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Thinking and Drinking: Alcohol-Related Cognitions across Stages of Adolescent Alcohol Involvement

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Abstract

Purpose—Alcohol-related cognitions, particularly expectancies for drinking and non-drinking and motives for non-drinking, are involved in the initiation, maintenance, and cessation of alcohol use and are hypothesized to play key roles in adolescent decision making. This study explored (a) the relationships between alcohol use expectancies, non-drinking expectancies and non-drinking motives, (b) the roles of these cognitions across hypothesized developmental stages of adolescent alcohol use and (c) the relationships between these cognitions and recent or intended future changes in drinking behavior in a cross-sectional sample.

Methods—Surveys assessing alcohol use behaviors and attitudes were administered to 1648 high school students.

Results—Heavier drinkers reported more positive alcohol use expectancies and fewer non-drinking motives than lighter drinkers or non-drinkers, however non-drinking expectancies only differed between non- and rare- drinkers and all subsequent drinking classes. Alcohol use expectancies, non-drinking expectancies and non-drinking motives differentiated students who recently initiated alcohol from those who had not, while non-drinking expectancies and non-drinking motives differentiated binge drinking students who had made recent efforts to reduce/ stop their drinking from those who had not. Intentions to initiate or reduce drinking in the coming month were also associated with these alcohol-related cognitions.

Conclusion—Drinking and non-drinking expectancies, and motives for not drinking may play critical roles in decisions to alter alcohol-use behavior during adolescence. Future exploration of temporal relationships between changes in alcohol-related cognitions and behavioral decision making will be useful in the refinement of effective prevention and intervention strategies.

Keywords

alcohol expectancies; non-drinking expectancies; non-drinking motives; adolescent alcohol use; alcohol use transitions

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Alcohol-related cognitions are involved in the initiation, maintenance, and cessation of alcohol use from childhood through adulthood (Brown, Christiansen, & Goldman, 1987; Cooper, 1994; Metrik, McCarthy, Frissell, MacPherson, & Brown, 2004; Stacy, Newcomb, & Bentler, 1991). Both expectancies and motives for alcohol use and non-use are strong candidates for inclusion within cognitive models of youth alcohol-related decision making. However, little research has examined the comparative roles these cognitions play during different phases of adolescent drinking. We expect that cognitions supporting or opposing alcohol use might have greater impact at specific transition points, as youth shift between initiation, escalation and de-escalation of alcohol involvement.

Alcohol Use/Non-Use Expectancies

Distinctions have been made between alcohol expectancies and drinking motives within the alcohol literature. Expectancy theory posits a process by which individuals come to anticipate certain outcomes for a particular behavior (Tolman, 1932). Through direct experience and modeling, pairings of *if-then* probabilistic statements (e.g., If I drink, I will be more attractive to the opposite sex) are encoded, held in memory, and influence future behavior both explicitly and implicitly (Goldman, Brown, Christiansen, & Smith, 1991, Reich, Below & Goldman, 2010). Positive alcohol expectancies, or anticipation of reinforcement from drinking, exist prior to drinking onset, predict early problem drinking and are seen as proximal predictors of drinking decisions (Smith, Goldman, Greenbaum, & Christiansen, 1995). Numerous types of positive alcohol expectancies have been examined, including anticipation of global positive outcomes, social and sexual facilitation, tension reduction, and cognitive or motor improvement (Brown, Christiansen & Goldman, 1987). Expectations for punishment from drinking, often termed negative alcohol expectancies, are also seen as specific to the type of outcome incurred (e.g., physical, social, cognitive, emotional) and predict reduced consumption (Leigh & Stacy, 2003).

The related construct of alcohol cessation expectancies, or anticipated consequences of *not* drinking or decreasing consumption, constitute cognitive mechanisms involved in purposeful decisions to stop or reduce drinking (Metrik et al., 2004). Two domains of cessation expectancies have been identified: anticipated global impact of not drinking and anticipated social impact of not drinking. Consistent with the alcohol use expectancy literature, drinking history also influences the formation, differentiation, and maintenance of alcohol cessation expectancies (Metrik et al., 2004). As drinking patterns escalate, teens appear to expect more negative short term consequences from choosing not to drink or limiting one's consumption. Cessation expectancies prospectively predicted self-reported change efforts and associated reductions in drinking behavior over a year, controlling for alcohol involvement and related problems (Metrik et al., 2003; Metrik et al., 2004).

As cessation expectancies represent cognitive processes underlying youth motivation to reduce or stop drinking, this domain of cognitions was initially thought to have greater utility for youth with more extensive drinking experience (e.g., heavy episodic drinking) who may be experiencing alcohol problems and/or considering reductions in alcohol use. However, non-drinking expectancies have also been found to predict lower rates of alcohol initiation among non-drinking youth (Bekman, Cummings, & Brown, 2010). Thus, it appears that expectations regarding the consequences of not using alcohol may play a role in adolescent decisions to initiate drinking as well as to stop or reduce alcohol use (Metrik et al., 2004). Conceptualized as a counterpart to alcohol use expectancies, cessation expectancies (or more inclusively, non-drinking expectancies) were negatively associated with positive alcohol expectancies (Anderson, Grunwald, Bekman, Brown, & Grant, 2010; Strizke & Butt, 2001). However, to our knowledge, non-drinking expectancies have not yet

been evaluated concurrently with alcohol use expectancies in the prediction of drinking behavior across various stages of escalation and de-escalation from drinking.

Motives for Drinking and Not Drinking

Whereas expectancies represent a spectrum of possible positive and negative outcomes of drinking, motives for alcohol use are conceptualized as reasons an individual chooses to drink, such as coping, social facilitation, etc. While non-drinkers may still hold expectations about how alcohol might affect them or others based on their observations, motives are only applicable to drinkers. Cooper and colleagues (1992) highlighted the role of drinking motives as a primary cognitive factor in drinking decisions, which has been supported in both adolescent and adult samples (Cooper, 1994; Cooper, Frone, Russell, & Mudar, 1995).

Despite the propagation of research on drinking motives, motives for abstention have received relatively less attention, perhaps due to lack of consensus on how to operationalize the construct (Epler, Sher, & Piasecki, 2009). Recent work has shown non-drinking motives predict abstinence and lowered drinking behavior in high school students (Anderson, Grunwald, Bekman, Brown, & Grant, 2010; Strizke & Butt, 2001) and longitudinal patterns of alcohol consumption in youth followed across four years (Epler et al., 2009). Unlike motives for drinking, both drinkers and abstainers may endorse non-drinking motives as drinkers still choose not to drink on some occasions. Given our interest in understanding mechanisms underlying adolescents' decisions to avoid, maintain and reduce their alcohol use, we focused on motives not to drink within the current investigation.

