



# Unplanned vs. planned drinking: Event-level influences of drinking motives and affect

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## HIGHLIGHTS

- Drinking to get high/buzzed/drunken on a given day is linked to planned drinking.
- Drinking to have fun on average is related to planned drinking.
- Higher positive affect in real-time is associated with a planned drinking event.
- Motives and affect did not predict greater odds of unplanned drinking.

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## ABSTRACT

**Objective:** Problematic alcohol involvement in college students remains a public health concern and identifying factors that promote this consequential behavior as it occurs in daily life is critical. Recent work has found that whether a drinking event is unplanned vs. planned has implications for the risk of negative consequences, though less work has identified fine-grained predictors of these two types of drinking occasions.

**Method:** The present study examined drinking motives and positive and negative affect as predictors of unplanned vs. planned drinking in a sample of college students who completed 28 days of ecological momentary assessment ( $N = 96$ ; 72% White; 52% female). We examined drinking motives reported at two points: (1) in real-time upon initiating drinking and (2) after one day of retrospection (collected at the daily diary report assessing the prior day). Positive and negative affect were both assessed in real-time. Generalized linear mixed-effects models disentangling within- and between-person effects were leveraged.

**Results:** Drinking “to get high, buzzed, or drunk” — when retrospectively reported for prior-day drinking — exhibited within-person associations with planned drinking, relative to unplanned drinking. This same effect was marginally significant when ascertained in real-time. Individuals with more frequent retrospective endorsement of the motive “to make the day/night more fun” reported more planned drinking. Higher real-time positive affect, but not negative affect, was marginally associated with planned drinking.

**Conclusions:** Our findings provide preliminary support that enhancement motives and higher positive affect are related to planned drinking, which may inform the development of momentary interventions.

## 1. Introduction

Decades of research has investigated the etiology of problematic alcohol involvement, with considerable evidence indicating that alcohol misuse is largely a developmental disorder of young adulthood (Grant et al., 2015; Littlefield & Sher, 2010; Sher & Gotham, 1999), particularly in college student populations (Schulenberg, Johnston, O'Malley, Bachman, Miech, & Patrick, 2019). College student alcohol misuse is linked to myriad negative consequences (Hingson, Zha, & Smyth, 2017; Hingson, Zha, & Weitzman, 2009; Lee et al., 2018;

Merrill, Rosen, Boyle, & Carey, 2018). Nevertheless, college student alcohol misuse is persistent, which underscores the need for understanding factors that promote this high-risk behavior as it naturally occurs.

Evidence is mixed regarding whether unplanned vs. planned drinking results in more negative consequences. Fairlie, Cadigan, Patrick, Larimer, and Lee (2019) recently examined unplanned vs. planned heavy drinking among college students using ecological momentary assessment (EMA). Consistent with the Model of Unplanned Drinking Behavior (MUDB; Pearson & Henson, 2013), which asserts

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that unplanned drinking is more consequential, unplanned heavy drinking was related to more negative consequences on that day (Fairlie et al., 2019).

Lauher, Merrill, Boyle and Carey (2020), however, examined consequences of any unplanned vs. planned drinking in an EMA sample of college students. Contrary to the MUDB and Fairlie et al. (2019), evidence showed that any unplanned drinking was linked to lower alcohol quantity, fewer alcohol-related consequences, and evaluating the event as less “worth it” (Lauher et al., 2020). Thus, some evidence exists on both sides with respect to risks associated with unplanned vs. planned drinking. Findings indicate that the highest levels of risk come with unplanned heavy drinking (Fairlie et al., 2019) or planned drinking events, irrespective of amount consumed (Lauher et al., 2020). However, research examining fine-grained predictors of unplanned vs. planned drinking is in its nascent stages.

Two event-level studies have investigated predictors of unplanned vs. planned drinking. Stevens, Littlefield, Talley and Brown (2017) investigated relations between impulsivity-like facets and any unplanned vs. planned drinking using daily diaries in young adults. Results indicated individuals higher in impulsivity intended to drink and, in turn, consumed more alcohol (Stevens et al., 2017). Fairlie et al. (2019) then examined positive and negative mood and context as predictors of unplanned vs. planned heavy drinking days, with higher between-person positive mood being linked to lower odds of unplanned heavy drinking; notably, days with special occasions also were associated with lower odds of unplanned heavy drinking (Fairlie et al., 2019). If and how similar predictors distinguish whether a drinking event is planned vs. unplanned is unknown.

