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Identifying Patterns of Situational Antecedents to Heavy Drinking among College Students

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Abstract

Background—Emerging adults have the highest prevalence of heavy drinking as compared to all other age groups. Given the negative consequences associated with such drinking, additional research efforts focused on at-risk consumption are warranted. The current study sought to identify patterns of situational antecedents to drinking and to examine their associations with drinking motivations, alcohol involvement, and mental health functioning in a sample of heavy drinking college students.

Method—Participants were 549 (65.8% women) college student drinkers.

Results—Latent profile analysis identified three classes based on likelihood of heavy drinking across eight situational precipitants. The “High Situational Endorsement” group reported the greatest likelihood of heavy drinking in most situations assessed. This class experienced the greatest level of alcohol-related harms as compared to the “Low Situational Endorsement” and “Moderate Situational Endorsement” groups. The Low Situational Endorsement class was characterized by the lowest likelihood of heavy drinking across all situational antecedents and they experienced the fewest alcohol-related harms, relative to the other classes. Class membership was related to drinking motivations with the “High Situational Endorsement” class endorsing the highest coping- and conformity-motivated drinking. The “High Situational Endorsement” class also reported experiencing more mental health symptoms than other groups.

Conclusions—The current study contributed to the larger drinking literature by identifying profiles that may signify a particularly risky drinking style. Findings may help guide intervention work with college heavy drinkers.

Keywords

Drinking antecedents; IDTS; profile analysis; alcohol use; college students

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Declaration of Interest

The authors report no other conflicts of interest. The authors alone are responsible for the content and writing of this paper.

Emerging adults have the highest prevalence of heavy drinking as compared to all other age groups (Substance Abuse and Mental Health Services Administration, 2014). Heavy episodic drinking is defined as the consumption of 5+/4+ alcoholic drinks for men/women within approximately two hours (National Institutes on Alcohol Abuse and Alcoholism, 2004). It has been estimated that approximately 36% of college students reported heavy drinking (five or more drinks) in the previous two weeks (Johnston, O'Malley, Bachman, & Schulenberg, 2011) while more than one third met criteria for an alcohol use disorder (Wu, Pilowsky, Schlenger, & Hasin, 2007). Rates of heavy drinking among college students have remained relatively stable despite two decades of prevention efforts (Wechsler & Nelson, 2008). Drinking among college students has been linked to a variety of negative consequences including academic problems, unsafe sexual practices, legal involvement, assault, short-term health problems, and even mortality (Hingson, Zha, & Weitzman, 2009; Perkins, 2002; Wechsler, Lee, Kuo, Seibring, Nelson, & Lee, 2002). In light of these negative outcomes, research efforts focusing on at-risk consumption and identifying situations antecedent to risky drinking has the potential to further inform intervention efforts for this population.

Situational Antecedents to Drinking

Understanding and identifying situational antecedents to alcohol consumption are critical to effectively intervene, particularly for approaches consistent with the cognitive-behavioral perspective (Marlatt & Gordon, 1980, 1985). Identifying specific precipitants to drinking can aid understanding of one's motivations for drinking as well as assist in pinpointing situations that may trigger high-risk drinking behaviors and/or negative consequences (Turner, Annis, & Sklar, 1997). In their work with alcohol dependent clients, Marlatt and Gordon (1980) identified eight types of high-risk situations that precede relapse. These categories include unpleasant emotions, physical discomfort, pleasant emotions, testing personal control, urges and temptations to use, conflict with others, social pressure to use, and pleasant times with others. Based on this work, the Inventory of Drinking Situations (IDS; Annis, 1982) as well as its derivatives (e.g., IDS-42; Annis, Graham, & Davis, 1987; IDTS; Turner et al., 1997) were developed as a means to assess the likelihood of heavy drinking and/or other substance use across these eight situational antecedents.

