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Short-term Changes in Plans to Drink and Importance of Positive and Negative Alcohol Consequences

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Clinicians and prevention scientists who implement indicated interventions seek to intervene in the midst of an ongoing process (Weissberg, Kumpfer, & Seligman, 2003). For example, those working with high risk drinkers encounter individuals who have initiated the behavior (i.e., heavy alcohol use) and who therefore already hold specific motivations and attitudes regarding their behavior and its consequences (Dunn & Goldman, 1998; Schulenberg & Maggs, 2002). These past experiences and present beliefs about alcohol may perpetuate and sustain emerging trajectories of use (Greenbaum, Del Boca, Darkes, Wang, & Goldman, 2005), which in turn have significant implications for adolescent health and development (Hawkins, Catalano, & Miller, 1992). The reciprocal relations between anticipatory cognitions and behavior should be recognized and articulated to fully capture the dynamic feedback of these constructs (Cooper, Frone, Russell, & Mudar, 1995), and their effects on adolescent risk behaviors.

Intervention programs that are designed to reduce alcohol use hypothesize about specific mediating constructs, such as alcohol expectancies, but these are often left unmeasured or empirically untested (Botvin & Griffin, 2004; Del Boca, Darkes, Goldman, & Smith, 2002; Jensen, Weersing, Hoagwood, & Goldman, 2005; Petraitis, Flay, & Miller, 1995). However, a defining feature of developmental science, clinical psychology, and prevention science alike is their focus on the importance of understanding and evaluating proximal predictors and processes (Catalano, Hawkins, Berglund, Pollard, & Arthur, 2002; Clingempeel & Henggeler, 2002). Proximal mediators that operate within a short time span, such as alcohol expectancies and motivations, may be both more amenable to the effects of intervention and more influential in creating behavioral changes (e.g., Goldman, 1999) than more distal mediators such as a family history of alcoholism (Hawkins et al., 1992). The current study examines whether anticipatory cognitions about alcohol evidence short-term changes (i.e., across weeks) following the experience of positive and negative consequences of drinking using diary data from a sample of first-year university students.

Alcohol Use Among Post-Secondary Students

Understanding the ways in which adolescents and emerging adults respond to their experiences and create expectations about future drinking is important because of the associated effects on physical, social, and emotional health and development. Among American college students, severe consequences resulting from alcohol use have a high prevalence, including damage to

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self, others, and institutions (Perkins, 2002). Hingson, Heeren, Winter, and Wechsler (2005) reported that over 500 000 students in the United States are unintentionally injured each year as a result of their own drinking and over 600 000 are hit or assaulted by other drinking students. College-bound students tend to use less alcohol than their non-college-bound peers during high school, but surpass their age mates in consumption during their university years (O'Malley & Johnston, 2002). As a result, the transition to college is an opportune time to investigate how an individual's personal characteristics and experiences shape development and behavioral choices (Maggs et al., 2006).

Theories about substance use, including social learning theory (Bandura, 1977), the theory of planned behavior (Ajzen, 1991; Ajzen & Fishbein, 2000), and expectancy-value theory (Hays, 1985; Wigfield & Eccles, 2000) highlight the theoretical importance of perceptions of the costs and benefits of substance use and substance-specific cognitions (see Petraitis et al., 1995 for a review). These theoretical traditions propose that individuals' evaluations of the rewards and costs of substance use behavior determine the level and frequency of use. Empirical evidence also illustrates the link, as planned and actual drinking and binge drinking are highly correlated (.69 and .67, respectively) among college students (Maggs, 1997), and intentions to drink before a party are significantly correlated with subsequent blood alcohol concentration (Glindemann, Geller, & Ludwig, 1996). Several interventions built on these ideas have targeted drinking among college students. Two popular strategies for intervention are motivational interviewing (e.g., Baer, Kivlahan, Blume, McKnight, & Marlatt, 2001; Borsari & Carey, 2000; Murphy et al., 2001) and public health social marketing campaigns, which highlight risks and aim to correct inflated perceived norms of campus drinking (e.g., Graham, Tatterson, Roberts, & Johnston, 2004; Neighbors, Larimer, & Lewis, 2004; Wechsler et al., 2003). Both types of programs aim to alter how students think about their behavior and its consequences, such that plans for behavior and perceptions of consequences are targeted as the mediators through which behavior change is hypothesized to be achieved (e.g., Borsari & Carey, 2000). Less research attention, however, has been focused on short-term influences on and variation of such anticipatory cognitions. The present paper focuses specifically on the role played by personal experiences with alcohol in predicting short-term changes in anticipatory cognitions, including plans to drink and the subjective importance of experiencing positive consequences and avoiding negative consequences of alcohol use.