Recently, we examined the interplay of positive alcohol use expectancies, non-drinking expectancies, and non-drinking motives in two large high school samples ($n > 2,500$; Anderson et al., 2010). A series of confirmatory factor and path analyses supported the reliability and validity of our measurement of these constructs in school-based surveys. As was anticipated, positive alcohol use expectancies were negatively associated with non-drinking expectancies and non-drinking motives. While positive use expectancies predicted increased alcohol consumption and associated problems, non-use expectancies and non-drinking motives were associated with less alcohol consumption and fewer problems. However, the unique contribution of these three types of cognitions to different phases of alcohol involvement has not been tested.

Adolescent Alcohol Use Patterns and Transitions

During adolescence, changes in alcohol use patterns occur rapidly, and both escalation and de-escalation of use is common (e.g., Brown, 2001; D'Amico et al., 2001). Identification of typical alcohol use patterns as youth progress in their experience with alcohol can help elucidate transition periods for both progression into and out of alcohol involvement and assist in development of more targeted prevention and treatment programs (Anderson, Ramo, Cummins, & Brown, 2010; Brown, 2004). Common longitudinal trajectories for alcohol and other drug involvement have been identified in both community and clinical samples of youth and young adults. Schulenberg and colleagues (1996) examined binge drinking as youth transition to young adulthood and identified five distinct trajectories that differentiated individuals who engaged in stable low or high rates of binge drinking, as well as individuals who decreased and increased their binge drinking over time, both temporarily and consistently. These trajectories were differentially associated with alcohol-related behaviors and attitudes. Brown and colleagues (2008) summarized the most common trajectories of alcohol use identified in longitudinal research on adolescents (ages 16 - 20 years). These six patterns include: *Abstainers/Light Drinkers* (stable non-drinkers or low use of alcohol; ~20 to 65%), *Stable Moderate Drinkers* (stable moderate use, limited heavy use; ~30%), *Fling Drinkers* (developmentally-limited use; ~10%), *Decreasers* (early onset,

declining course; ~10%), *Chronic Heavy Drinkers* (early onset, stable course of heavy drinking; <10%), and *Late-onset Heavy Drinkers* (late onset, with rapid escalation to heavy drinking; <10%). While there is considerable interest in defining and predicting these use patterns across time, there is continued need for research examining factors associated with distinctive patterns of use that may shed light on the developmentally linked transitions in drinking patterns that occur among youth.

Understanding how cognitive factors are differentially associated with transitions from initiation to hazardous drinking, and then to reductions in use may be useful in elucidating mechanisms of change. Previously, we proposed a developmental social information processing model of purposeful self-change efforts (e.g., Brown, 2001; Brown et al., 2005; Metrik et al., 2004) based on cognitive social learning theory (Bandura, 1986; Coie & Dodge, 1998) that postulates distal (e.g., genetic, personality or culturally-based risk) and proximal factors (e.g., social context, substance availability, motivational state, etc.) contribute to alcohol use decisions via a combination of cognitive appraisal (e.g., perceived norms) and evaluation processes (e.g., expectancies and motives) and emotional state. By better understanding the interplay of cognitive factors associated with alcohol use and cessation, we can develop similar comprehensive models across earlier stages of alcohol engagement.

Current Study

The first aim for this study was to verify that items from scales measuring three types of alcohol-related cognitions (alcohol use expectancies, non-drinking expectancies and non-drinking motives) represent three distinct, but related constructs. We hypothesized that non-drinking expectancies and non-drinking motives would be positively related to one another, but alcohol use expectancies would be negatively related to both non-drinking expectancies and non-drinking motives. Unfortunately, drinking motives were not available in the current sample and could not be examined in conjunction with the other three. Our second aim was to describe hypothesized stages of alcohol use during adolescence in the current sample and explore how alcohol-related cognitions were associated with drinking levels. Specifically, we predicted that higher levels of alcohol use would be associated with more positive alcohol use expectancies, more negative non-drinking expectancies and fewer non-drinking motives, above and beyond the impact of grade and gender.

As we are interested in the role that alcohol-related cognitions play in transitions in patterns of adolescent alcohol involvement, we determined the proportion of teens at each level of alcohol use who reported making purposeful change efforts in their drinking. We also examined differences between adolescents who reported making recent changes in their drinking compared to peers who did not report similar drinking changes. We hypothesized that teens who had recently made the decision to initiate alcohol use would differ in their endorsement of alcohol-related cognitions from those who remained abstinent. Differences in cognitions were also predicted between binge drinking youth who reported recent reduction/cessation attempts and those who had not made such efforts. We predicted that these cognitions would also be associated with behavioral intentions regarding future initiation or cessation of alcohol use. Specifically, we predicted that more positive alcohol use expectancies and lower non-drinking motives would partially explain (a) past year initiation and (b) intentions to drink in the coming month among current non-drinkers. We also predicted that (c) past month quit/reduction attempts and (d) intentions to quit or reduce alcohol use in the next month among drinking youth would be partially explained by greater motives and more positive non-drinking expectancies. That is, we hypothesized that outcomes anticipated from a behavioral change (e.g. changing from use to non-use, or from non-use to initiation) would be more influential in decisions to initiate or reduce alcohol use

than beliefs regarding current behaviors. For example, research has demonstrated that reductions in positive alcohol expectancies following cessation may occur gradually, and result from an accumulation of new learning experiences and solidification of memory networks in the absence of alcohol (Brown, Carrello, Vik & Porter, 1998; Brown, 1993; Conners, Tarbox & Faillace, 1993). The same may be true of non-drinking expectancies for a period of time following initiation.

Method

Sample

In fall 2009, 1,930 high school students in the San Diego metropolitan area completed a survey assessing substance use-related attitudes and behaviors. Students were dropped from analysis ($n = 282$) if they did not complete all items used to create drinking classes, endorsed use of a fictitious substance, or inconsistently reported their alcohol use (e.g., reported alcohol use in the past month but no lifetime use). Of the remaining sample, 52.4% were female; 66% reported they were Caucasian, 13% Hispanic, 13% Asian, 2% African American, 1% American Indian/Alaskan Native or Hawaiian Native/Pacific Islander and 5% Other. On average, participants were 15.8 years old ($SD = 1.2$); 26% were in 9th grade, 27% in 10th grade, 25% in 11th grade and 22% in 12th grade.