Drinking motives may also be relevant to unplanned/planned drinking, as some are related to mood regulation, and they robustly and proximally predict alcohol use behavior (Cooper, 1994; Cox & Klinger, 1988; Kuntsche, Knibbe, Gmel, & Engels, 2006). Recent evidence also shows within-person variability in drinking motives (Armeli, O'Hara, Covault, Scott, & Tennen, 2016; Armeli, O'Hara, Ehrenberg, Sullivan, & Tennen, 2014; O'Hara, Armeli, & Tennen, 2015, 2014; O'Hara et al., 2014), suggesting a possibility for motives to differ by event type (unplanned vs. planned). Identifying such predictors will further our understanding of what sets unplanned and planned drinking apart, which will improve our ability to tailor interventions that target high-risk behaviors in the moment.

### 1.1. Present study

We sought to test predictors of unplanned vs. planned drinking days among college students, using EMA data spanning 28 days of assessment. Predictors required some retrospection across one day (drinking motives for prior day) and/or were assessed in real-time and proximal to the drinking event (drinking motives, positive affect, and negative affect). Given within-person discrepancies have been noted when comparing real-time versus retrospective reports (Monk, Heim, Qureshi, & Price, 2015; Shiffman et al., 1997; Solhan, Trull, Jahng, & Wood, 2009; Stevens, Sokolovsky, Treloar Padovano, White, & Jackson, 2020), it was important to examine both real-time and retrospectively-assessed drinking motives as predictors, acknowledging strengths and limitations of both report types. We are the first, to our knowledge, to examine drinking motives as predictors of unplanned/planned drinking; thus, no hypotheses are proffered for motives. Consistent with Fairlie et al. (2019), we hypothesized that positive affect, but not negative affect, would evince greater odds of planned drinking.

## 2. Method

### 2.1. Participants and procedure

Full-time college students between ages 18 and 20 years were recruited in a northeastern area of the United States. Interested students

were screened online to determine eligibility, and those eligible were redirected to an online baseline survey. As a part of a larger parent study, including Lauher et al. (2020), eligibility criteria included smartphone ownership and (1) at least weekly heavy episodic drinking (4+ /5+ drinks in one occasion for females/males) or (2) at least one negative consequence related to alcohol use in the past two weeks. All procedures were approved by the university's Institutional Review Board.

Eligible students were invited to attend an in-person group orientation to the study, followed by 28 days of EMA on their alcohol use, including real-time and next-day surveys. Surveys were programmed using software from Metricwire Inc., which allows for researcher-designed schedules of survey notifications and reminders that are sent via an app downloaded to each participant's phone. Participants were asked to complete a daily diary report each day (available from 7:00 am until 11:59 pm) and to provide user-initiated surveys when they started drinking. Participants were instructed to complete a user-initiated survey upon initially consuming alcohol, but the report included a question on total number of drinks consumed so far, if reports were completed later.

One hundred students completed the study protocol. Four students reported no alcohol consumption across the 28 days of EMA and were excluded from analyses. The final analytic sample comprised 96 college student drinkers. Of those, most students were in their first year of college (80%) and self-identified as female (52%) and White (72%). Almost all (99%) daily diary reports were submitted, and 78% were submitted before noon, with 12% submitted between noon and 3:00 pm, 7% between 3:00–6:00 pm, and 3% after 6:00 pm. The average completion time was 10:39 am and ranged from 7:00 am to 10:45 pm. On average, user-initiated surveys were submitted by 8:07 pm, with submission times ranging from 9:00 am to past midnight. Of the 469 daily diary reports on which participants endorsed prior-day drinking, they also completed a user-initiated drink report the day before on 377 (80%) occasions.

### 2.2. Measures

#### 2.2.1. Demographics

We collected demographic data at the baseline survey, including age, gender, race, ethnicity, and year in college.

#### 2.2.2. Unplanned vs. planned drinking. Daily diary report

As part of a larger parent study, drinking plans were assessed by asking participants at each daily diary report to “Estimate the number of days until your next drink (0 = Today).” A planned drinking day was coded (‘1’) if the participant had indicated an intention to drink that day on the daily diary report and also reported drinking on the daily diary report the next day when asked about the prior day. Likewise, an unplanned drinking day was coded (‘0’) if the participant had not reported an intention to drink that day on the daily diary report but did report drinking on the daily diary report the next day. For this outcome, participants reported 375 (80%) planned drinking days and 94 (20%) unplanned drinking days.