Alcohol Expectancies and Consequences

Research on individual factors for alcohol use has addressed the role of alcohol expectancies and motivations in predicting alcohol use cross-sectionally and longitudinally over months and years (e.g., Baer, 2002; Goldman, Del Boca, & Darkes, 1999; Komro et al., 2001; Leigh, 1989). Among adolescents and young adults, positive expectancies, more than negative expectancies, are particularly predictive of levels of between-person differences in alcohol use and heavy drinking (Leigh & Stacy, 2004) and perceived benefits are important determinants of behavioral intentions (Parsons, Siegel, & Cousins, 1997). Positive expectancies are also strongly associated with experiencing positive alcohol consequences and with alcohol use behavior among college students (Park & Grant, 2005). Men and women both experience positive consequences of alcohol more frequently than negative consequences (Park & Grant, 2005), although men experience more overall positive and negative consequences of alcohol than do women (Park, 2004), which is consistent with the fact that men consume alcohol more frequently and in greater quantities per occasion (Johnston, O'Malley, Bachman, & Schulenberg, 2005; Wilsnack & Wilsnack, 2002).

In contrast to an extensive body of research documenting that alcohol expectancies predict use and consequences (Goldman, 1994; Goldman, Brown, & Christiansen, 1987; Goldman, Darkes, & Del Boca, 1999), in the current study we focus on whether alcohol expectancies

evidence short-term changes in response to experienced consequences of drinking. Recent research suggests that experienced consequences of alcohol use may affect motivations (Blume, Schmaling, & Marlatt, 2006), although there is some evidence that the heaviest drinkers fail to change their behavior in response to negative alcohol effects (Mallett, Lee, Neighbors, Larimer, & Turrisi, 2006; McCarthy, Pedersen, & Leuty, 2005). Therefore, the relative importance of experienced positive and negative consequences in predicting both behavior and cognitions provides a unique and important perspective for research on the determinants of short-term changes in alcohol use. Questions surrounding how experiencing consequences may affect short-term changes in anticipatory cognitions largely remain to be answered, although they are theoretically proximal causes of alcohol use behavior.

The Current Study

The current analyses address several factors that may influence an individual's anticipatory cognitions, which were operationalized as plans to drink and the subjective importance of avoiding negative drinking consequences and of attaining positive drinking consequences. Using plans and subjective importance of alcohol consequences as outcome variables, rather than as predictors, is unusual. The present study focuses on plans to drink, and on the conscious and intended consumption of alcohol, as opposed to prior alcohol use which may be more heavily influenced by situational pressures and environmental influences (Baer, 2002). The variance associated with this planned aspect of behavior may be especially important because of its centrality as a targeted mediator in many intervention programs designed to reduce alcohol use among adolescents and college students (Botvin & Griffin, 2004; Del Boca et al., 2002; Jensen, Weersing, Hoagwood, & Goldman, 2005; Petraitis et al., 1995). Therefore, modeling short-term changes in these constructs in response to experienced consequences may provide insights into the etiology of proximal predictors of behavioral intentions as well as valuable information toward the development of more effective interventions.

Research Questions

This study investigates the associations of three predictors with plans to drink and the subjective importance of potential positive and negative alcohol consequences over 10 weeks in one semester. Experiencing more positive and more negative consequences across weeks is hypothesized to be associated with anticipatory cognitions that support drinking behavior (i.e., plans to drink more, greater importance of experiencing positive consequences, less importance of avoiding negative consequences) because individuals who consume more alcohol experience more positive and negative consequences (Park, 2004). Pilot data from first-year university students showed that experiencing positive consequences during the previous three weeks led to a reported greater importance of attaining positive consequences and lesser importance of avoiding negative consequences (Maggs, 1993). Experiencing negative consequences between occasions of measurement was not associated with changes in anticipatory cognitions in this pilot sample. Other work has shown that experiencing negative consequences is positively correlated with positive alcohol expectancies (Park & Grant, 2005). Although counter-intuitive, experiencing negative consequences may fail to lead to a decrease in alcohol use because of the correlation between experiencing positive consequences and experiencing negative consequences, and the relatively stronger influence of positive consequences on students' intentions for future drinking (Park, 2004).