Fifty-five percent of students reported that they had initiated alcohol use. Students who have ever had a drink ($n = 915$) reported alcohol use an average of 2.2 ($SD = 2.8$) times in the past month with about 2.5 ($SD = 2.8$) drinks per occasion, and an average maximum of 4.0 ($SD = 4.8$) drinks per occasion. Twenty three percent of students reported heavy episodic drinking (≥ 5 drinks per occasion) in the past month, and among these teens, these binge drinking episodes occurred an average of 2.25 ($SD = 1.5$) times in the past month.

Measures

To minimize participant burden and efficiently assess multiple variables within a brief amount of time, a subset of items were chosen from well-established measures. We selected items that have been shown to be most strongly associated with youth drinking outcomes in previous studies and which were the highest loading items on relevant factors and thus most representative of the constructs of interest.

Alcohol use expectancies—Four items from the Alcohol Expectancy Questionnaire for Adolescents (AEQ-A; Brown et al., 1987) were selected to create a composite of positive alcohol use expectancies from the Social Facilitation scale and the Relaxation and Tension Reduction scale. These items were selected based on factor loadings on the scales and predictive power of these scales in prior studies. Items were rated along a five-point Likert scale (*Strongly Disagree* to *Strongly Agree*). Despite only moderate internal consistency ($\alpha = .62$), all four items were retained as the “parties” item, which had a lower factor loading than the other three items (Figure 1), improved the predictive utility of this scale with regards to participant’s recent and lifetime alcohol use.

Non-drinking expectancies—Four items from the Cessation Expectancy Questionnaire were selected based on high loadings in their respective factors (Global and Social) in the original measurement development sample (CEQ; Metrik et al., 2004). Together, these items provided a combined score that effectively assesses participants’ beliefs about the overall positive or negative impact not drinking or reducing their alcohol use would have on them (Figure 1; $\alpha = .94$). Instructions were modified to improve applicability for individuals who did not drink (*If you don’t drink, or cut down or stopped drinking, what would happen?*). The five point Likert scale ranged from *A lot worse* to *A lot better*.

Non-drinking motives—The highest loading item was selected from each of the five factors assessed within the Motives for Abstaining from Alcohol Questionnaire (MAAQ; Stritzke & Butt, 2001): Fear of Negative Consequences, Dispositional Risk, Family Constraints, Religious Constraints, and Indifference toward Alcohol (Figure 1; $\alpha = .82$). Together these five items comprised an abbreviated measure summarizing key reasons for not drinking. This measure has been validated in this and an independent sample of high school students ($n = 1070$; Anderson et al., under review). Each item was rated on a five point scale (*Not at All Important* to *Extremely Important*).

Alcohol use variables—Items from Monitoring the Future (Johnston, O'Malley, Bachman & Schulenberg, 2009) and the Customary Drinking and Drug Use Record (Brown et al., 1998) were used to assess age of first alcohol use, lifetime (7-point scale, *never to over 100 times*) and past 30 days alcohol use (*0-30*). Students also reported their average and maximum number of drinks consumed per occasion, frequency of binge drinking in the past month, how many times they had experienced each of seven drinking related problems (e.g., interpersonal, physical) in the past 30 days (*0-9 or more times*), how many times they had attempted to quit or reduce their alcohol use in the past month (*0-30*), if they planned to quit or reduce their drinking in the next month (5 point scale, *Definitely not* to *Definitely will*) and if they planned to drink alcohol in the next month (5 point scale, *Definitely not* to *Definitely will*).

Procedure

Using a consent procedure developed by the California Department of Education and approved by the University of California, San Diego Human Research Protections Program and each high school, parents who did not want their child to participate in the survey completed a post card, emailed or called the research office or returned a form to the school indicating their request that their child not participate (3% of parents in this sample). Trained research proctors surveyed all classrooms on days when typical drinking (e.g., outside of alcohol-related holidays, spring breaks) and absence rates were expected (93% of enrolled students were present). After verbally reviewing the written assent statements handed to students, all assenting youth (95% of eligible students) with parental consent completed the survey and returned them to proctors after 45 minutes.

Data Analysis Plan

To verify that selected items described three distinct constructs, confirmatory factor analysis (CFA) was conducted in Mplus 5.1 (Muthen & Muthen, 1998-2007) using weighted least squares with a robust chi-square test (WLSMV) to appropriately handle the ordinal (5-level Likert) indicators of the three scales. To identify drinking subgroups, latent class analysis (LCA) was conducted on the observed indicators of past-30 day drinking frequency, average quantity, binge drinking, and maximum drinks. Measures of relative model fit including bootstrapped parametric likelihood ratio test (BLRT), Bayesian Information Criterion (BIC), and Lo-Mendell-Rubin (LMR) adjusted LRT test (Nylund, Asparouhov, & Muthen, 2007), as well as entropy (a measure of classification precision where higher values are preferred) were used to identify the optimal number of classes and to determine the best-fitting class solution for the drinking subgroups.

To explore differences in alcohol-related cognitions at various stages of alcohol use, endorsement of these cognitions was compared across each of the drinking classes identified in the LCA via a multivariate analysis of covariance (MANCOVA). Grade and sex were included as covariates in this MANCOVA. When exploring differences in alcohol related cognitions before and after recent behavioral changes regarding alcohol use, two logistic regressions were conducted to examine the role of alcohol cognitions in predicting initiation

of alcohol use within the past year and purposeful efforts to quit or reduce drinking among binge drinkers in the past month. Two linear regressions were used to examine the utility of alcohol related cognitions in predicting intent to drink in the month following assessment among current abstainers, and intent to reduce or quit drinking in the month following assessment among current drinkers.

Results

Confirmation of Cognitive Measures

A three factor model of the alcohol related cognitions fit the data reasonably well ($\chi^2 [31] = 387.69, p < .001$; CFI = .98; TLI = .99; RMSEA = .08; see Figure 1). Removal of the “parties” indicator for AEQ, which had the lowest factor loading in the model ($b = .44$), only slightly improved overall model fit ($\chi^2 [29] = 288.70, p < .001$; CFI = .98; TLI = .99; RMSEA=.07); as such, it was retained for subsequent analyses. Factor correlations within the full measurement model indicate that, as hypothesized, non-drinking expectancies and non-drinking motives were positively associated ($r = .47, p < .001$), but alcohol use expectancies were negatively related to both non-drinking expectancies ($r = -.50, p < .001$) and non-drinking motives ($r = -.70, p < .001$). These correlations among factors, in combination with the model results of the 3-factor CFA, verified that these items represent three distinct, but related domains of adolescent alcohol related cognitions.