Clinical samples

The majority of studies focusing on Marlatt's typology and the IDS/IDTS have primarily been with clinical populations (e.g., DeHaas, Calamari, Bair, & Martin, 2001; Turner et al., 1997). Among a sample of alcohol dependent treatment seekers, drinking is most likely to follow situations involving negative emotional states, interpersonal conflicts and social pressure to drink (Marlatt & Gordon, 1985). Similarly, other studies found that among adult treatment seekers, alcohol dependence symptoms (Turner et al., 1997) and length of problem drinking (Annis et al., 1987) are related to drinking in response to negative reinforcement situations including unpleasant emotions, physical discomfort, and conflict with others (Turner et al., 1997). One study identified four modal or ideal profiles based on the IDS in a substance dependent sample and found that a negative profile represented clients that drink heavily in response to negative emotions and conflict with others and was associated with

alcohol dependency (Annis & Graham, 1995). It appears that antecedents related to negative emotions are stronger determinants of drinking for problem drinkers whereas less problematic drinkers emphasized positive and social situations (Victorio-Estrada & Mucha, 1997). Overall, these findings suggest that as alcohol use severity increases, alcohol is used progressively in negatively rather than positively reinforcing contexts and where alcohol is a coping response to negative situations.

Non-clinical samples

The utility of the IDS/IDTS with non-clinical samples of young adults has been studied less often than alcohol-dependent adult populations. However, there is some research to support its use within this group (e.g., Buckner, Eggleston, & Schmidt, 2006; Carrigan, Samoluk, & Stewart, 1998). Prior research found that college students endorse more frequent alcohol consumption involving positive reinforcement situations (e.g., pleasant time with others, pleasant emotions) versus situations of negative reinforcement (e.g., unpleasant emotions, conflict with others) or temptation situations (e.g., urges and temptations; Carrigan et al., 1998). When examined by drinker type, heavy drinking students, as compared to low and/or moderate users, are at increased risk of drinking in *interpersonal* situations that include conflict with others, social pressure, and pleasant time with others, as well as *intrapersonal* situations of physical discomfort, pleasant emotions, and urges and temptations (Carey, 1993, 1995). Drinking involving antecedents of social pressure, conflict, and pleasant social occasions were most correlated with alcohol-related harms (Carey, 1995). Thus, while college alcohol users endorsed some of the same drinking situations as dependent drinkers, they also appear to emphasize positive and social antecedents. It may be that for college drinkers, it is a combination of both positively and negatively reinforcing situations that impact their alcohol use and experience of harmful consequences. Efforts to identify profiles based on situational antecedents may reveal the combination of high-risk situations most associated with harmful drinking for college students. Moreover, given that heavy drinking students appear to have a unique set of antecedents to drinking (Carrigan et al., 1998) and are at greater risk of experiencing alcohol-related harms than low or moderate drinkers (see White & Hingson, 2013 for a review), research is needed to examine the situational patterns of heavy drinking college students specifically.

Drinking Motives and Affective Functioning

An individual's pattern of drinking situations may be associated with their reasons for drinking. Drinking motives refer to an individual's motivational state that drives their alcohol use (Cooper, 1994; Cox & Klinger, 1988). There are four primary motives (i.e., coping, conformity, social, and enhancement reasons) with each showing distinct associations with drinking patterns and related consequences (e.g., Cooper, 1994; MacLean & Lecci, 2000; Martens, Rocha, Martin, & Serrao, 2008). Coping- and conformity-motivated drinking may be considered negative reinforcement motives as the individual is drinking to avoid a negative outcome, such as negative emotions or social rejection, while social and enhancement may be considered positive reinforcement motives as drinking is related to gaining a positive outcome, such as enhanced mood or social rewards (Cox & Klinger, 1988, 1990).

Negative reinforcement motives, though less frequently endorsed than positive among adolescents and young adults (Carey & Correia, 1997; Kuntsche, Knibbe, Gmel, & Engels, 2005), may be particularly high-risk given their positive association with problematic drinking patterns (Cooper, 1994; Merrill & Read, 2010). For instance, those who drink to cope with negative emotions are more likely to experience alcohol-related problems and dependence symptoms (e.g., Carpenter & Hasin, 1998; Cooper, 1994; Cooper, Frone, Russell, & Mudar, 1995). Relatedly, individuals with more mental health symptoms (e.g., anxiety, depression) may drink to cope in response to stress (e.g., Buckner & Shah, 2015; Cooper, Russell, Skinner, Frone, & Mudar, 1992). However, the relationship between affective functioning and drinking is intricate. Stronger drinking to cope motivations do not always relate to more drinking (Hussong, Galloway, & Feagons, 2005; Ralston, Palfai, & Rinck, 2013) and actually may be contingent on the day of the week (Armeli, Todd, Conner, & Tennen, 2008). Furthermore, individuals with higher anxiety symptoms may consume less alcohol (Lewis et al., 2008), but experience more alcohol-related harms (e.g., Dennhardt & Murphy, 2011; Lewis et al., 2008). Because of the complex associations amongst these constructs, additional research is needed. It may be that endorsement of negative reinforcement motives, and level of mental health functioning are associated with particular patterns of drinking situational antecedents. Findings could offer valuable information to guide intervention and clinical work with young adult drinkers by helping to identify those most susceptible to harmful drinking.