Two central research questions are examined, the first focusing on between-person differences and the second on within-person short-term changes or fluctuations.

1. Do males and students who experience more positive and negative alcohol-related consequences on average across weeks (a) plan to drink more, (b) report greater

importance of potential positive consequences, and (c) report lesser importance of potential negative consequences of alcohol use?

2. Week to week, do individuals' plans to drink and subjective importance of potential drinking consequences change systematically in response to experiencing positive and negative consequences of alcohol use the week prior?

Method

Procedures

The University Life Transitions project was conducted at a large state university in the Southwest U.S. (see Lee, Maggs, & Rankin, 2006; Rankin & Maggs, in press). Students ($N = 943$) completed initial paper surveys during first-year orientation sessions the summer prior to college entry (98% response rate). Incentives were a t-shirt and entry into a raffle for \$20 at each data collection session. From these orientation surveys, students were recruited for participation in a 10-week telephone diary study. Participants were telephoned once each week for 10 weeks, and compensated with a nominal payment (\$20) at the end of the study. Brief telephone interviews regarding alcohol use and related behaviors and attitudes were conducted once per week, for a total of 10 interviews per participant. All procedures were approved by the institutional review board at the university where the data were gathered, and procedures for the ethical treatment of human subjects were followed.

Participants

Eligible students for the diary study (a) were in their first year (96% of Orientation sample); (b) were under 21 years of age, the local legal age for alcohol consumption (99.8%); (c) were living in on-campus housing (86.3%); (d) agreed to be contacted (64.6%); and (e) had not abstained from alcohol in their final year of high school (79.3%). As a result of the focus on within-person variation, alcohol abstainers were not included in the diary sample. Telephone numbers were identified for 342 of the 390 students who met the eligibility criteria; 87 were not reached. Of the 255 contacted, 90% agreed to participate in the diary study and 69% provided sufficient data to be included in the present analyses. The telephone diary participants were 63% women, 84% white, and 32% sorority/fraternity members, with a mean of 18.8 years ($SD = 0.4$). The dataset used for these analyses included 176 individuals and 1742 weeks (of 1760 possible [176×10] weeks) of data on each of the between-person measures and at least partial data on the within-person measures of interest.

Measures

Data were collected weekly for a period of 10 weeks, to provide both between-person and within-person variance. Participants reported their experienced consequences of drinking by indicating whether they had experienced any of 23 alcohol use consequences in the previous 7 days. Positive consequences (13 items, $\alpha = .90$; e.g., became more social, had fun) and negative consequences (10 items, $\alpha = .79$; e.g., had a hangover, did/said something embarrassing) were computed separately as the mean of responses within positive and negative domains. Consequence scores are used as between-person predictors (person mean across weeks) and within-person predictors (individual deviation from person mean on a given week).

Two variables were also assessed as outcomes in the model. Plans to drink were reported by participants at each telephone interview. The number of standard drinks individuals expected to consume during the following seven days was reported. The intra-class correlation (ICC) indicated that 65% of the variance in plans to drink over 10 weeks was between-persons (Raudenbush & Bryk, 2002; Snijders & Bosker, 1999). In other words, although people differ from one another on average as expected, 35% of the variance resulted from within-person

fluctuations in plans to drink from week-to-week from how people differ from themselves across weeks. The presence of meaningful within-person variation allows for the modeling of variation in behavior across weeks.

