 90 days and more than 6 alcohol-related problems in the previous 90 days according to the B-YAACQ. Based on an 18-item version of the RAPI, Neal, Corbin, and Fromme (2006) found that RAPI scores greater than seven were associated with increased likelihood of alcohol treatment. In the

present sample, 7.6% endorsed clinically significant alcohol-related problems (RAPI scores ≥ 8).

Factor Structure of the Unplanned Drinking Scale—To examine the factor structure of the Unplanned Drinking Scale, we conducted an exploratory factor analysis with maximum likelihood extraction and direct oblimin rotation. The EFA results showed that a single dominant factor explained 40.43% of the total scale variance (Eigenvalues: 2.83, 1.13, 1.05, .60, .54, .46, .40). The four items that most clearly assessed 'unplanned' drinking loaded on the first factor, and the three reverse-coded items that assessed 'planned' drinking loaded on a second (2 items) and third factor (1 item). Because we required a strong, unidimensional and face valid assessment of Unplanned Drinking, we dropped the three 'planned' (i.e., reverse-coded) drinking items so that the final Unplanned Drinking Scale contains four items that load strongly on a single factor [factor loadings: .737 ("I drink when I do not plan to drink"), .708 ("I find myself drinking 'all of a sudden'"), .670 ("I begin drinking without really thinking about it"), .530 ("I drink more than I originally planned to")]. Subsequent analyses used a composite Unplanned Drinking score created by averaging the four items of the scale (α = .74).

Hypothesis 1: Concurrent Validity of Unplanned Drinking Scale—Examining each alcohol problems measures separately (RAPI and B-YAACQ), two hierarchical regressions were conducted to characterize the concurrent validity of the Unplanned Drinking Scale controlling for known covariates: gender and consumption. In step 1, gender was entered as a covariate. In step 2, four measures of alcohol use (typical quantity of use, heaviest quantity of use, typical frequency of use, heaviest frequency of use) were entered to control for consumption. Because of the high correlations among the four types of consumption, we focus on the combined effect of these alcohol use measures by examining the change in R-squared, rather than the strength and significance of any one of the regression coefficients. In step 3, the Unplanned Drinking Scale score was entered to demonstrate its incremental validity beyond gender and consumption. These results are shown in Table 2.

In step 1, gender was not significantly related to either alcohol problems measure. In step 2, the four alcohol use measures accounted for 23.8% of the variance in alcohol-related problems as assessed by the RAPI, and 26.1% of the variance in problems assessed by the B-YAACQ. In step 3, unplanned drinking significantly predicted both alcohol-related problems beyond that which was explained by gender and alcohol use.

Hypothesis 2: Indirect Effects of Impulsivity-like Traits on Alcohol-Related Problems—We estimated the total, direct, and indirect effects of impulsivity-like traits on alcohol-related consequences through unplanned drinking in a path analytic model using a bias corrected bootstrap (Efron & Tibshirani, 1993). The bias-corrected bootstrap does not rely on the tenuous assumption that the indirect effects are normally distributed and has been shown to be one of the most powerful tests of mediation (Fritz & MacKinnon, 2007; Preacher & Hayes, 2004, 2008). Specifically, using MPlus 6 (Muthén & Muthén, 1998–2010), we bootstrapped each analysis 5,000 times, and all parameters were estimated using full information maximum likelihood estimation.

Initially, we included all four measures of alcohol use in this model, but because there was high multi-collinearity among the alcohol use measures, we tested a simpler model shown in Figure 2 that only included typical drinks per week as the operationalization of consumption; final results do not change by using a different alcohol use measure. The purpose of these analyses was to ascertain if either unplanned drinking or typical drinks per week mediated the effects of each impulsivity-like trait on alcohol-related problems. Under

the MUDB, we expected significant mediated effects of impulsivity on problems specifically through unplanned drinking after controlling for quantity of alcohol use.

Figure 2 shows all the significant relationships (i.e., direct effects) among our variables. Table 3 lists the total indirect effects (i.e., combined mediated effects through unplanned drinking and alcohol consumption), specific indirect effects through unplanned drinking and consumption, direct effects (i.e., effects controlling for mediated effects through unplanned drinking and consumption), and total effects (i.e., not controlling for unplanned drinking and alcohol consumption); gender was a covariate in all analyses.

As described in Figure 2 and Table 3, negative urgency had direct effects on both measures of alcohol problems, which suggests that those with higher negative urgency report more consequences even after controlling for unplanned drinking and alcohol quantity. Consistent with the predictions of the MUDB, negative urgency had a significant mediated effect on problems assessed by the B-YAACQ via unplanned drinking, but not via typical quantity of use. Although the mediated effect of negative urgency on problems assessed by the RAPI did not reach significance, the total indirect effect was 'marginal' (i.e., $p < .10$).