Current Study

The aims of the present investigation were to (1) determine patterns of situational antecedents with heavy drinking college drinkers using a person-centered statistical approach (i.e., latent profile analysis [LPA]) to identify latent classes or groups of college student heavy drinkers who share similarities in their profiles based on the IDTS; and (2) examine differences between latent classes on drinking-related variables (quantity, frequency, heavy episodic drinking frequency, and problems), endorsement of potentially risky drinking motives (i.e., coping and conformity), and mental health symptoms. It was hypothesized that there would be distinct high situational frequency and low situational frequency groups of individuals based on their IDTS profiles and that these latent groups would be differentiated based on drinking behaviors, coping and conformity drinking motives, and mental health functioning.

The current study has the potential to contribute to our knowledge base as to aide those working directly with college drinkers most vulnerable for experiencing alcohol-related harms. Examining the situational antecedent profiles of college students would allow the identification of profiles most associated with harmful drinking. Having knowledge that endorsement of particular drinking antecedents are associated with a higher likelihood of experiencing alcohol-related harms, intervention personnel working with college students then may be able to identify at-risk drinkers simply by assessing their salient situational triggers.

Methods

Participants and Procedure

Participants were 549 (65.8% women) college students recruited from an undergraduate psychology research pool at a mid-size East Coast university. To be eligible, participants must have (1) been between the ages of 18 and 25 years old and (2) engaged in at least two heavy episodic drinking episodes (4/5 or more drinks in one sitting for women/men) in the previous 30 days. The mean age of the sample was 19.94 ($SD = 1.93$) years. Approximately 51.6% of participants identified their racial group as Caucasian, 29.7% as African American, 5.5% as Hispanic, 3.6% as Asian, 8.7% self-identified as “other” or biracial, and 0.9% did not respond. Class standing of participants was 37.2% freshmen, 27.9% sophomores, 18.8% juniors, 15.3% seniors, and 0.9% self-identified as “other”.

Data collection was administered in groups. Following informed consent, participants completed a battery of self-report questionnaires that took approximately one hour to complete. Participants received course credit for their participation. This study was approved by the university's committee on human subjects research and followed American Psychological Association (APA, 2002) guidelines.

Measures

Drinking situations—The 50-item Inventory of Drug-Taking Situations – Alcohol Version (IDTS-A; Annis & Martin, 1985) was used to measure the likelihood of heavy drinking across eight different drinking situations: unpleasant emotions (e.g., “When I was depressed about things in general”), physical discomfort (e.g., “When I felt shaky, sick, or nauseous”), testing personal control (e.g., “When I wanted to see whether I could drink in moderation”), urges and temptations to use (e.g., “When I unexpectedly found some booze or happened to see something that reminded me of drinking”), conflict with others (e.g., “When other people rejected me or didn't seem to like me”), social pressure to use (e.g., “When others in the same room were drinking and I felt that they expected me to join in”), pleasant emotions (e.g., “When I was happy”), and pleasant times with others (e.g., “When I met some old friends and we wanted to have a good time”). Participants reported the frequency of drinking in each situation on a 4-point scale ranging from 1 (*never*) to 4 (*almost always*). Subscale scores were calculated by taking the mean of the subscale items. Coefficient alphas across subscales ranged from .73 to .92.

Drinking motives—Motivations for drinking were assessed using the Drinking Motives Questionnaire (DMQ-R; Cooper, 1994). The DMQ-R consists of 20 items regarding one's reasons for drinking alcohol ranging from 1 (*almost never/never*) to 5 (*all of the time*). The DMQ-R contains four subscales including coping (e.g., “To forget your worries”), conformity (e.g., “To be liked”), social (e.g., “To be sociable”), and enhancement motives (e.g., “Because it's exciting”). Scores were calculated by summing responses associated with each individual subscale; higher scores reflect greater endorsement of each motive. Coefficient alphas ranged from .83 to .87.