Importance of Alcohol Consequences was assessed using the Importance of Consequences of Drinking (ICOD) measure (Maggs, Vesterdal, & Galambos, 2004). This 21-item scale measures the importance of achieving potential positive alcohol consequences (e.g., have more fun, unwind, maintain your reputation) and avoiding potential negative alcohol consequences (e.g., avoid passing out, avoid getting in a car accident) as a result of drinking alcohol on scale of 1 = *not important* to 5 = *very important*. These scales capture an individual's perspective on the value of gains or losses that may result from future drinking behavior, rather than evaluating consequences that were already experienced. The importance of avoiding potential negative consequences (Neg-ICOD) was computed as the mean of responses from negative items (10 items, $\alpha = .89$). The importance of attaining potential positive consequences (Pos-ICOD) was indicated by the mean of responses from positive items (13 items, $\alpha = .91$). Each week's importance ratings referred to the subjective importance of experiencing consequences in the upcoming week (Level 1, within-person fluctuations) and a person's mean across weeks reflected the subjective importance of experiencing consequences overall (Level 2, between-person differences). Variance in Neg-ICOD indicated by ICC was 74% between-persons and 26% within-persons over the 10 weeks; 78% of variance in Pos-ICOD was between-persons, and 22% was within-persons. Although there are differences between people on average, about a quarter of variation is within-people over time.

Results

Plan of Analysis

Multi-level models estimated within- and between-person variation using hierarchical linear modeling software (HLM; Raudenbush & Bryk, 2002). The multi-level approach models both between-person variance in the outcomes (e.g., by gender) and within-person variance in the outcomes (e.g., by weekly consequences) so that we can test whether individuals differ from each other on average and from themselves across multiple occasions (Singer & Willett, 2003). Ten occasions of each Level 1 predictor (i.e., positive and negative consequences experienced) and 10 occasions of each outcome (i.e., plans to drink, Neg-ICOD, Pos-ICOD) were nested within persons. Outcomes of interest were plans to drink, Neg-ICOD, and Pos-ICOD (see equations in Table 1). Although the dependent variables were positively skewed, Level 1 residuals for the final models of all three outcomes were symmetrically distributed. Between-person (Level 2) predictors were gender and the person means of experienced positive and negative consequences over the 10 weeks. Within-person (Level 1) variables were centered within persons; the resulting deviation scores represent week-to-week variation in experienced negative and positive consequences (Kreft, de Leeuw, & Aiken, 1995). For example, weekly experienced consequences indicated the extent to which individuals experienced more or fewer consequences than they usually did on a given week (i.e., deviated from their own means).

Although it was not the focus of the present study, because Spring Break occurred during the data collection period, controls were added to the model to account for associated variation. Lee, Rankin, and Maggs (2006) demonstrated that actual alcohol use and heavy drinking increased during this week, particularly among students who went on Spring Break trips. These controls were dummy-coded variables indicating whether a given week was Spring Break (Level 1), and whether the individual went on a Spring Break trip (Level 2). Spring Break week was associated with an increase in planned drinks across the sample, as well as additional increases in planned drinks for individuals who went on trips.

Description of the Variables

Means, standard deviations, and ranges are shown for the Level 1 variables in Table 2. On average across weeks, male students planned to consume 10.34 ($SD = 12.57$) drinks and female students planned to consume 6.44 ($SD = 7.53$) drinks during the subsequent week. On average, participants reported that it was less important to attain positive consequences ($M = 1.98$, $SD = 0.79$ on a scale of 1 = *not important* to 5 = *very important*) and more important to them to avoid negative consequences ($M = 4.25$, $SD = 0.70$), paired-samples $t(175) = 76.22$, $p < .001$. However, students reported experiencing more positive consequences ($M = 0.23$, $SD = 0.27$ over 13 items, or 2.99 positive consequences per week) than negative consequences ($M = 0.08$, $SD = 0.15$ over 10 items, or 0.8 negative consequences per week), paired-samples $t(175) = -12.26$, $p < .001$. More than 3 out of 4 students (77.8%) reported binge drinking at least once during the study (defined as 4 or more drinks for women and 5 or more drinks for men). Four out of five students (80.1%) reported negative consequences at least once during the 10 week period; 91.5% reported positive consequences.

Between-Person Differences in Anticipatory Cognitions

Between-person differences in the three outcome variables were assessed with the Level 2 portion of the multi-level model (Table 1). On average, men (γ_{01}) planned to drink more and had lower Neg-ICOD ratings than did females. Individuals who experienced more negative consequences on average over the 10 weeks (γ_{02}) planned to drink more and had lower Neg-ICOD ratings. Students who experienced more positive alcohol consequences on average over the 10 weeks (γ_{03}) planned to drink more and reported lower Neg-ICOD and higher Pos-ICOD scores.