Classification of Student Drinking Groups

LCA results of 2 to 6-class solutions were examined to determine the best-fitting solution for youth current drinking patterns (Table 1). The BIC decreased as the number of drinking classes increased, both entropy and the average latent class probability for most likely class were similar across models, and BLRT was significant at $p < .001$ for all solutions less than six classes. The Lo-Mendell-Rubin (LMR) adjusted LRT test was non-significant ($p = .53$) with six classes, suggesting that five classes were sufficient. The five-class solution was also preferred for model parsimony and interpretability. Descriptions of drinking patterns for the groups derived from the 5-class model are shown in Table 2. The “non- and rare-drinker” group characterizes 72% of the sample, “biweekly drinking/never binge” 6%, “biweekly drinking/monthly binge” 11%, “weekly drinking/biweekly binge” 6%, and “frequent drinking/weekly binge” 5%. These classes were distinguished by the variables used to create them, including frequency ($F(4, 1643) = 1020.23, p < .001$), quantity ($F(4, 1643) = 1686.15, p < .001$), max drinks per occasion ($F(4, 1631) = 2131.87, p < .001$) and binge drinking ($F(4, 1643) = 3203.50, p < .001$). Of note, drinking classes also differed in the amount of drinking-related problems they had experienced in the past month ($F(4, 1640) = 176.96, p < .001$), the recency with which they had initiated drinking initiation ($F(4, 891) = 8.34, p < .001$), lifetime frequency of drinking ($F(4, 1643) = 292.83, p < .001$) and drunkenness ($F(4, 1643) = 62.66, p < .001$).

Differences in Cognitions by Drinking Group

The drinker classes significantly differed in their alcohol related cognitions such that heavier drinkers endorsed more positive alcohol expectancies ($F(4, 1508) = 117.89, p < .001; r^2 = .29$), less positive non-drinking expectancies ($F(4, 1508) = 36.24, p < .001; r^2 = .11$) and fewer non-drinking motives ($F(4, 1508) = 72.78, p < .001; r^2 = .21$). Males (p 's $< .001$) and students in higher grades (p 's $< .05$) also expressed more positive alcohol use expectancies, less positive non-drinking expectancies and fewer non-drinking motives when compared to their female and younger peers. As shown in Figure 2, alcohol use expectancy scores increased in two stages, such that non- and rare- drinkers had the lowest expectancies, biweekly drinkers with and without monthly binges had similar use expectancies to one another and the two most frequent drinking groups were also similar to one another and had

higher still alcohol use expectancies. Conversely, motives to not drink declined across the first three groups (p 's < .001) and were the lowest among the “frequent drinking/weekly binge” group. Non-drinking expectancies showed a sharp contrast between non- and rare-drinkers and all other drinking groups, which did not differ significantly from one another.

Transitions in drinking: Alcohol Initiation and Quit Attempts

When examining transitions in drinking, we first sought to describe what percentage of youth reported making purposeful attempts to quit or reduce their drinking in the past month at each level of alcohol use. While most of the drinkers who had made attempts to quit or reduce their drinking (6% of total sample; 19% of those not in Class 1) were evenly distributed across the highest three drinking classes (22% of Class 3, 22% of Class 4, 19% of Class 5), 25 individuals in the lightest drinking classes also reported efforts to quit or reduce alcohol use (1% of Class 1, 12% of Class 2). Nine of these light drinkers reported experiencing problems as a result of their drinking.

We then examined the role of alcohol-related cognitions as predictors of drinking initiation within the past year ($n = 137$, 15% of drinkers) vs. continued abstinence (Figure 3). Alcohol use expectancies ($OR = 2.55$; 95% CI : 1.93 – 3.39; $p < .001$), non-drinking expectancies ($OR = .71$; 95% CI : .58 – .89; $p < .01$) and motivation for not drinking ($OR = .81$; 95% CI : .66 – .99; $p < .05$) were all significant predictors of past year drinking initiation. In our second model, non-drinking expectancies ($OR = 6.26$; 95% CI : 2.82 – 13.89; $p < .001$) and non-drinking motives ($OR = 1.58$; 95% CI : 1.10 – 2.28; $p < .01$) predicted past month purposeful efforts to quit or reduce alcohol use among binge drinkers, whereas alcohol use expectancies did not ($OR = 1.14$; 95% CI : 0.74 – 1.77, $p > .05$; Figure 4). These differences were found despite the fact that binge drinking youth who reported making efforts to quit or reduce drinking ($n = 73$) reported equivalent rates of recent drinking frequency ($t = 1.55$, $p = .12$), binge drinking ($t = .29$, $p = .77$), maximum drinks/occasion ($t = .18$, $p = .85$) and experience of alcohol-related problems ($t = 1.00$, $p = .32$) when compared to those who did not make quit attempts ($n = 300$).

Two additional models were run to explore how well alcohol related cognitions predict future behavioral intentions. Alcohol-related cognitions predicted 12% of the variance in both intentions to initiate alcohol use among non-drinkers and intentions to reduce alcohol use among drinkers. As expected, more positive alcohol use expectancies and fewer motives to not drink predicted intent to initiate (Table 3). Although we did not hypothesize that alcohol use expectancies would relate to intentions to reduce drinking, all three types of cognitions predicted interest in reducing alcohol use (Table 3).

Discussion

This study simultaneously assesses alcohol use expectancies, non-drinking expectancies, and non-drinking motives within the same sample. We demonstrated that when considered together, our abbreviated measures reflected three distinct, but related constructs that were uniquely associated with adolescent drinking behavior. Drinker classes based on recent alcohol use topography also reflected varying levels in lifetime drinking patterns. These data provide partial support for the conclusion that individuals in higher classes have longer, more extensive drinking histories and that these classes may represent progression into heavier drinking stages. As hypothesized, all three alcohol-related cognitions differed across these classes. Youth with cumulatively more drinking experience and heavier alcohol use have different beliefs and motives than lighter drinking or non-drinking peers about the impact that decisions to drink or not drink can have on critical life domains such as relationships, achievement, health, and family. Among the three types of cognitions measured, alcohol use expectancies demonstrated more differentiation among drinking

classes relative to non-drinking expectancies and non-drinking motives, indicating that these cognitions may play a particularly salient role in decision-making around alcohol use (frequency, and quantity of drinking) across adolescent development. These findings highlight the value of diverse cognitive factors in understanding recent onset of alcohol use among teens, differences in the progression of adolescent alcohol experience, and efforts by teens to cut down or stop their drinking.