#### 2.2.3. Drinking motives

A single checklist was used to assess each drinking motive at two report types. **Daily diary report.** Participants were instructed to select all drinking motives that apply (yes vs. no) when asked at each daily diary report following a drinking event: “What was your reason(s) for drinking yesterday?” Options for motives included: “to feel less depressed,” “to feel less nervous/anxious,” “to make the day/night more fun,” “to get high, buzzed, or drunk,” and “to not be left out.” These items were similar to items those used in other daily studies (Armeli et al., 2014; O'Hara, Armeli, & Tennen, 2015). Fun motives were the most frequently endorsed (84%) about prior day drinking, followed by high/buzzed/drunken motives (60%), conformity motives (14%), anxiety

motives (11%), and depression motives (10%). **Start drink report.** These same motives also were assessed at each start drink report (“What are your reasons for drinking right now?”). When assessed in real-time, fun motives were again most frequently endorsed (81%), followed by high/buzzed/drunken motives (59%), conformity motives (15%), anxiety motives (11%), and depression motives (10%). Correlations between motives reported at the two report types were strong: depression motives ( $r = 0.85$ ), anxiety motives ( $r = 0.78$ ), fun motives ( $r = 0.62$ ), high/buzzed/drunken motives ( $r = 0.70$ ), and conformity motives ( $r = 0.73$ ).

#### 2.2.4. Positive and negative affect. Start drink report

At each start drink report, three positive affect items (relaxed, happy, energetic) and three negative affect items (sad, irritable, stressed) were assessed. For example, participants were asked: “How relaxed do you feel right now?” Response options ranged from *not at all* (0) to *extremely* (6). We created sum scores for positive affect and negative affect. Between-person internal reliabilities were good for both positive ( $\Omega = 0.86$ ) and negative ( $\Omega = 0.86$ ) affect, whereas within-person internal reliabilities were lower, as expected, reflecting the state-like nature of positive ( $\Omega = 0.67$ ) and negative ( $\Omega = 0.61$ ) affect in this sample (Geldhof, Preacher, & Zyphur, 2014).

#### 2.2.5. Covariates

Sex, weekend (Friday, Saturday) vs. weekday, study day (1–28), and daily diary report submission time were included as covariates in all models. Sex was collected at the baseline survey and weekend (vs. weekday), study day, and daily diary report submission time were collected as meta-data. In models examining motives and affect from the start drink report, we also included the number of drinks consumed prior to submitting the start drink report as a covariate.

### 2.3. Data analytic plan

Data management and coding was conducted in SAS 9.4<sup>TM</sup> software<sup>1</sup>. Generalized linear mixed-effects modeling (GLMM) was employed using PROC GLIMMIX and Laplace approximation given the outcome of interest is binary and that repeated EMA surveys (Level-1) are nested within individuals (Level-2). This nested structure would violate assumptions of ordinary least squares regression (Curran & Bauer, 2011; Hedeker, 2005; Raudenbush & Bryk, 2002; Singer, 1998). For all models, within-person (Level-1) and between-person (Level-2) effects were decomposed using centering, such that within-person variations were examined by creating a person-centered variable (Curran & Bauer, 2011). We also included a between-person (Level-2) equivalent for each Level-1 predictor to isolate within-person effects (Curran & Bauer, 2011). For drinking motives (yes vs. no), the Level-2 equivalent was determined by calculating the proportion of study days where the focal variable was endorsed. All models included a random intercept. Random slopes were tested and not statistically significant, thus removed for parsimony.

We examined four total models examining predictors of unplanned vs. planned drinking. We first examined retrospectively-assessed drinking motives as predictors of whether the drinking day was unplanned vs. planned ( $n$  observations = 2653)<sup>2</sup>. All five motives<sup>3</sup> were

assessed in the same model to determine which motives uniquely predicted an unplanned vs. planned drinking day. We included sex, weekend vs. weekday, study day, and the daily diary report submission time as covariates in this model. Daily diary report submission time was included as a covariate because this report, from which the dependent variable was derived, was made available to all participants from 7:00 am until 11:59 pm, which affects the degree of retrospection required at this report.