Short-Term Changes in Anticipatory Cognitions

Within-person fluctuations, or short-term changes, in the outcome variables were modeled using positive and negative consequences as Level 1 predictors. Across the 10 weeks, individuals planned to drink more and had higher Pos-ICOD scores following weeks in which they reported having experienced a greater number of positive consequences (γ_{20}). Although many students experienced negative consequences (as noted previously), weekly variations in experienced negative consequences were not significantly associated with fluctuations in plans to drink or Neg-ICOD ratings for the following week (γ_{10}). The pattern of within-person associations did not differ between males and females in this sample, as indicated by non-significant interactions between experienced consequences and gender (not shown).¹

Discussion

Between-Person Differences

Subjectively rewarding consequences of alcohol use, such as having fun and feeling good, are important to college students and therefore may affect their drinking patterns. Between-person analyses allow us to investigate the differences between individuals on average across the period of 10 weeks. Differences between individuals on gender and average number of positive and negative alcohol consequences experienced were associated with anticipatory cognitions regarding alcohol. Individuals who experienced more positive and negative consequences of alcohol had anticipatory cognitions that were supportive of future use, which is consistent with the overall importance of positive consequences in reinforcing alcohol behavior (Park, 2004; Park & Grant, 2005). Men planned to drink more and reported that negative alcohol

¹The expectancy literature (e.g., Wigfield & Eccles, 2000) has suggested that experiencing consequences may particularly affect plans to drink if the consequences are highly valued. Therefore, we also tested whether experiencing a positive consequence on a given week interacted with a person's mean level of valuing positive consequences in the prediction of drinking the following week. The same interaction was tested for negative consequences and expectancies. These interactions were non-significant.

consequences were less important to them than women. These findings are expected given that men evidence heavier alcohol use than women (Johnston et al., 2005).

Within-Person Fluctuations

The Level 1, or within-person, component of multi-level models enables researchers to assess how the experiences of individuals affect their own fluctuations using data reported on a short-term basis. In this study, we investigated whether college students planned to drink more in weeks after they had experienced more positive and negative consequences of alcohol use, compared to weeks that had experienced fewer consequences. Similarly, we examined whether the *importance* of experiencing positive consequences and avoiding negative consequences rose and fell in tandem with the previous week's experienced consequences. The results suggested that experiencing more positive consequences appeared to reinforce continued use, as evidenced by short-term changes in anticipatory cognitions surrounding alcohol use; conversely, experiencing fewer positive consequences predicted planning to drink less and subjectively evaluating positive consequences as less important for the subsequent week. For instance, if people have *relatively* more fun than usual, that is particularly reinforcing; if they have less fun than usual, they tend to plan to drink less during the subsequent week. Experiencing more or fewer negative consequences than usual in the past week was not associated with plans to drink or the subjective importance of experiencing positive and negative consequences the following week.

Between- and within-person effects provide different types of information for intervention. For example, negative consequences were associated with plans to drink more on average (between-person), but experiencing more negative consequences than usual during the previous week was not associated with planning to drink more the following week (within-person). Positive consequences, however, were associated with plans to drink on average (between-persons) and on a weekly basis (within-person). Therefore, brief interventions that seek to change the ways individuals plan for and think about their alcohol use experiences would likely be more successful by acknowledging the positive effects of use, rather than the negative consequences.

The Development of Drinking

The current findings suggest that individuals who drank most problematically, evidenced by experiencing the most negative consequences of use across weeks (Level 2 effect), also reported that the negative consequences of alcohol use were less important to avoid compared to individuals who experienced fewer negative consequences. Individuals who experienced more positive consequences also reported that negative consequences were less important and positive consequences were more important, compared to individuals who experienced fewer consequences. Since positive expectancies are most strongly associated with alcohol use behavior (Goldberg, Halpern-Felsher, & Millstein, 2002; Leigh & Stacy, 2004; Park & Grant, 2005), this finding has important public health implications. Furthermore, these associations may be increasingly reinforced with time, evidenced by the short-term increases in reported importance of future positive consequences after experiencing rewarding alcohol effects during the previous seven days (Level 1 effect). Experiencing positive consequences is powerful, and the desire to attain them in the future may cause drinking patterns to escalate. These results inform models, such as social learning theory (Bandura, 1977) and the theory of planned behavior (Ajzen, 1991; Ajzen & Fishbein, 2000), that focus on expectations of a behavior's costs and benefits. Specifically, positive consequences of alcohol use are more prevalent than negative consequences and therefore more likely to affect future behavior motivation (see Leigh, 1989).