Mental health symptoms—Mental health symptoms were assessed using the Brief Symptom Inventory-18 (BSI-18; Derogatis, 2000; Derogatis & Melisaratos, 1983). The BSI is an 18-item measure of general mental health symptomatology including symptoms of anxiety, depression, and somatization (e.g., “Nervousness or shakiness inside”). Scores range from 1 (*not at all*) to 5 (*extremely*). Scores were calculated by summing responses with higher scores indicating poorer mental health. In the present study, $\alpha = .92$.

Alcohol consumption—Alcohol consumption was assessed using the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985). Participants indicated the number of drinks they typically consumed for each day of an average week in the past 3 months. Typical weekly quantity, frequency, and frequency of heavy episodic drinking episodes (i.e., 4+/5+ drinks in one sitting for women/men) were used as measures of alcohol consumption.

Alcohol-related problems—Alcohol-related problems were assessed using the Young Adult Alcohol Consequences Questionnaire (YAACQ; Read, Kahler, Strong, & Colder, 2006). The YAACQ is a 48-item measure of harms experienced within the past year with yes (2) or no (1) response options (e.g., “I have woken up in an unexpected place after heavy drinking”). Higher scores represent more alcohol-related problems experienced. In the present study, $\alpha = .93$.

Results

Data Analytic Strategy

Prior to conducting any analyses, data were cleaned and statistical assumptions were addressed. Drinking variables were investigated for skewness and kurtosis. Alcohol use quantity and heavy episodic drinking frequency were slightly positively skewed so these variables were square root transformed. Because the outcomes of the transformed variables were similar to those that were nontransformed, the outcomes of the nontransformed drinking variables are reported to enhance interpretability. Missing data ranged from 0% to 15.5% across all variables. To address missing data, pairwise deletion was used in a one-way analysis of multivariate analysis of variance (MANOVA) models and maximum likelihood estimation was used in LPA models. MANOVAs were tested using SPSS version 20 and LPA was conducted with Mplus version 7.11 (Muthén & Muthén, 1998-2012).

LPA was used to identify profiles based on participants' frequency of drinking in various situations. LPA is a type of latent variable mixture model where the latent variable is categorical (e.g., classes) and the indicator variables (e.g., drinking situations) are continuous. LPA identifies classes of individuals that are similar on observed continuous indicators. LPA identifies each individual's likelihood, or posterior probability, of being in each class. Individuals are assigned to the class in which their posterior probability is highest. Several models are estimated indicating different numbers of classes and the optimal number is determined using model comparison criteria. The Akaike Information Criteria (AIC) and sample size adjusted Bayesian Information Criteria (SSA BIC) were used to assess model fit, with lower values indicating better model fit (Nylund, Asparouhov, & Muthén, 2007). Additionally, the Lo-Mendell-Rubin (LMR) likelihood ratio test assesses if the current number of classes (k) is a better fitting model than a model with one fewer class

($k - 1$; Wang & Wang, 2012). Furthermore, relative entropy values were used to evaluate classification accuracy. Relative entropy values range from 0.0 to 1.0, with higher values indicating greater accuracy; a value of 0.80 is high, 0.60 is medium, and 0.40 is low entropy (Clark, 2010). These criteria together were used to determine the best-fitting model, thus indicating the appropriate number of classes represented by the latent variable. After the ideal number of latent classes was established, MANOVA models were used to determine if the classes differed based on drinking motives (i.e., coping, conformity, social, enhancement), alcohol use indicators (i.e., alcohol quantity, frequency, heavy episodic frequency), and alcohol-related problems. In addition, an ANOVA model was used to test for differences in mental health symptoms. IBM SPSS Statistics software (version 20) was used to test all MANOVA and ANOVA models.

Latent Profile Models

Models with a 1-, 2-, 3-, 4- and 5-class solution were examined. Fit statistics for the five LPA models are presented in Table 1. The AIC and SSA-BIC consistently decreased as more classes were added. However, based on the LMR likelihood ratio test, a 3-class solution was shown to be most optimal. The 3-class model had an entropy value of .950, slightly higher than the other models, which indicates a superior level of classification accuracy. Additionally, in order to have a meaningful group classification, the relative size of each latent class should not be too small (Wang & Wang, 2012). The 4- and 5-class solutions contained fewer than 5% of participants. After considering all criteria, a 3-class model was determined to be the most ideal.