Cognitions not only related to intensity and duration of alcohol involvement, but specific patterns of cognitions were associated with recent changes in drinking behavior. The probability of recent initiation of alcohol use (within the past year) was associated with all three types of alcohol-related cognitions, but was most strongly associated with alcohol use expectancies. Conversely, purposeful change efforts among binge drinking youth were predicted by both non-drinking expectancies and non-drinking motives, but not by alcohol use expectancies. These differences were significant despite the fact that teens who reported quit efforts had similar rates of alcohol use as peers who did not make purposeful reduction efforts. Additionally, more positive alcohol use expectancies and fewer non-drinking motives were predictive of intention to initiate alcohol use among non-drinking youth. All three types of alcohol-related cognitions were predictive of youth intentions to quit or reduce drinking. Although this study utilized a cross-sectional sample that does not allow us to test temporal relationships, these results support the hypothesis that alcohol-related cognitions may play a role in developmental transitions into and out of alcohol involvement. *If* behavioral intentions result in actual future behavioral change efforts, then the relationships found between cognitions and behavioral intentions may indicate that alcohol-related cognitions precede behavioral change efforts.

While there is considerable overlap between expectancies and motives, they differ from one another in that expectancies represent an accumulation of positive and negative observed and experienced associations, whereas motives are more directly stated reasons for use and non-use. Although at face value, motives may appear to be more explicit in nature, both expectancies and motives develop in a cultural context (Donovan, 2009), and can operate explicitly as well as implicitly. Joint consideration of these cognitive constructs can provide a more comprehensive picture of at what stage in the progression of youth alcohol involvement these processes impact teen's drinking decisions. To inhibit youth plans to initiate drinking or escalate from lighter to frequent binge drinking, expectancies and non-drinking motives both appear pertinent and potential targets for prevention. Regarding de-escalation or desisting the additional domain of non-drinking expectancies appear important in this process. The current results provide support for the role of these cognitive evaluative processes in social information processing models of self-change efforts (Brown, 2001; Brown et al., 2005) and relapse (Anderson & Parent, 2007; 2008) by elucidating differences in these cognitions across hypothesized stages of adolescent alcohol use, and between individuals who made recent transitions into or out of drinking and those who had not. Further research is needed examining how automatic associations between expectancies and motives for alternate behavioral choices combine with cognitive appraisal and emotional processes and result in behavioral intent, decision making and action for change. This can inform intervention efforts aimed at deliberative evaluation of these previously automatic processes, as they continue to provide a promising avenue for prevention and intervention efforts (e.g., Brown et al., 2005; Darkes & Goldman, 1998; Miller & Rollnick, 2002).

Our developmental social information processing model articulates two stages of purposeful change: initial deliberate self-regulatory efforts via quit/reduction attempts followed by efforts to maintain behavioral change (Brown, 2001; Brown et al., 2005). Considerable information has been learned about this process within smoking cessation research (Myers & MacPherson, 2009), but far less is known about the cognitive, contextual and

motivational factors that facilitate adolescent alcohol quit attempts and how successful reduction efforts are maintained. In this sample, about 10% of drinkers and 20% of binge drinking youth reported purposeful change efforts in the past month, which is comparable to research demonstrating that 14–17% adolescent drinkers reduce or stop drinking without formal intervention (e.g., Stice, Myers & Brown, 1998; 14%; Brown, 2005: 17%; D'Amico et al., 2001: 16%; Wagner et al., 1999: 14%). These findings represent the first time that alcohol related cognitions of youth have been examined in relation to youth drinking severity classes and specific efforts and intentions to change their drinking patterns. This study demonstrates that, although more prevalent among heavier drinkers, change efforts exist across drinking classes and particularly those with escalating binge drinking. These rates are considerably lower than attempts to quit or reduce tobacco use among teen smokers; Bancej and colleagues (2007) found that the median 6-month, 12-month and lifetime cessation attempt prevalence were 58%, 68% and 71%, respectively, among adolescent smokers. Discrepant rates of youth change efforts among alcohol users and smoking may be due to differences in distal or proximal influences associated with smoking versus alcohol use (e.g., biological drug interactions, availability, salience of peer models, enforced public policies), as well as dissimilarity in the expected risks of using or not using as well as other cognitive factors (e.g., perceived social norms, motivation, self-efficacy).

Limitations and Future Directions

Although we hypothesized differences between youth's endorsement of alcohol-related cognitions across developmental drinking stages, this sample was cross-sectional only and thus did not allow us to test temporal relations between cognitions and transitions in alcohol involvement. Longitudinal and experimental research is needed to establish a temporal relationship between changes in cognition and drinking behavior within the developmental and social context of adolescent alcohol use. Previous research has demonstrated the prospective utility of expectancies and motives in relation to adolescent initiation, alcohol use, alcohol-related problems and post-treatment abstinence (Aas, Leigh, Anderssen, & Jakobsen, 1998; Brown, 1985; Colder, Chassin, Stice, & Curran, 1997; Cooper et al., 1995; Epler et al., 2009; Strizke & Butt, 2001). Less is known about the relationship between changes in non-drinking expectancies, non-drinking motives and subsequent modification of youth drinking behavior. Other variables, such as environmental contexts or role transitions which quickly evolve during adolescence, changes in alcohol exposure, social context or emotional experience could be responsible for changes in both alcohol-related cognitions and use. Preexisting risk and protective characteristics not measured in the present study may influence both expectancy and motivation endorsement. Finally, reciprocal relations between use and cognitions exist such that changes in alcohol use may precede modifications in certain alcohol-related cognitions rather than cognition shifts provoking behavior change. Prospective assessments of concurrent development of drinking, expectancies and motives for drinking and not drinking have yet to be conducted. The present study suggests that such research will be critical to fully understanding the prevention and intervention implications of this line of research.

Although we elected to focus on expectancies for drinking and not drinking, and non-drinking motives, we were not able to include the critical domain of motives for drinking. Additionally, multiple other cognitive mechanisms of change, such as perceived norms, self-efficacy, attitudes and values, may display similar patterns and interact with one another during key drinking transitions of youth. Additionally, when examining severity-based alcohol use classes, thresholds used to define the groups may not generalize to other adolescent samples. To provide support for the severity-based alcohol use classes identified in this study, replication is warranted. Finally, when measuring the three types of cognitions we included, we were only able to use a few items rather than the fully developed scales

recommended in the literature. Studies that incorporate a wider range of alcohol-related cognitions and more detailed assessment of the included cognitive factors would substantially improve our understanding of connections between constructs predictive of alcohol use outcomes.