Intervention Challenges

Intervening in the midst of ongoing alcohol use involves encountering existing expectations and values regarding drinking (Cooper et al., 1995). Developmental scientists are well aware of the ongoing nature of development and change across the life span (e.g., Baltes, 1987; Elder, 1998). Regardless of the timing of an intervention, individuals already have behaviors and predispositions that may affect how they respond. For instance, even children and early adolescents who have yet to initiate alcohol use have beliefs and attitudes about drinking (Johnson & Johnson, 1996; Leigh, 1989; Leigh & Stacy, 2004; Miller, Smith, & Goldman, 1990) that may affect how they respond to intervention programs. However, investigating the proximal processes that operate in the midst of ongoing development may provide interesting and informative results for intervention, particularly because they may be more susceptible to intervention changes than would more cumulative and distal influences. For college students, in particular, the importance attached to achieving positive consequences (Maggs, 1997), which are aspects of motivation (Eccles & Wigfield, 2002), are likely among the most important proximal processes influencing use. Therefore, interventionists must be aware of the ways these positive beliefs may alter plans, behaviors, and responses to intervention programs targeting alcohol use.

Students are likely aware of both positive and negative alcohol consequences, and choose to drink in order to experience these effects based on what is rewarding to them both physiologically and socially (e.g., Furby & Beyth-Marom, 1992; Goldman et al., 1999; Spear, 2000). Especially because many intervention programs that are designed to reduce alcohol use attempt to change anticipatory cognitions (e.g., Borsari & Carey, 2000), the fact that these cognitions respond so quickly to experiences adds further complexity. Innovative intervention approaches that acknowledge positive consequences experienced from alcohol use (e.g., fun) and provide safer alternatives for experiencing them (e.g., alcohol-free programs; see Morritz, Seehafer, & Maatz-Majestic, 1993) are needed. Darkes and Goldman (1993) suggested using expectancy challenge procedures to encourage reflection about the veracity of alcohol expectancies. Realizing how expectations affect behavior (even in the absence of alcohol's physiological effects) may decrease the reinforcing value of alcohol (Goldman, 1999), although tests of this approach have yielded mixed results (e.g., Corbin, McNair, & Carter, 2001; Wiers & Kummeling, 2004).

Limitations

Three limitations regarding the timing of the current study are worthy of mention. First, the models presented here focus on anticipatory cognitions at the weekly level. However, within a given week, there is also variation in alcohol use across days and types of days (e.g., weekday vs. weekend). Finer-grained analyses linking experiences with subsequent plans and expectancies should be conducted with data collected daily or across shorter intervals, using for example experience sampling methodologies (e.g., Muraven, Collins, Morsheimer, Shiffman, & Paty, 2005). Second, we focused exclusively on the impact of proximal factors on anticipatory cognitions regarding alcohol use. However, more distal factors are likely also important, including family background, previous alcohol consumption, and peer alcohol norms (e.g., Hawkins et al., 1992). Our focus on proximal factors represents an effort to explore the fluctuations in expectations regarding alcohol in order to understand more fully potential mediational processes. As the short-term impacts of anticipatory alcohol cognitions are more clearly articulated, intervention science will be better equipped to respond to the challenges of intervening in the midst of these processes. Third, the current sample is relatively homogenous in terms of ethnicity, age, and residence (living on campus at a single university.) Therefore, generalizing results to other populations and age ranges may not be appropriate.

Future Directions

Future research should address the limitation of data collection timing highlighted above. For example, measurement burst designs that utilize daily data collection techniques will enable researchers to deepen our understanding of what influences alcohol use behavior among adolescents and emerging adults, both students and those in other social roles, on an event level. Measuring multiple events known to be associated with increases in alcohol use (e.g., Halloween, St. Patrick's Day, sports tailgating; Greenbaum et al., 2005) will allow for within-person prediction of spikes in plans to drink. Such heavy drinking episodes are particularly risky for acute consequences that may have lifelong implications. Moreover, the inclusion of daily covariates will enable researchers to answer interesting questions about associations among behaviors and cognitions. For example, event-level associations between sexual behavior and alcohol use among college students are a matter of campus and public health concern (e.g., Cooper, 2002). Identifying the specific situational and interpersonal determinants of risky sexual behaviors in the context of heavy alcohol use is of public health importance (e.g., Cooper, 2002). Innovative data collection strategies could be used to describe more fully the manner in which such behaviors co-vary over time.