As can be seen in Figure 1 and Table 2, Class 1 appeared to be characterized by the lowest likelihood of heavy drinking across all situations assessed on the IDTS and represented 70.4% ($n = 386$) of the sample. As such, this class was labeled “Low Situational Endorsement” group. Class 2 was characterized by greater endorsement of heavy drinking likelihood on the IDTS subscales than Class 1, and comprised 23.6% ($n = 130$) of the sample. This class was labeled “Moderate Situational Endorsement” group. Lastly, Class 3 was characterized by relative elevations across all IDTS subscales and represented 6.0% ($n = 33$) of the sample. Class 3 was labeled “High Situational Endorsement” group. All IDTS subscales were significantly correlated with one another (r 's range from .21 to .85) when examined across groups. The majority of IDTS subscales were significantly intercorrelated within each group. Significant correlations within groups ranged from .14 to .68.

There were significant differences between latent class means for each of the IDTS subscale indicators: unpleasant emotions, $F(2, 511) = 667.52, p < .001$; physical discomfort, $F(2, 530) = 359.69, p < .001$; pleasant emotions, $F(2, 521) = 50.32, p < .001$; testing personal control, $F(2, 527) = 213.15, p < .001$; urges and temptations, $F(2, 535) = 262.29, p < .001$; conflict with others, $F(2, 514) = 716.61, p < .001$; social pressure to use, $F(2, 536) = 136.69, p < .001$; pleasant times with others, $F(2, 530) = 84.85, p < .001$. Post hoc tests revealed that the High Situational Endorsement group scored significantly higher than the Low Situational Endorsement group across all indicators. The High Situational Endorsement group scored significantly higher than the Moderate Situational Endorsement group on all indicators with the exception of pleasant time with others, where the two classes were not different. The

Moderate Situational Endorsement group scored significantly higher than the Low Situational Endorsement group on all indicators.

MANOVA Models

Two separate MANOVA models were conducted to determine significant differences between classes regarding (1) alcohol use outcomes and (2) drinking motives. Regarding alcohol outcomes, the overall multivariate effect was significant, Pillai's Trace (V) = 0.29, $F(8, 910) = 19.16$, $p < .001$, partial $\eta^2 = .144$. The follow-up analysis of variance (ANOVA) models indicated that latent classes differed on all dependent variables (see Table 3). Pairwise comparisons demonstrated that for the quantity and heavy episodic frequency drinking indicators, alcohol use was lowest in the Low Situational Endorsement group as compared to the Moderate group; however, the High Situational class was not significantly different from other classes. Regarding frequency, alcohol use was lower in the Low Situational Endorsement group as well as the High Situational Endorsement group as compared to the Moderate group. Regarding alcohol-related problems, all YAACQ means differed, with the High Situational group reporting the most alcohol-related problems as compared to the Low and Moderate groups. It is interesting to note that there was a pattern in which the Moderate group consumed alcohol significantly more frequently than the High group, despite reporting fewer alcohol-related problems than the High group.

The multivariate effect for drinking motives also was significant, $V = 0.36$, $F(8, 1088) = 29.72$, $p < .001$, partial $\eta^2 = .179$. Follow-up ANOVA models revealed significant differences between latent classes across all motives (see Table 3). Pairwise comparisons indicated that the means for coping and conformity motives were higher in the High Situational group than Moderate group; Moderate group means were higher than the Low group. For social and enhancement motives, Moderate and High groups were not different but both had higher social and enhancement motives than the Low group.

ANOVA Model

Classes significantly differed overall in terms of level of mental health symptomatology. Pairwise comparisons revealed that the High Situational Endorsement group reported poorer mental health functioning than the Moderate and Low Situational Endorsement groups. The Moderate group reported more mental health symptoms than the Low group. See Table 3.

Discussion

The present study sought to identify patterns of situational antecedents to heavy drinking. A person-based technique was used to uncover latent groups of college drinkers sharing similarity in the situations in which they endorsed likelihood of heavy drinking. The nature of these classes was examined further by testing differences with regard to their drinking habits, experience of alcohol-related harms, motivations for drinking, and mental health symptomatology.

LPA analyses identified three latent classes of heavy college drinkers based on the frequency in which they drink in response to eight situational antecedents as assessed by the IDTS. The "High Situational Endorsement" group, representing 6% of our sample, is characterized by

those reporting the greatest likelihood of heavy drinking across all situations assessed. They endorsed drinking “frequently” or “almost always” across all antecedents. The “Moderate Situational Endorsement” class represented about 23% of the sample and the likelihood of heavy drinking across situations fell generally in-between the other classes. The “Low Situational Endorsement” group was composed of individuals endorsing the overall lowest likelihood of heavy drinking in situations as compared to the other two latent classes. This also is the largest group representing about 70% of our sample.