Conclusions

The assessment of expectancies of outcomes associated with both alcohol consumption and not drinking, as well as non-drinking motives, aid in the understanding of cognitive processes potentially involved in developmental progression into and out of youth alcohol involvement. Alcohol expectancies and non-drinking motives can help clarify key factors in teens' decisions to delay initiation of alcohol use as well as their decisions to reduce or stop drinking. To the extent that these cognitions are malleable and serve as barriers to reducing hazardous drinking of youth or inhibit likelihood of seeking treatment, they can become systematic targets for prevention and intervention programs.

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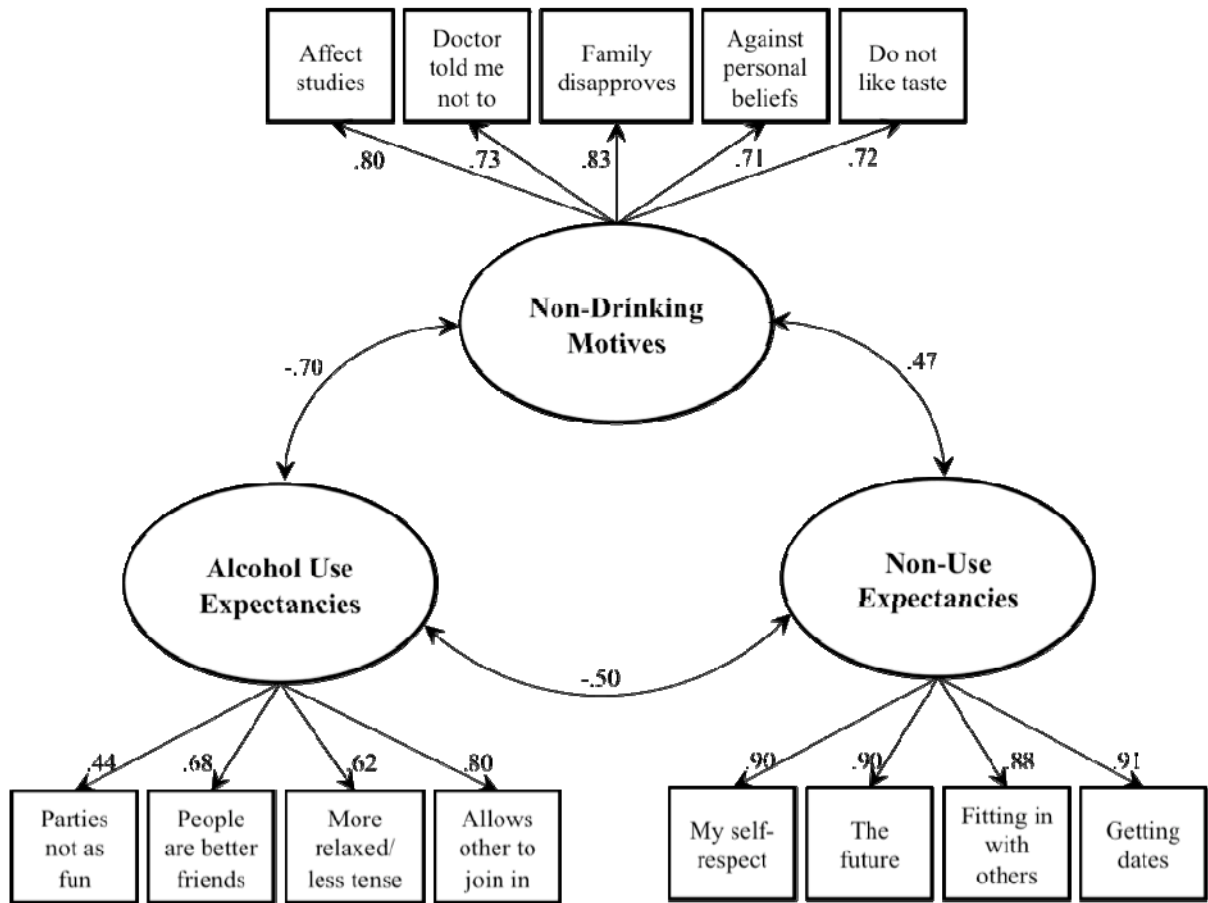


Figure 1. A three factor model of the alcohol related cognitions ($n = 1648$) *Note:* Standardized factor loadings are reported in this figure.