We assessed three additional models to examine real-time predictors of an unplanned vs. planned drinking day, such that these predictors (i.e., real-time drinking motives, positive affect, negative affect) were ascertained at the start drink report and lagged to match the unplanned vs. planned drinking day outcome.<sup>4</sup> In addition to the aforementioned covariates, we also adjusted for total number of drinks consumed at the time of the start drink report’s submission on that day, which was included because some students consumed alcohol prior to submitting their start drink report ( $M = 1.62$  drinks;  $SD = 1.76$ ) and could have shaped their responses to questions on this report.

### 3. Results

See Table 1 for between-person correlations among study variables. Participants reported an average of five drinking days ( $SD = 2.54$ ) across the study, with approximately one unplanned ( $SD = 1.10$ ) and four planned drinking days ( $SD = 2.39$ ). The intraclass correlation coefficient (ICC = 0.10) indicated that 10% of the variance in unplanned vs. planned drinking occurs at the between-person level.

When examining all five (retrospectively reported) drinking motives as predictors, drinking “to get high, buzzed, or drunk” was associated with a planned drinking day (vs. unplanned) at the within-person level after adjusting for covariates (OR = 2.90). At the between-person level, a greater proportion of drinking “to make the day/night more fun” across the study was linked to planned drinking (vs. unplanned; OR = 1.27; see Table 2). In a parallel model examining real-time motives from the start drink report, only drinking “to get high, buzzed, or drunk,” assessed at the within-person level, was marginally associated with a planned (vs. unplanned) drinking day after adjusting for covariates (OR = 1.06; see Table 3).

When examining real-time positive affect as a predictor, higher positive affect at start drink, relative to one’s own average, was marginally related to a planned drinking day (OR = 1.12; see Table 3). Positive affect across study days (i.e., between-person effect) was unrelated to unplanned vs. planned drinking. In a separate model, we examined start drink reports of negative affect as a focal variable, which was unrelated to unplanned vs. planned drinking at within- and between-person levels (see Table 3).

### 4. Discussion

We examined drinking motives and positive and negative affect as predictors of unplanned vs. planned drinking using event-level data. To our knowledge, we are the first to examine drinking motives as a predictor of this outcome, and the first to look at affect as a predictor of any (vs. heavy) drinking that is planned vs. unplanned. Most drinking days (80%) were identified as planned, operationalized as occasions where one reported an intention to drink the morning of the day that the

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<sup>2</sup> For descriptive purposes, this reflects the total number of daily diary report observations, including drinking and non-drinking days. Given the outcome reflects drinking days only, non-drinking days were excluded from analyses ( $n$  analyzed = 469).

<sup>3</sup> We examined within-person correlations between similar drinking motives: depression and anxiety motives (real-time motives:  $r = 0.41$ ; retrospective motives:  $r = 0.26$ ), and fun and high/buzzed/drunken motives (real-time motives:

(footnote continued)

$r = 0.03$ ; retrospective motives:  $r = 0.04$ ). Despite the conceptual similarities of these two sets of items, these correlations suggested that examining these two sets of items separately would yield the most nuanced findings.

<sup>4</sup> An anonymous Reviewer noted the possibility of examining each affective item separately, given there is support for each item within the 12-point affect circumplex model (Yik, Russell, & Steiger, 2011). Though our findings were null when examining each affective item separately, we have provided the results of these six models in the Supplemental Tables to inform future work.

**Table 1**  
Between-person correlations among study variables.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. DD Dep Motives	–											
2. DD Anx Motives	0.43*	–										
3. DD Fun Motives	–0.17*	–0.06*	–									
4. DD Drunk Motives	0.02	0.10*	0.03	–								
5. RT Dep Motives	0.85*	0.37*	–0.17*	0.02	–							
6. RT Anx Motives	0.41*	0.89*	0.01	0.09*	0.38*	–						
7. RT Fun Motives	–0.19*	–0.07*	0.77*	0.07*	–0.14*	–0.01	–					
8. RT Drunk Motives	–0.01	0.05*	0.14*	0.80*	0.04*	0.04*	0.04*	–				
9. RT PA	–0.31*	–0.18*	0.28*	0.03	–0.30*	–0.13*	0.26*	–0.00	–			
10. RT NA	0.45*	0.27*	–0.23*	–0.11*	0.44*	0.31*	–0.22*	–0.04*	–0.42*	–		
11. Sex (Male)	0.06*	0.19*	–0.01	0.18*	0.06*	0.10*	–0.03	0.20*	–0.12*	–0.07*	–	
12. DD Submit Time	–0.06*	0.09*	–0.05*	0.04*	–0.09*	0.08*	–0.02	0.00	–0.14*	0.09*	0.20*	–
13. RT # of Drinks	–0.16*	–0.17*	0.18*	0.16*	–0.16*	–0.14*	0.23*	0.23*	0.11*	–0.04*	0.05*	0.14*