To further elucidate this marginal negative urgency relationship with the RAPI, two post-hoc models were examined. In the first model, typical quantity of use was dropped from the model and only unplanned drinking was examined as a mediator of impulsivity-like traits. In this model, negative urgency had a direct effect (= .35, $p = .000$) on the RAPI, but unplanned drinking was also a significant mediator (= .07, $p = .023$). In the second model, unplanned drinking was dropped from the model and only typical quantity of alcohol use was examined as a mediator of impulsivity-like traits. Again, the direct effect (= .38, $p = .000$) on the RAPI was significant, but typical quantity of alcohol use was not a significant mediator (= .03, $p = .326$). Thus, unplanned drinking partially mediated the effects of negative urgency on both measures of alcohol-related consequences.

Consistent with previous research, the effects of sensation seeking on both measures of alcohol problems were fully mediated by quantity of alcohol use. Further, sensation seeking was unrelated to unplanned drinking. Premeditation had a significant indirect effect on both measures of problems via quantity of use. Although the indirect effects of premeditation via unplanned drinking did not reach statistical significance, it is important to note that premeditation was significantly inversely related to unplanned drinking (= −.15, $p = .048$). Perseverance had a direct effect on alcohol problems assessed by the B-YAACQ, but was unrelated to unplanned drinking.

Discussion

Consistent with past research (Fischer & Smith, 2008; Magid & Colder, 2007; Smith et al., 2007), we found that at least some impulsivity-like traits predicted alcohol-related problems above and beyond their effects on alcohol use. Using the newly developed Unplanned Drinking Scale (UDS), the results indicated that unplanned drinking predicts alcohol-related problems when controlling for frequency/quantity of alcohol use and gender. These results support the primary hypothesis of the MUDB that asserts that unplanned drinking is problematic (i.e., likely to result in alcohol-related problems). Supporting the second premise of this model, we found that unplanned drinking partially mediated the effects of negative urgency on alcohol-related problems. This finding suggests that people who have poor impulse control more generally or specific deficits in impulse control when experiencing negative affect experience more negative consequences at least partially due to the fact that they do not plan their alcohol consumption.

As impulsivity-like traits have been shown to have robust relationships with alcohol-related problems even after controlling for frequency and quantity of alcohol use, it is important to identify more proximal mediators through which impulsivity could affect alcohol-related consequences. Although unplanned drinking did not fully mediate any of the relationships, it did partially mediate some relationships. Whereas impulsivity-like traits are considered more stable personality traits, proximal mediators, such as unplanned drinking, are likely more amenable to change. Therefore, if an intervention could successfully decrease unplanned drinking, it may be particularly beneficial for impulsive individuals, especially individuals high in negative urgency.

Importantly, Study 1 examined two premises of the MUDB, and is the first study to test this theoretical model. As always, it is important to replicate these findings to confirm the veracity and generalizability of these conclusions. It is also important to identify the overlap between the UDS and use of protective behavioral strategies (PBS), because multiple studies have examined protective behavioral strategies as a proximal behavioral mediator of risk factors associated with alcohol-related problems including drinking motives (Martens, Ferrier, & Cimini, 2007; Patrick, Lee, & Larimer, 2011), depressive symptoms (Martens et al., 2008), conscientiousness (Martens et al., 2009), and age of drinking onset (Palmer, Corbin, & Cronce, 2010). Therefore, to properly develop and characterize the utility of the MUDB, it is important to examine if the UDS has a unique effect on outcomes after controlling for use of PBS.

Study 2

Purpose—The purpose of Study 2 was to both replicate and extend some of the findings from Study 1. First, we confirm the factor structure of the UDS from Study 1 on a new sample using confirmatory factor analysis (CFA). Second, to retest the first premise of the MUDB, we examined whether the UDS predicts unique variance in alcohol consequences when controlling for alcohol use. Third, we examined the relationship between unplanned drinking and use of PBS. Specifically, we wanted to identify whether the direct effect of unplanned drinking on alcohol consequences remained significant when controlling for PBS. It is important to distinguish our conceptualization of "unplanned drinking" from the conceptually similar construct of PBS, which represent alcohol-use behaviors related to "planned drinking."