The latent classes were compared on several alcohol-related outcome variables. The most distinct finding to emerge is that the High Situational group experienced the most alcohol-related problems. Thus, while the Moderate class consumed alcohol more frequently and reported similar levels of quantity and heavy episodic frequency as the High Situational class, the latter group experienced greater alcohol harms and this elevated risk is associated with greater probability of heavy drinking across a variety of situations.

Notable differences in profile membership were found as a function of drinking motivations. The High Situational Endorsement class endorsed significantly more coping-motivated and conformity-motivated drinking than either of the other two classes. The motivation to drink for negative reinforcement reasons, like avoiding negative emotional states and peer rejection, is associated with the highest elevations on the IDTS. Prior research has found negative reinforcement motives to be less frequently endorsed than positive (Kuntsche et al., 2005), predictive of alcohol-related problems, and considered particularly risky (e.g., Cooper, 1994; Merrill & Read, 2010). Negative reinforcement motives have been examined in the context of the various IDTS subscales. Associations were found between unpleasant emotions and coping motives among a sample of college drinkers (Carrigan et al., 1998) and abusing/dependent female drinkers (Stewart, Samoluk, Conrod, Pihl, & Dongier, 2000). Our findings offer support to these previous studies by showing that a latent class with the highest elevation on the unpleasant emotions subscale also endorsed significantly greater coping motives.

Our last aim was to examine differences between profile memberships on mental health symptomatology (i.e., anxiety, depression, and somatization). Findings indicate that individuals in the High Situational Endorsement class reported significantly more mental health symptoms than the Low and Moderate classes, and that the Moderate class reported more symptoms than the Low class. Although limited research has examined the relationship between mental health and IDTS drinking situations, the current results are consistent with prior work showing that individuals with poorer mental functioning endorse alcohol use in a variety of high-risk drinking situations such as unpleasant emotions, conflict with others, and social pressure (e.g., Buckner et al., 2006). In concert with our findings that the High Situational Endorsement group reported more negative reinforcement motives, it is possible that this group of drinkers is particularly vulnerable to using maladaptive coping strategies when faced with a variety of situations (Ham & Hope, 2003).

The results of the present study provide insight that could guide intervention work with heavy drinking college students. Our findings suggest that those individuals in the High Situational Endorsement class represent a group of college drinkers who are most at-risk for

alcohol-related harms. Consequently, this group could benefit from targeted intervention services as they are a class of college drinkers most in need of such resources. Because of their potential future trajectory for greater abuse and possible dependency, extra campus outreach efforts should be made to reach these individuals specifically. Therapist and counselors working with college students could benefit from assessing their drinking antecedents and drinking motives as to assist in identifying at-risk individuals. Specific endorsement of negative reinforcement motives may signal students who are at-risk and experiencing alcohol-related negative consequences. In working with these drinkers, a focus on negative emotional drinking should be given high priority. Intervention efforts could focus on means to develop new coping strategies to address the negative situations, or emotions that seem to drive drinking.

While the current study findings could guide intervention development for college drinkers, there also remain important targets for future research. Future work could benefit from a more fine-grained examination of the extent to which high-risk drinking situations, motives and affective functioning relate to one another. The limited research on situational antecedents and alcohol use among college student samples has relied generally on aggregate, between-subject designs. The degree to which the association between situational antecedents and alcohol use covary within-person awaits empirical investigation. Given our findings that motives and psychological symptoms are associated with various situational antecedents, it may be helpful to examine these associations more in-depth by using momentary data collection procedures. It may be that fluctuations in daily levels of motivations and/or mental health symptoms could predict drinking in different situations.

The current study findings should be interpreted with caution given several study limitations. First, participants for the present study were based on a convenience sample of undergraduate students enrolled in psychology courses. The ability to generalize these findings to other populations is limited. Another limitation is that the data is based on retrospective self-reports and thus, data may have been susceptible to memory bias or demand characteristics. Another limitation of this study utilized a cross-sectional design which limits our ability to make causal inferences. Finally, approximately 70% of our sample reported being in Low Situational Endorsement group, indicating that the majority of our sample reported rarely drinking across the heavy drinking situations identified by the IDTS-A questionnaire, despite our sample of only heavy episodic drinkers. As such, it is possible that the IDTS-A may not be as sensitive in addressing drinking situations relevant to college students as compared to alcohol dependent individuals. Future research may want to assess other types of drinking situations that may be particularly problematic for college-aged adults, such as solitary drinking (e.g., Andersson, Sundh, Waern, Jakobsson, Lissner, & Spak, 2013; Gonzalez & Skewes, 2013).