In addition, whether and how strongly students subjectively value specific alcohol-related consequences will need to be better understood to inform intervention efforts. Specific consequences vary in their magnitude, such that one severe consequence (e.g., receiving a citation for drinking and driving) may over-shadow several more minor consequences (e.g., having a headache) in terms of the effects on behavior. In addition, positive effects may override negative effects in motivating behavior (Park & Grant, 2005) and consequences labeled as positive or negative by researchers (e.g., hangovers) may, in fact, not be subjectively evaluated as such by college students themselves (Leigh, 1989; Perkins, 2002). Future investigations may more fully capture the effects of alcohol consequences by focusing on which specific positive and negative consequences are most important to adolescents, and how these associations change over time. Questions regarding perceptions of the consequences of drinking, and how these perceptions change with experience, are important avenues for adolescent research.

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Table 1
Predicting Short-term Changes in Plans to Drink and Anticipatory Cognitions Regarding Alcohol Use

	Anticipatory Cognitions for the Subsequent Week		
	Planned Drinks B (SE)	Neg-ICOD B (SE)	Pos-ICOD B (SE)
Average Outcome over 10 Weeks, β_0			
Intercept, γ_0	-0.35(0.76)	4.56(0.08) ***	1.36(0.07) ***
Male Gender, γ_{01}	2.53(0.81) **	-0.21(0.09) *	0.09(0.07)
Negative Consequences Mean, γ_{02}	33.07(5.15) ***	-1.76(0.55) **	-0.12(0.44)
Positive Consequences Mean, γ_{03}	14.37(2.53) ***	-0.55(0.27) *	2.99(0.22) ***
SB Trip (Control), γ_{04}	0.60(0.81)	0.08(0.09)	-0.13(0.07)
Average Fluctuations in Weekly Negative Consequences, β_1			
Intercept, γ_{10}	0.09(1.32)	-0.09(0.10)	-0.17(0.09)
Average Fluctuations in Weekly Positive Consequences, β_2			
Intercept, γ_{20}	1.80(0.69) *	-0.05(0.06)	0.50(0.06) ***
Average Effect of SB Week (Control), β_3			
Intercept, γ_{30}	5.04(1.41) **	-0.12(0.07)	0.05(0.07)
SB Trip (Control), γ_{31}	3.89(1.81) *	-0.06(0.09)	0.06(0.08)

*
 $p < .05$

**
 $p < .01$

 $p < .001$.

Note. Level 1 $N = 1742$ person weeks, Level 2 $N = 176$ people. β coefficients (Level 1) are estimated for each person. γ coefficients (Level 2) are aggregate estimates across the sample and are presented in the table.

Level 1: Outcome (Anticipatory Cognitions) = $\beta_0 + \beta_1$ (Neg Consequences) + β_2 (Pos Consequences) + β_3 (SB Week) + r_{1t}

Level 2: $\beta_0 = \gamma_{00} + \gamma_{01}$ (Gender) + γ_{02} (Neg Cons Mean) + γ_{03} (Pos Cons Mean) + γ_{04} (SB Trip) + U_0

$\beta_1 = \gamma_{10}$

$\beta_2 = \gamma_{20}$

$\beta_3 = \gamma_{30} + \gamma_{31}$ (SB Trip) + U_3

Table 2

Descriptive Statistics for Level 1 Constructs

	<i>M</i>	<i>SD</i>	Range
Predictors			
Positive Consequences	0.23	0.27	0–1
Negative Consequences	0.08	0.15	0–0.9
Anticipatory Cognition Outcomes			
Planned Drinks	7.49	9.42	0–50
Pos-ICOD ^a	1.98	0.79	1–5
Neg-ICOD ^b	4.25	0.70	1–5

Note. Level 1 *N* = 1742 person weeks, Level 2 *N* = 176 weeks.

^aPos-ICOD = Importance of Positive Alcohol Consequences.

^bNeg-ICOD = Importance of Negative Alcohol Consequences.