Method

Participants and Procedure—One hundred seventy (89 women) college student drinkers participated at a large university in Southeast Virginia. Participants included freshmen (30.6%), sophomores (23.5%), juniors (19.4%), seniors (24.7%), and graduate students (1.2%). About half of the sample self-identified their racial group as Caucasian or White (51.2%), 30.0% as African-American or Black, 3.5% as Latino or Latina, 5.9% as Asian or Pacific Islander, 1.2% Native American, and 7.1% as a group other than those stated.

Participants enrolled and participated in a brief survey online (~15 minutes) that was described as a study examining drinking behaviors. All participants electronically volunteered their participation after reading a notification statement that explained what the study involved ("this study will require you to fill out an online survey") and the inclusionary criteria ("you must be at least 18 years of age and have consumed alcohol at least once in the past 30 days to participate in this study"). All data were kept anonymous, and all procedures were approved by the human subjects committee at the participating university

Measures—Unplanned drinking (final 4-item UDS), alcohol use (DDQ; Collins, Parks, & Marlatt, 1985), and alcohol-related consequences (B-YAACQ; Kahler, Strong, & Read, 2005; RAPI; White & Labouvie, 1989) were assessed using the same measures as in Study 1. Cronbach's alphas for multi-item inventories are shown in Table 3.

Protective behavioral strategies: Protective behavioral strategies were assessed using a modified version of the 21-item Strategy Questionnaire (Sugarman & Carey, 2007; 2009). The original scale's stemming item states, "Please indicate how often you have used the following strategies in the past 2 weeks" and the items were measured on a 6-point Likert-type scale (*0 times* to *11+ times*). However, this assessment strategy conflates frequency of alcohol use with frequency of using protective behavioral strategies; therefore, we modified the stemming item ("Please indicate the degree to which you engage in the following behaviors when using alcohol or 'partying'") and the response scale (*Never, Rarely, Occasionally, Sometimes, Pretty Often, Always*). Sugarman and Carey (2007) identified three factors: *Selective Avoidance of Heavy Drinking Activities and Situations* (7 items), *Strategies Used While Drinking* (10 items), and *Alternatives to Drinking* (4 items). Cronbach's alphas for all multi-item inventories are listed in Table 4.

Results

Confirming the Factor Structure of the Unplanned Drinking Scale—In Study 1, EFA was used to identify a unidimensional measure of unplanned drinking behavior. Confirmatory factor analysis (CFA) allows us to determine whether the theorized factor structure of the UDS replicates in an independent sample. Following recommendations of evaluating fit with multiple indices (Kline, 2005), we examined model fit using absolute fit indices (Chi-square [x^2], Standardized Root Mean Square Residual [SRMR]), a relative fit index (Tucker Lewis Index [TLI]), and noncentrality-based indices (Comparative Fit Index [CFI], Root Mean Square Error of Approximation [RMSEA]). Excellent model fit is indicated by a non-significant x^2 statistic. Generally, fit is considered to be good when CFI/ TLI > .95, RMSEA < .06, and SRMR < .08 (Hu & Bentler, 1999). The CFA results revealed that all items loaded strongly on a single latent factor [factor loadings: .596 ("I drink when I do not plan to drink"), .707 ("I find myself drinking 'all of a sudden'"), .861 ("I begin drinking without really thinking about it"), .644 ("I drink more than I originally planned to")], and the model fit was excellent [$x^2(2) = .55$, $p = .76$, CFI = 1.00, TLI = 1.02, RMSEA = .000, SRMR = .008]. To be consistent with study 1, a composite score was created by averaging the four items of the UDS ($\alpha = .80$).

Concurrent Validity of Unplanned Drinking Scale—Descriptive statistics and correlations among all study variables are depicted in Table 4. Consistent with Study 1 and using both measures of alcohol problems (RAPI and B-YAACQ), two hierarchical regressions were used to examine the concurrent validity of the Unplanned Drinking Scale. In step 1, gender was entered as a covariate. In step 2, four measures of alcohol use (typical quantity of use, heaviest quantity of use, typical frequency of use, heaviest frequency of use) were entered. In step 3, the Unplanned Drinking Scale score was entered to examine incremental validity. However, unlike Study 1, the three subscales of protective behavioral strategies were entered (i.e., Selective Avoidance, Strategies Used While Drinking, Alternatives to Drinking) on step 4 to examine if the Unplanned Drinking Scale remained a unique predictor of alcohol consequences.