Note.  $N = 96$ . All correlations are between-person. Except for sex, all daily variables were aggregated across the study to reflect a given participant's average reporting across the 28 days. DD = daily diary report; RT = real-time report. Dep = depression; anx = anxiety; drunk = high/buzzed/drunk; PA = positive affect; NA = negative affect. RT # of drinks reflects the average number of drinks reported "so far" when submitting a start drink report.

\* $p < 0.05$

**Table 2**  
Retrospective drinking motives predicting unplanned vs. planned drinking.

Predictor	B (SE)	OR	[95% CI]	p-value
Level-1 effects				
Depression motives	–0.07 (0.66)	0.93	[0.25, 3.43]	0.91
Anxiety motives	0.70 (0.64)	2.01	[0.58, 7.05]	0.27
Fun motives	0.69 (0.42)	2.00	[0.88, 4.54]	0.10
High/buzzed/drunk motives	1.06* (0.36)	2.90	[1.44, 5.86]	< 0.01
Conformity motives	0.33 (0.52)	1.39	[0.50, 3.82]	0.53
Study day	–0.02 (0.02)	0.98	[0.95, 1.02]	0.32
Weekend	1.17* (0.29)	3.21	[1.81, 5.69]	< 0.01
Survey submit time	0.05 (0.05)	1.05	[0.94, 1.16]	0.39
Level-2 effects				
Depression motives	0.47 (0.96)	1.60	[0.24, 10.63]	0.63
Anxiety motives	0.84 (0.94)	2.33	[0.37, 14.77]	0.37
Fun motives	1.27* (0.62)	3.57	[1.04, 12.17]	0.04
High/buzzed/drunk motives	0.41 (0.46)	1.50	[0.61, 3.72]	0.38
Conformity motives	0.36 (0.77)	1.44	[0.32, 6.50]	0.64
Sex (male = 1)	–0.16 (0.32)	0.85	[0.46, 1.58]	0.61

Note.  $n$  observations analyzed = 468. OR = odds ratio. Level-1 effects = within-person; Level-2 effects = between-person. Reference group for outcome is unplanned (vs. planned) drinking. All data were drawn from the daily diary report. Intraclass correlation coefficient (ICC) = 0.10, which indicates 10% of the variance in the outcome is at the between-person level (Singer, 1998; Sommet & Morselli, 2017). Level-1 effects are person-mean centered. Level-2 effects are grand-mean centered. † $p < .10$ ; \* $p < .05$ .

drinking ultimately occurred. We also found that significantly more variance in unplanned vs. planned drinking occurred at the within-person level, relative to the between-person level. This suggests significant within-person variability in intentions for drinking across the study. When reporting on prior-day drinking, only drinking "to get high, buzzed, or drunk" was significant at the within-person level, over and above other drinking motives and covariates, and was linked to greater odds of planned drinking. At the between-person level, drinking "to make the day/night more fun" was related to planned drinking. When drinking motives were ascertained at the start drink report, only drinking "to get high, buzzed, or drunk" was marginally associated with a planned drinking day at the within-person level, over and above other motives and covariates. Within-person positive affect, but not negative affect, was marginally linked to a planned drinking day.

#### 4.1. Drinking motives and planned drinking

When asked about prior-day drinking, items that reflect enhancement motives (i.e., drinking to enhance positive affect) were the only statistically significant predictors of planned drinking, relative to

unplanned. The within-person effect for drinking "to get high, buzzed, or drunk" was significant when assessed via retrospective daily diary report (about the prior day), but only marginally significant when ascertained at the start drink. However, comparatively fewer observations were analyzed in the model examining real-time drinking motives as predictors. Given the strong correlations between motives assessed at both report types, the differences in model findings may be due to reduced power to detect significant relations in the model examining real-time motives.