Conclusions

Despite these limitations, our study findings contributed to the larger college drinking literature as it was the first to identify profiles based on heavy drinking college students' situational antecedents that may signify a particularly risky drinking style. In addition, we identified mental health symptomatology and particular drinking motives as factors that may

contribute to one's likelihood of drinking in these situations. The identification of such risk situations is critical in understanding the underlying issues that influence drinking for different groups of students. This knowledge then can be used to design and improve tailored intervention programs for those most at-risk for experiencing alcohol harms.

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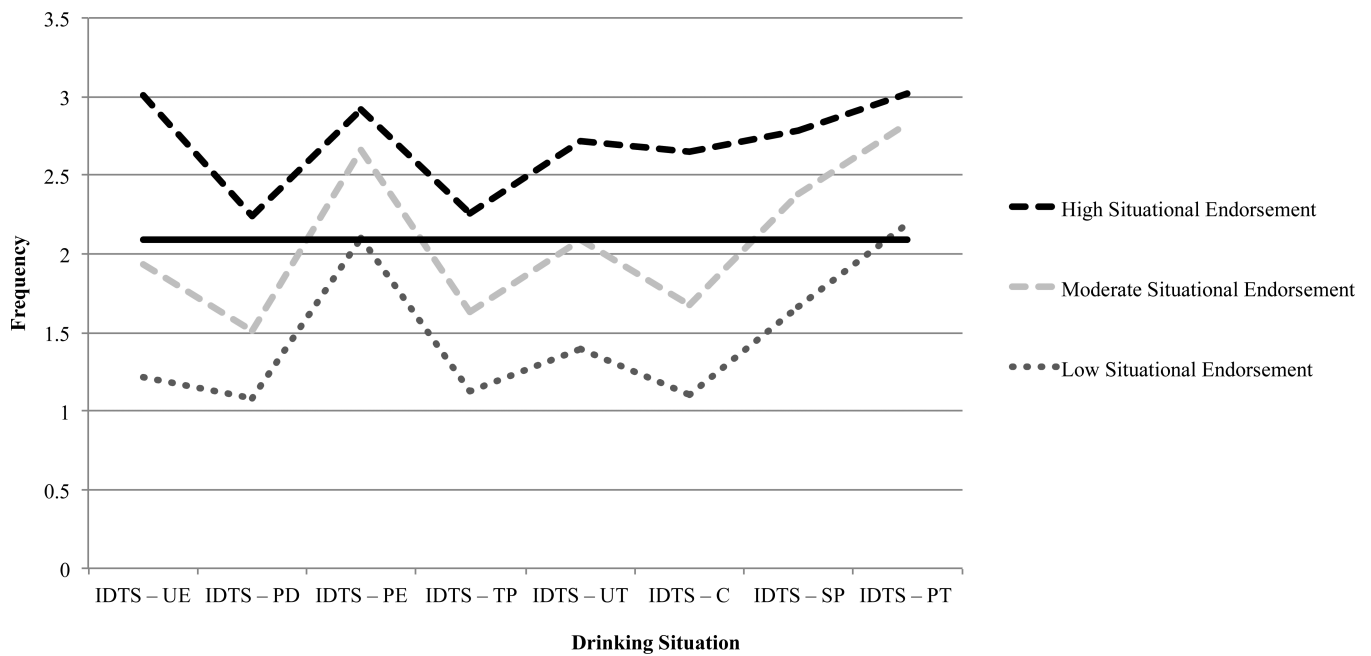


Figure 1. Estimated means for unconditional 3-class latent profile model. IDTS = Inventory of Drug-taking Situations; UE = unpleasant emotions; PD = physical discomfort; PE = pleasant emotions; TP = testing personal control; UT = urges/temptations; C = conflict with others; SP = social pressure; PT = pleasant times. The solid black line indicates the mean across classes for all IDTS subscales.