Consistent with Study 1, gender was not significantly related to either alcohol problems measure in step 1. In step 2, alcohol use accounted for 36.0% of the variance in alcohol-related problems as assessed by the RAPI and 30.5% of the variance in problems assessed by the B-YAACQ. In step 3, unplanned drinking significantly predicted both alcohol-related

problems with effect sizes similar to Study 1. Finally, in step 4, adding the three subscales of protective behavioral strategies to the model did not result in a significant change in *R*-squared in either model; however, individually, Selective Avoidance PBS was a significant predictor of alcohol-related problems as assessed by the BYAACQ, but not as assessed by the RAPI. More important for the purpose of the present study, unplanned drinking remained a significant predictor in both models even after controlling for gender, alcohol use, and use of protective behavioral strategies.

Discussion

Using confirmatory factor analysis, we found support for the single factor structure of the Unplanned Drinking Scale, and found that the scale has good reliability (= .80). Given that Study 1 was the first test of the MUDB, it was important to see if these results would replicate in an independent sample. We replicated our findings from Study 1 such that unplanned drinking predicted alcohol consequences even after controlling for frequency and quantity of alcohol use. These findings lend further support to the first premise of the MUDB.

We also wanted to extend the findings from Study 1 by demonstrating that unplanned drinking is a unique antecedent to alcohol-related consequences despite the apparent conceptual overlap with protective behavioral strategies. Consistent with previous research (Martens et al., 2005; Martens, Pederson et al., 2007; Martens et al., 2009), protective behavioral strategies were negatively correlated with alcohol use and alcohol-related consequences; however, unplanned drinking had a direct effect on alcohol consequences even after controlling for protective behavioral strategies. Surprisingly, unplanned drinking was only significantly correlated with one protective behavioral strategies subscale (Strategies Used While Drinking), and this correlations was rather weak ($r = .16$), demonstrating that unplanned drinking seems to be both conceptually and empirically distinct from planned drinking.

General Discussion

Across these two studies of college student drinkers, we demonstrated that unplanned drinking had a direct effect on alcohol consequences when controlling for alcohol use (both studies), gender (both studies), impulsivity-like traits (Study 1), and protective behavioral strategies (Study 2). These results support the first premise of the newly introduced MUDB that asserts that unplanned drinking is problematic, because it is likely to result in negative alcohol-related consequences regardless of how much one drinks. In addition, Study 1 provided some limited support for the second premise of the MUDB that suggests that unplanned drinking may serve as a proximal antecedent to alcohol consequences that may mediate the effects of more distal personality predictors. Specifically, we found that unplanned drinking partially mediated the effect of negative urgency, an impulsivity-like trait, on alcohol-related consequences.

Using both exploratory factor analysis (Study 1) and confirmatory factor analysis (Study 2), we tested the factor structure of a newly developed self-report measure of unplanned drinking. Although a few reverse-coded items formed a unique planned drinking factor in Study 1, we were able to create a reliable measure of unplanned drinking with only four items (s .74–.80). This scale was found to be moderately correlated with alcohol use measures, and more strongly related to negative alcohol-related consequences. Given the length of the scale, it takes about 1 minute to complete, making it easy to add this scale to larger assessment batteries with little increase to participant burden.

Theoretical Integration

The present studies sought to validate a construct called 'unplanned drinking,' that we expected would be predictive of negative alcohol-related consequences. Although these studies offer some preliminary insight into the predictive effects of unplanned drinking, it is important that future research integrate our construct of 'unplanned drinking' with other conceptually similar constructs. Most notably, the construct of 'impaired control' has significant conceptual overlap with our construct of 'unplanned drinking' (Heather, Tebbutt, Mattick, & Zamir, 1993; Leeman, Patock-Peckham, & Potenza, 2012). Specifically, parts 2 and 3 of the Impaired Control Scale (ICS; Heather et al., 1993) assess individuals' abilities to control their drinking and their beliefs that they can control drinking if they wanted to, respectively. There is significant overlap in item content between these scales. For example, our item, "I drink when I do not plan to drink" is quite similar to the ICS item, "…I have started drinking even after deciding not to." However, Part 2 of the ICS is more concerned with individuals having difficulty in controlling their drinking (other items: "…I have found it difficult to limit the amount I drink," "…I have started drinking at times when I knew it would cause me problems…", "…I have found it difficult to resist drinking, even for a single day"), whereas the unplanned drinking scale is not concerned with the ability or motive to control one's drinking. The model we have introduced assumes that unplanned drinking is multiply determined and it is inherently problematic regardless of the predisposing factors. Future work is necessary to examine whether unplanned drinking and impaired drinking control offer unique prediction of alcohol-related problems.