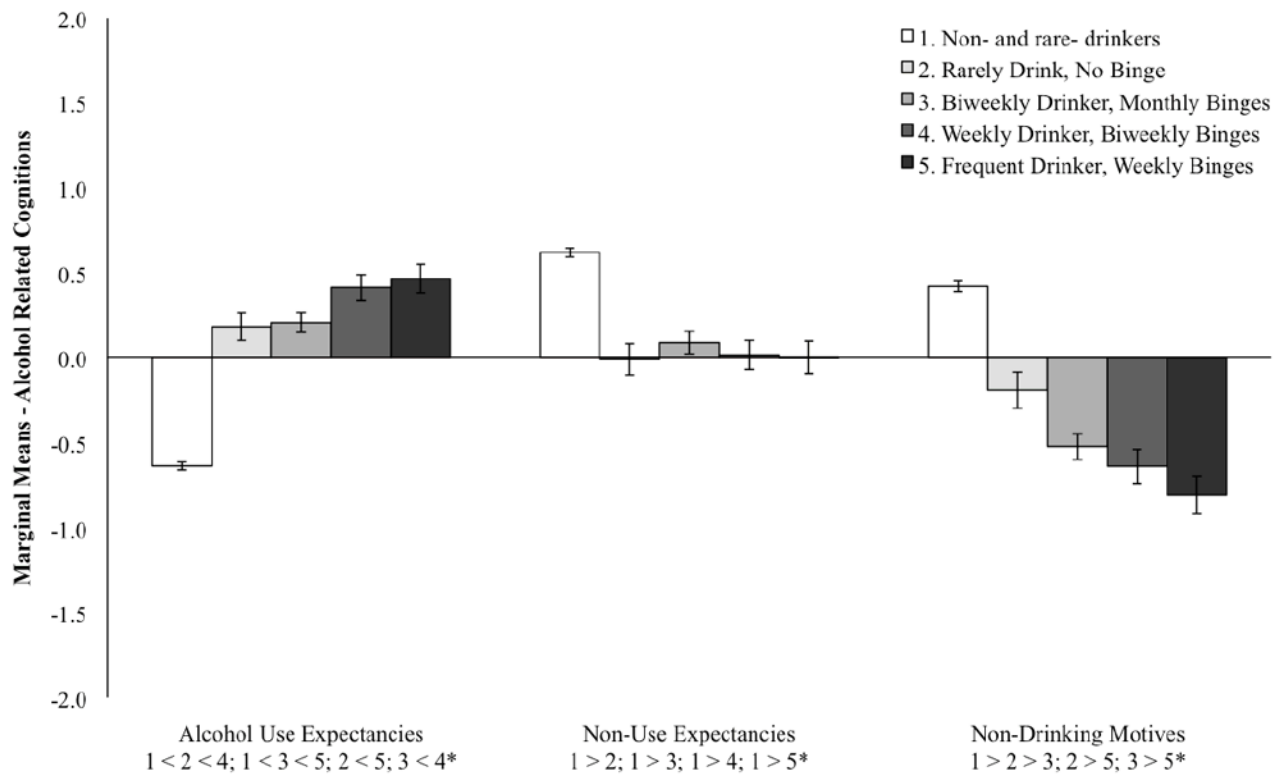


Figure 2. Estimated marginal means of alcohol-related cognitions for five drinking groups, co-varying for sex and grade ($n = 1515$). *Notes:* Covariates were evaluated at the following values: sex = .47, grade = 10.45; * $p < .001$. Error bars represent standard error values. * Significant post-hoc comparisons ($p < .05$)

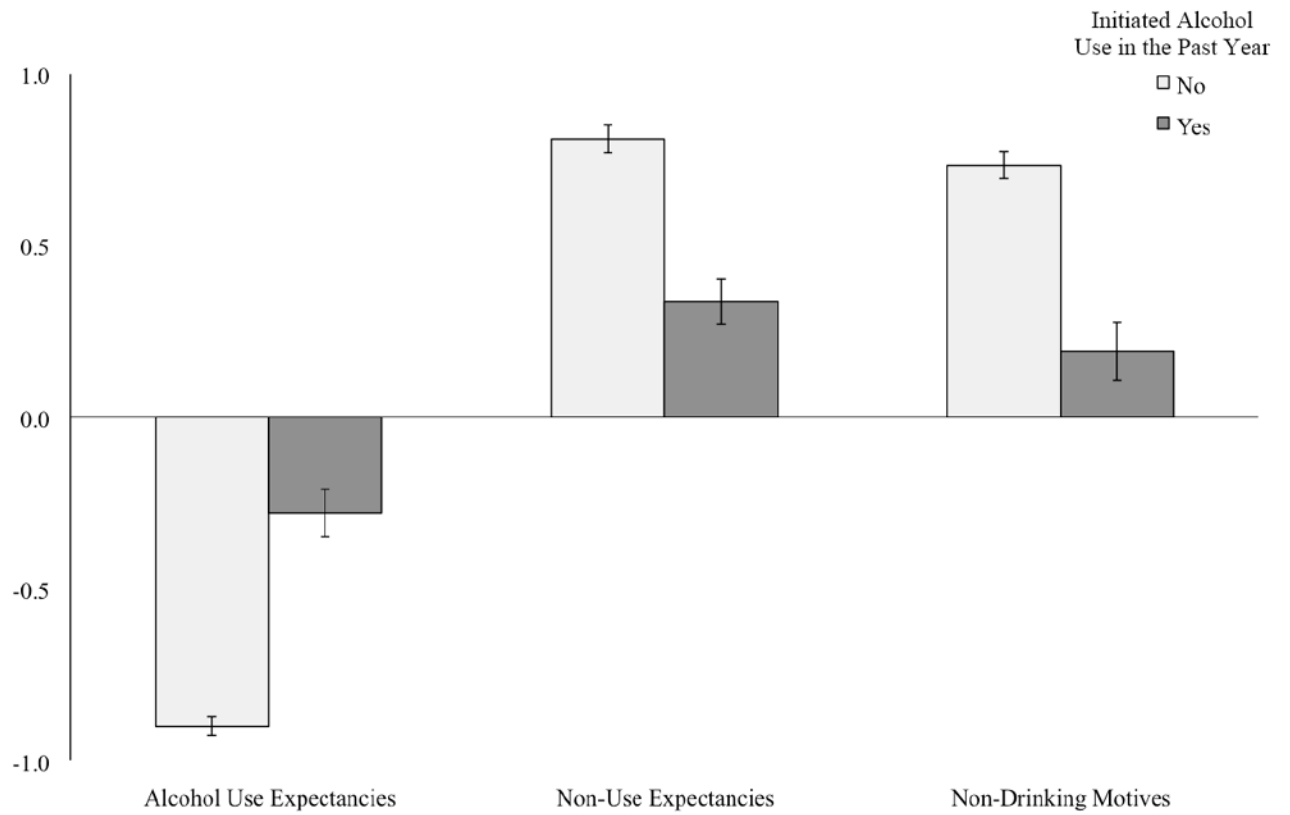


Figure 3. Differences in alcohol-related cognitions between youth who initiated alcohol use in the past year compared to those who have never drunk alcohol ($n = 870$). *Note:* Error bars represent standard error values.