Table 1

Summary of Model Fit for Latent Profile Models

Classes:	AIC	SSA BIC	Relative Entropy	LMR <i>p</i>	Proportion of smallest group
1	22085.539	22103.678	--	--	--
2	20535.016	20563.358	0.949	.0139	.202
3	19975.157	20013.702	0.950	.0489	.060
4	19667.742	19716.490	0.864	.1954	.044
5	19457.529	19516.481	0.872	.4349	.016

Note. AIC = Akaike Information Criterion, SSA BIC = Sample Size Adjusted Bayesian Information Criterion, LMR = Lo-Mendell-Rubin likelihood ratio test.

Table 2

Means (standard errors) of Indicator Variables for 3-class Latent Profile Model

Latent class	Indicator variables									
	IDTS – UE	IDTS – PD	IDTS – PE	IDTS – TP	IDTS – UT	IDTS – C	IDTS – SP	IDTS – PT		
Class 1: Low Situational Endorsement	1.22 (0.02) ^a	1.08 (0.01) ^a	2.10 (0.03) ^a	1.13 (0.02) ^a	1.40 (0.02) ^a	1.10 (0.01) ^a	1.66 (0.03) ^a	2.19 (0.03) ^a		
Class 2: Moderate Situational Endorsement	1.93 (0.03) ^b	1.51 (0.02) ^b	2.66 (0.06) ^b	1.63 (0.03) ^b	2.09 (0.04) ^b	1.67 (0.02) ^b	2.38 (0.05) ^b	2.83 (0.05) ^b		
Class 3: High Situational Endorsement	3.01 (0.05) ^c	2.24 (0.05) ^c	2.92 (0.12) ^c	2.26 (0.06) ^c	2.72 (0.07) ^c	2.65 (0.04) ^c	2.78 (0.09) ^c	3.02 (0.10) ^b		

Note. IDTS = Inventory of Drug-taking Situations; UE = unpleasant emotions; PD = physical discomfort; PE = pleasant emotions; TP = testing personal control; UT = urges/temptations; C = conflict with others; SP = social pressure; PT = pleasant times. Numbers represent mean estimates; standard error estimates are enclosed in parentheses. Class values that do not share the same superscript are significantly different between groups for each IDTS subscale.

Table 3
Summary of Multiple Comparisons among Latent Profiles for Alcohol Outcomes and Drinking Motives

Dependent variable	Latent profile				F	partial η^2
	Class 1: Low Situational Endorsement	Class 2: Moderate Situational Endorsement	Class 3: High Situational Endorsement			
Alcohol outcomes						
Drinks per week	13.49 (0.61) ^a	18.97 (1.06) ^b	14.44 (2.21) ^{a,b}	10.06 ^{**}	0.03	
Weekly drinking frequency	2.71 (0.07) ^a	3.51 (0.12) ^b	2.68 (0.26) ^a	15.75 ^{**}	0.06	
Weekly HED frequency	1.53 (0.07) ^a	2.00 (0.12) ^b	1.52 (0.24) ^{a,b}	6.37 [*]	0.03	
YAACQ	58.40 (6.88) ^a	67.35 (9.54) ^b	71.04 (12.34) ^c	72.58 ^{**}	0.24	
Drinking motives						
DMQ – Coping	1.75 (0.04) ^a	2.57 (0.07) ^b	3.60 (0.13) ^c	126.94 ^{**}	0.32	
DMQ – Conformity	1.38 (0.03) ^a	1.78 (0.06) ^b	2.27 (0.12) ^c	37.96 ^{**}	0.12	
DMQ – Social	3.39 (0.05) ^a	3.86 (0.08) ^b	4.02 (0.17) ^b	16.12 ^{**}	0.06	
DMQ – Enhancement	2.88 (0.05) ^a	3.46 (0.09) ^b	3.68 (0.18) ^b	21.15 ^{**}	0.07	
BSI	28.00 (0.62) ^a	36.16 (1.11) ^b	44.78 (2.31) ^c	40.16 ^{**}	0.16	

Note. DMQ = Drinking Motives Questionnaire. HED = Heavy Episodic Drinking. YAACQ = Young Adult Alcohol Consequences Questionnaire. BSI = Brief Symptom Inventory. Numbers represent mean estimates; standard errors are enclosed in parentheses. Heavy episodic frequency is calculated as the frequency of consuming 4+/5+ drinks in one sitting for women/men. Values that do not share the same superscript are significantly different between groups.

^{**} $p < .001$.

^{*} $p < .01$.