Our emphasis on alcohol-related problems rather than alcohol use is notable, but it is not unique. Other research has examined the etiology of alcohol problems separately from the etiology of alcohol use (e.g., Simons, Carey, & Wills, 2009). Therefore, it is important that future research further examine how the construct of unplanned drinking relates to other factors that have been shown to have direct effects on alcohol-related problems including depression (Schuckit, Smith, & Chacko, 2006), affective lability (Simons et al., 2005; Simons et al., 2009), and drinking to cope motives (Cooper, 1994; Grant, Stewart, O'Connor, Blackwell, & Conrod, 2007), to name a few.

Limitations

One limitation of the present studies was the modest sample sizes. The modest sample size in Study 1 limited the power to detect indirect effects, and the modest sample size in Study 2 precluded the ability to examine factorial invariance of the Unplanned Drinking Scale. Another important limitation to the present studies are their cross-sectional design, which limits the validity of examining 'predictors,' given that the dependent variables concern past behavior as measured by retrospective self-reports. A longitudinal design would be helpful to determine whether the predictors substantially predict future use and problems, and more ecologically valid measures of assessing alcohol use and problems would be prudent to better examine predictive validity. Further, a better test of mediation requires at least three time points to demonstrate that the independent variable prospectively predicts the mediator, which prospectively predicts the outcome variable. Such longitudinal tests of mediation allow the determination of causal ordering (i.e., temporal precedence; MacKinnon & Fairchild, 2009), and would allow a stronger test of the MUDB.

Although assessing four different impulsivity-like traits is an improvement to unidimensional assessment (Study 1), future research would be enhanced by including both self-report and behavioral measures of impulsivity-like traits (e.g., Balloon Analogue Risk Task: Lejuez et al., 2002; Stroop task: Houben & Wiers, 2009). In addition, Cyders and colleagues (Cyders & Smith, 2007; Cyders et al., 2007; Cyders, Flory, Rainer, & Smith, 2009) have demonstrated the incremental validity of a fifth impulsivity-like trait, positive

urgency, which assesses the tendency to behave impulsively when experiencing positive affect. Future studies could examine whether the effect of positive urgency on alcohol-related outcomes is mediated by unplanned drinking.

Further limitations derive from the convenience sampling method used in both studies, which resulted in an oversampling of women in Study 1, and a sample of almost exclusively young, undergraduate psychology students in both studies. This sampling method limits the generalizability of these findings.

Future Research

Given the promise of the MUDB for explaining alcohol-related problems, it is important to more fully test this model longitudinally to test the effects of either development-based change (i.e., maturation) or intervention-based change. It is essential to note that the present studies offer preliminary evidence for the validity of a self-report measure of unplanned drinking behavior; however, it is important that researchers operationalize unplanned drinking in other ways as a way to conceptually replicate these findings. For example, using ecological momentary assessment (EMA; Shiffman, Stone, & Hufford, 2008), one could operationalize unplanned drinking as the discrepancy between drinking intentions and drinking behavior. Experimentally, unplanned drinking may be operationalized as a spontaneous "taste test" (e.g., ad lib drinking event in a bar laboratory) when one's cognitive resources have been depleted. Thus, it is important to observe whether unplanned drinking with these other operationalizations has concurrent validity. There are certainly limitations to assessing a behavioral tendency with a retrospective self-report measure, and this research could be strengthened by examining the degree to which self-report measures lead to similar conclusions as more direct measurements (as discussed above).

It is also important to examine alcohol consequences in more comprehensive ways. For example, in the present studies, we operationalized consequences as 'number of problems' by using a dichotomous scoring of our problems measures rather than 'frequency of problems,' which could be derived from Likert-type scales. Thus, it would be valuable to see if unplanned drinking is more or less predictive of frequency of problems. It is also important to examine whether unplanned drinking predicts other types of risky behaviors that have been shown to be related to alcohol use including risky driving behaviors (Vassallo et al., 2008) and risky sexual behaviors (O'Hare, 2001)

Clinical Implications

As the present studies are the first tests of any premise of the MUDB, it is essential that these findings be replicated using diverse methodologies before they are used to inform clinical practice. Given methodological limitations mentioned above, we see these results as suggestive rather than conclusive; however, with further support of the MUDB, this model could have important clinical implications. We believe that some existing interventions may directly or indirectly reduce unplanned drinking and that these reductions in unplanned drinking are likely to at least partially account for intervention effects. If it is established that intervention-induced reductions in unplanned drinking result in less alcohol-related problems, then it may be worthwhile to develop interventions designed specifically to modify unplanned drinking. As we posit that unplanned drinking is multiply determined, such an intervention would likely need to include educational components (i.e., define unplanned drinking), motivational components (i.e., convincing one that unplanned drinking is problematic), self-efficacy components (i.e., empower one to feel that they can avoid unplanned drinking), and skill building components (i.e., train one how to avoid unplanned drinking).