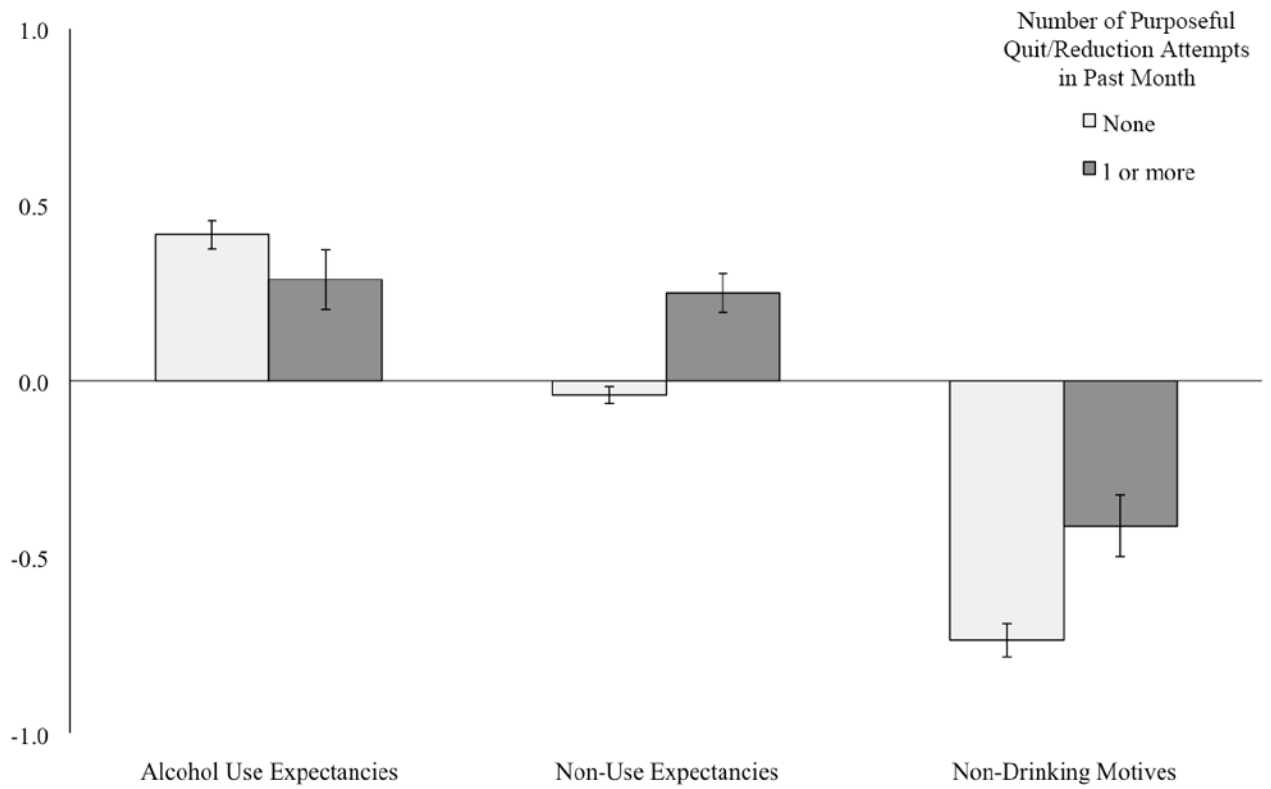


Figure 4. Differences in alcohol-related cognitions between binge drinking youth who had made purposeful attempts to quit or reduce their alcohol use in the past month compared to those who had not ($n = 373$). *Note:* Error bars represent standard error values.

Table 1

2- to 6-class solution using latent class analysis (n = 1648)

Number of classes	BLRT	LMR	BIC	Entropy	Average latent class probabilities
2	$p < 0.001$	6273 ($p < 0.001$)	23304	0.99	0.99
3	$p < 0.001$	2975 ($p < 0.001$)	20286	0.99	0.99 - 1.00
4	$p < 0.001$	1988 ($p < 0.001$)	18280	1.00	1.00
5	$p < 0.001$	618 ($p = 0.01$)	17684	0.99	0.93 - 1.00
6	$p < 0.001$	-280 ($p = 0.53$)	16860	0.99	0.93 - 1.00

Note: BLRT = Bootstrapped Parametric Likelihood Ratio Test; LMR = Lo-Mendell-Rubin; BIC = Bayesian Information Criterion

Table 2

Past month and lifetime alcohol use by drinking class (n = 1648)

Class	Non- and rare drinkers	Biweekly drinker, Never binge	Biweekly drinker, Monthly binges	Weekly drinker, Biweekly binges	Frequent drinker, Weekly binges
N (% of Total)	1182 (72%)	91 (6%)	181 (11%)	106 (6%)	88 (5%)
Alcohol Use	<i>M (SD) sig.</i>	<i>M (SD) sig.</i>	<i>M (SD) sig.</i>	<i>M (SD) sig.</i>	<i>M (SD) sig.</i>
Past Month					
Frequency*	0.08 (0.34) ^a	2.95 (2.03) ^b	2.74 (2.05) ^b	4.51 (2.30) ^c	7.36 (1.92) ^d
Mean Drinks/ Occasion*	0.08 (0.31) ^a	2.57 (0.87) ^b	4.36 (2.10) ^c	5.68 (1.85) ^d	6.38 (1.86) ^e
Max Drinks/ Occasions*	0.09 (0.40) ^a	3.31 (0.78) ^b	8.18 (2.94) ^c	9.90 (3.27) ^d	10.85 (3.32) ^e
Binge Occasions*	0.00 (0.00) ^a	0.00 (0.00) ^a	1.00 (0.00) ^b	2.29 (0.46) ^c	4.77 (0.42) ^d
Related Problems	0.22 (1.82) ^a	1.60 (2.70) ^b	2.12 (2.76) ^b	4.95 (5.93) ^c	7.09 (6.72) ^d
Quit/Reduce Attempt, <i>n</i> (% Class)	14 (1%)	11 (12%)	39 (22%)	23 (22%)	17 (19%)
Lifetime					
Age of 1st Drink	13.88 (1.95) ^{f, a}	14.12 (1.69) ^a	13.95 (1.56) ^a	13.66 (1.52) ^a	13.62 (1.73) ^a
Initiation Recency (years)	2.11 (1.87) ^{f, a}	1.81 (1.56) ^a	2.20 (1.47) ^{a, b}	2.70 (1.38) ^{b, c}	3.00 (1.74) ^c
Frequency 1+ Drinks	4.05 (14.66) ^a	17.31 (25.12) ^b	28.45 (32.25) ^c	51.42 (39.85) ^d	67.77 (37.04) ^e
Frequency Drunk/Sick	0.68 (5.98) ^a	1.68 (2.18) ^a	2.95 (2.76) ^a	7.62 (13.24) ^b	13.58 (24.29) ^c

Note:

* These four variables were indicators in the LCA which defined the above groups;

^f *n* = 433; Sig. = significance of Tukey's HSD post hoc tests at *p* < .05. Group alcohol use means with unmatched superscripts are significantly different from one another.

Table 3

Linear regressions predicting behavioral intentions to initiate drinking among current abstainers ($n = 733$) and to cut down or reduce drinking among current drinkers ($n = 915$) in the next month.

	Intent to Initiate Alcohol Use			Intent to Cut Down/Reduce Alcohol Use		
	<i>B</i>	95% <i>CI</i>		<i>B</i>	95% <i>CI</i>	
<i>Step 1</i>						
Sex	0.04	-0.04 0.13	<i>Step 1</i>	-0.05	-0.31 0.07	Sex
Grade	0.01	-0.04 0.05	$r^2 = .00$	-0.10	-0.21 -0.03	Grade
<i>Step 2</i>			<i>Step 2</i>	0.02	-0.14 0.23	Sex
Sex	-0.04	-0.13 0.04	$r^2 = .12^*$	-0.04	-0.13 0.04	Grade
Grade	-0.04	-0.06 0.02		-0.21**	-0.48 -0.22	Alcohol Use Expectancies
Alcohol Use Expectancies	0.24**	0.12 0.24		0.15**	0.16 0.52	Non-drinking Expectancies
Non-drinking Expectancies	0.01	-0.04 0.04		0.17**	0.12 0.34	Non-drinking Motives
Non-drinking Motives	-0.18**	-0.14 -0.06				