Conclusions

Based on the results of the present studies, the Model of Unplanned Drinking has promise to explain why some individuals experience more alcohol-related problems than one would expect based on their frequency and quantity of alcohol use. Specifically, unplanned drinking predicted problems beyond that which could be explained by frequency/quantity of alcohol use, and it partially mediated the effect of negative urgency, an impulsivity-like trait, on alcohol-related problems. The effect of unplanned drinking on alcohol problems was maintained when controlling for use of protective behavioral strategies, which indicates that 'unplanned drinking' is not simply the absence of using protective behavioral strategies. It may be the case that maturational processes that lead to decreases in alcohol-related problems work through decreasing unplanned drinking, and/or that successful interventions may reduce unplanned drinking.

Acknowledgments

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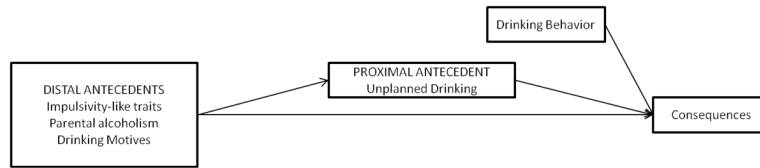
Figure 1.
Depicts the theorized relationships between putative risk factors, unplanned drinking, and alcohol-related consequences based on the Model of Unplanned Drinking Behavior
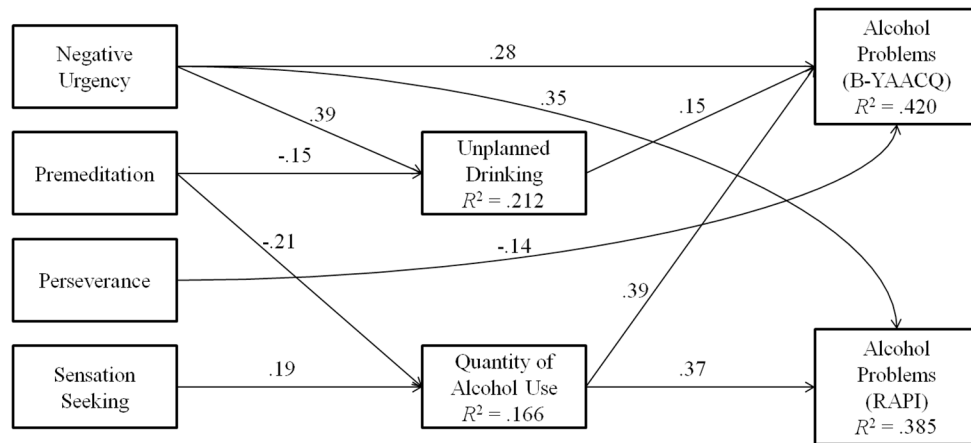
Figure 2.
Depicts the observed relationships between impulsivity-like traits, alcohol use, unplanned drinking, and alcohol-related problems. Only significant effects are shown at $p < .05$. Coefficients are standardized regression coefficients from a path analysis estimated using the bias-corrected bootstrap of 5000 samples. Gender was modeled as a covariate (i.e., predicted all variables); the correlations between impulsivity-like traits, the correlation between the disturbances for unplanned drinking and quantity of alcohol use, and the correlation between the disturbances between B-YAACQ and RAPI were also estimated, but not shown for reasons of parsimony (unplanned drinking with quantity of alcohol use, $r = .20$; B-YAACQ with RAPI, $r = .63$)

Table 1

Correlations and Descriptive Statistics of All Study Variables: Study 1

Variables	1	2	3	4	5	6	7	8	9	10	11	M	SD
1. Unplanned Drinking	(.76)											2.48	0.77
2. Perseverance	−.09	(.84)										3.73	0.61
3. Premeditation	**−.28**	**.42**	(.88)									3.65	0.65
4. Negative Urgency	**.43**	**−.25**	**−.41**	(.90)								2.80	0.81
5. Sensation Seeking	.10	.09	**−.16**	.00	(.87)							3.58	0.77
6. Typical Quantity of Use	**.27**	−.02	**−.23**	**.14**	**.31**	-----						12.28	11.53
7. Typical Frequency of Use	**.30**	−.08	**−.23**	**.14**	**.28**	**.66**	-----					2.65	1.37
8. Heaviest Quantity of Use	**.25**	−.03	**−.22**	.12	**.29**	**.89**	**.56**	-----				19.43	16.93
9. Heaviest Frequency of Use	**.24**	−.10	**−.23**	**.16**	**.34**	**.58**	**.76**	**.64**	-----			3.15	1.70
10. Alcohol Problems (RAPI)	**.36**	**−.16**	**−.30**	**.46**	**.17**	**.46**	**.37**	**.46**	**.37**	(.84)		3.85	3.93
11. Alcohol Problems (B-YAACQ)	**.40**	**−.24**	**−.35**	**.45**	.13	**.47**	**.29**	**.45**	**.34**	**.77**	(.86)	6.30	4.59
12. Gender (0 = male, 1 = female)	−.02	−.01	−.08	.10	**−.38**	**−.25**	**−.21**	**−.30**	**−.23**	−.06	.02	0.66	0.47

Note. Significant effects are in boldtype face for emphasis ($p < .05$). Cronbach's alphas are listed on the diagonal in parentheses.

Table 2

Multiple Regressions Predicting Alcohol-Related Problems from Gender, Alcohol Use, and Unplanned Drinking: Study 1

Dependent Variable: RAPI	Step 1		Step 2		Step 3	
		p		*p*		*p*
Gender (0 = men, 1 = women)	−.06	.429	.09	.151	.08	.223
Typical Quantity of Alcohol Use	----	----	.20	.225	.20	.220
Typical Frequency of Alcohol Use	----	----	.06	.587	.00	.994
Heaviest Quantity of Alcohol Use	----	----	.21	.197	.18	.266
Heaviest Frequency of Alcohol Use	----	----	.10	.379	.11	.313
Unplanned Drinking	----	----	----	----	**.24**	**<.001**
Change in R^2 [*p*-value]	.003 [.429]		**.238 [<.001]**		**.050 [<.001]**	

Dependent Variable: B-YAACQ	Step 1		Step 2		Step 3	
	B	*p*	B	*p*		*p*
Gender (0 = men, 1 = women)	.02	.796	**.16**	**.014**	**.14**	**.024**
Typical Quantity of Alcohol Use	----	----	**.48**	**.003**	**.47**	**.002**
Typical Frequency of Alcohol Use	----	----	−.18	.103	**−.26**	**.017**
Heaviest Quantity of Alcohol Use	----	----	.02	.898	−.02	.880
Heaviest Frequency of Alcohol Use	----	----	**.23**	**.038**	**.24**	**.020**
Unplanned Drinking	----	----	----	----	**.30**	**<.001**
Change in R^2 [*p*-value]	.000 [.796]		**.261 [<.001]**		**.081 [<.001]**	

Note. RAPI = Rutgers Alcohol Problem Index; B-YAACQ = Brief Young Adult Alcohol Consequences Questionnaire. Significant effects (*p* < .05) are in boldtype face for emphasis.

Table 3

Total, Direct, and Indirect Effects of Impulsivity-like Traits on Alcohol Problems via Unplanned Drinking and Alcohol Use: Study 1

Independent Variable:	Premeditation			Perseverance			Sensation Seeking			Negative Urgency		
Dependent Variable: RAPI	B	B	p	B	B	p	B	B	p	B	B	p
Total Indirect	**−.56**	**−.09**	**.026**	.21	.03	.264	**.39**	**.08**	**.021**	.34	.07	.096
Specific Indirect Effects												
Alcohol Use (typical)	**−.48**	**−.08**	**.032**	.17	.03	.313	**.36**	**.07**	**.023**	.16	.03	.328
Unplanned Drinking	−.08	−.01	.350	.04	.01	.504	.03	.01	.583	.18	.04	.197
Direct Effect	−.07	−.01	.869	−.35	−.06	.347	.28	.06	.334	**1.70**	**.35**	**.000**
Total Effect	−.63	−.11	.169	−.14	−.02	.749	**.67**	**.13**	**.027**	**2.03**	**.42**	**.000**
Independent Variable:	Premeditation			Perseverance			Sensation Seeking			Negative Urgency		
Dependent Variable: B-YAACQ	B	B	p	B	B	p	B	B	p	B	B	p
Total Indirect	**−.74**	**−.11**	**.014**	.29	.04	.238	**.50**	**.08**	**.021**	**.53**	**.09**	**.035**
Specific Indirect Effects												
Alcohol Use (typical)	**−.59**	**−.08**	**.024**	.21	.03	.319	**.44**	**.08**	**.024**	.19	.03	.322
Unplanned Drinking	−.15	−.02	.200	.08	.01	.409	.05	.01	.508	**.34**	**.06**	**.036**
Direct Effect	−.17	−.02	.739	**−1.04**	**−.14**	**.029**	.21	.04	.555	**1.60**	**.28**	**.000**
Total Effect	−.91	−.13	.091	−.75	−.10	.158	.71	.12	.068	**2.13**	**.37**	**.000**

Note. All parameter estimates and significance test are based on 5000 bootstrapped samples. Significant effects ($p < .05$) are in boldtype face for emphasis.

Table 4

Correlations and Descriptive Statistics of All Study Variables: Study 2

Variables	1	2	3	4	5	6	7	8	9	10	M	SD
1. Unplanned Drinking	(.80)										1.84	0.75
2. Selective Avoidance	−.07	(.86)									3.18	1.12
3. Strategies Used While Drinking	**−.16**	**.60**	(.82)								3.78	0.96
4. Alternative to Drinking	−.08	**.50**	.66	(.87)							3.67	1.28
5. Typical Quantity of Use	**.31**	**−.30**	−.14	**−.16**	-----						10.81	10.47
6. Typical Frequency of Use	**.36**	−.14	−.10	−.13	**.74**	-----					2.49	1.52
7. Heaviest Quantity of Use	**.27**	**−.33**	**−.19**	**−.16**	**.87**	**.57**	-----				15.82	15.90
8. Heaviest Frequency of Use	**.30**	**−.26**	**−.18**	**−.18**	**.70**	**.80**	**.72**	-----			2.74	1.78
9. Alcohol Problems (RAPI)	**.48**	**−.18**	−.11	−.08	**.51**	**.57**	**.45**	**.55**	(.85)		3.34	3.86
10. Alcohol Problems (B-YAACQ)	**.40**	**−.23**	−.11	−.07	**.49**	**.47**	**.47**	**.49**	**.77**	(.86)	4.87	4.42
11. Gender (0 = male, 1 = female)	−.03	**.32**	**.22**	**−.22**	**−.24**	.09	**−.26**	.11	−.01	.02	0.52	0.50

Note. Significant effects are in boldtype face for emphasis ($p < .05$). Cronbach's alphas are listed on the diagonal in parentheses.

Table 5

Multiple Regressions Predicting Alcohol-Related Problems from Gender, Alcohol Use, Unplanned Drinking, and Protective Behavioral Strategies: Study 2

Dependent Variable: RAPI	Step 1		Step 2		Step 3		Step 4	
	β	p	β	p	β	p	β	p
Gender (0 = men, 1 = women)	−.01	.944	.08	.201	.08	.222	.09	.161
Typical Quantity of Alcohol Use	---	---	.15	.355	.15	.339	.12	.452
Typical Frequency of Alcohol Use	---	---	.27	.042	.18	.165	.21	.112
Heaviest Quantity of Alcohol Use	---	---	.03\	.843	−.00	.991	−.00	.979
Heaviest Frequency of Alcohol Use	---	---	.21	.109	.22	.073	.20	.105
Unplanned Drinking	---	---	---	---	**.30**	**<.001**	**.31**	**<.001**
Selective Avoidance	---	---	---	---	---	---	−.13	.117
Strategies Used While Drinking	---	---	---	---	---	---	.06	.533
Alternative to Drinking	---	---	---	---	---	---	.03	.680
Change in R^2 [p-value]	.000 [.429]		**.360 [<.001]**		**.077 [<.001]**		.009 [.472]	

Dependent Variable: B-YAACQ	Step 1		Step 2		Step 3		Step 4	
	β	p	B	p	β	p	β	p
Gender (0 = men, 1 = women)	.03	.745	**.14**	**.045**	**.13**	**.049**	**.16**	**.021**
Typical Quantity of Alcohol Use	---	---	.14	.409	.14	.404	.09	.577
Typical Frequency of Alcohol Use	---	---	.16	.261	.08	.555	.13	.341
Heaviest Quantity of Alcohol Use	---	---	.20	.218	.17	.267	.17	.283
Heaviest Frequency of Alcohol Use	---	---	.13	.333	.14	.284	.11	.425
Unplanned Drinking	---	---	---	---	**.24**	**.001**	**.25**	**<.001**
Selective Avoidance	---	---	---	---	---	---	**−.20**	**.019**
Strategies Used While Drinking	---	---	---	---	---	---	.06	.529
Alternative to Drinking	---	---	---	---	---	---	.06	.491
Change in R^2 [p-value]	.001 [.745]		**.304 [<.001]**		**.049 [.001]**		.023 [.126]	

Note. RAPI = Rutgers Alcohol Problem Index; B-YAACQ = Brief Young Adult Alcohol Consequences Questionnaire. Significant effects ($p < .05$) are in boldtype face for emphasis.