These findings provide preliminary evidence that individuals are more likely to report enhancement motives at the start of a planned drinking event and when reporting on a prior-day planned drinking event. Unexplored moderators may further explain this relation, as Fairlie et al. (2019) found that heavy drinking on a special occasion was more likely to be planned, which may covary with drinking "to get high, buzzed, or drunk." Thus, we would anticipate potential Level-1 by Level-1 interactions between motives and contextual variables in predicting planned drinking, particularly between enhancement motives and the type of drinking occasion (e.g., celebration). Future research should examine these event-level interactions as predictors of unplanned vs. planned drinking to further understand under which circumstances, for what reasons, and in what manner are people drinking on a given day in order to intervene just-in-time (Goldstein et al., 2017; Nahum-shani et al., 2014; Spruijt-Metz & Nilsen, 2014).

Notably, our sample comprised predominantly first-year college students, and differential effects between motives, affect, and unplanned vs. planned drinking may emerge when examined in more clinical samples. Specifically, the multi-stage model of addiction postulates that earlier stages of alcohol use are marked by drinking for positive reinforcement (e.g., enhancement motives), whereas later stages transition to drinking for negative reinforcement (e.g., coping motives; Cho et al., 2019; Koob & Volkow, 2010). We showed disproportionate endorsement of positive reinforcement-oriented drinking motives in this sample, and it is possible that disparate findings would emerge in a clinical sample endorsing coping motives more frequently.

#### 4.2. Affect and planned drinking

Supporting our hypothesis, we found a marginally significant within-person effect for positive affect on planned, relative to unplanned, drinking. This suggests that individuals experience higher positive affect, relative to their own average, at the start of a drinking event that is planned. Coupled with our evidence for enhancement motives (reported for prior-day drinking) on planned drinking days, these findings are consistent with our understanding of positive affect



**Table 3**  
Real-time predictors of unplanned vs. planned drinking.

Predictor	B (SE)	OR	[95% CI]	p-value
<b>Real-Time Drinking Motives Model</b>				
<b>Level-1 effects</b>				
Depression motives	0.68 (0.79)	1.97	[0.42, 9.31]	0.39
Anxiety motives	−0.93 (0.67)	0.39	[0.11, 1.48]	0.17
Fun motives	0.05 (0.48)	1.06	[0.41, 2.73]	0.91
High/buzzed/drank motives	0.73 <sup>†</sup> (0.43)	2.08	[0.90, 4.82]	0.09
Conformity motives	0.62 (0.59)	1.86	[0.58, 5.96]	0.30
Study day	−0.03 (0.02)	0.97	[0.93, 1.01]	0.14
Weekend	1.15* (0.34)	3.16	[1.61, 6.18]	< 0.01
Survey submit time	0.01 (0.07)	1.01	[0.89, 1.16]	0.84
Number drinks	0.19 <sup>†</sup> (0.11)	1.21	[0.98, 1.49]	0.07
<b>Level-2 effects</b>				
Depression motives	−0.01 (1.09)	0.99	[0.12, 8.49]	0.99
Anxiety motives	1.26 (1.02)	3.52	[0.47, 26.37]	0.22
Fun motives	0.67 (0.64)	1.96	[0.56, 6.93]	0.29
High/buzzed/drank motives	−0.18 (0.53)	0.83	[0.30, 2.34]	0.73
Conformity motives	0.98 (0.92)	2.67	[0.44, 16.18]	0.29
Sex (male = 1)	−0.34 (0.37)	0.71	[0.34, 1.48]	0.36
<b>Real-Time Positive Affect Model</b>				
<b>Level-1 effects</b>				
Positive affect	0.11 <sup>†</sup> (0.07)	1.12	[0.98, 1.28]	0.08
Study day	−0.02 (0.02)	0.98	[0.94, 1.01]	0.22
Weekend	1.16* (0.33)	3.19	[1.67, 6.09]	< 0.01
Survey submit time	0.01 (0.06)	1.01	[0.89, 1.14]	0.89
Number drinks	0.13 (0.10)	1.14	[0.93, 1.40]	0.19
<b>Level-2 effects</b>				
Positive affect	0.02 (0.07)	1.02	[0.89, 1.16]	0.82
Sex (male = 1)	−0.26 (0.35)	0.77	[0.39, 1.55]	0.47
<b>Real-Time Negative Affect Model</b>				
<b>Level-1 effects</b>				
Negative affect	−0.09 (0.07)	0.91	[0.80, 1.05]	0.19
Study day	−0.02 (0.02)	0.98	[0.94, 1.02]	0.26
Weekend	1.12* (0.33)	3.07	[1.59, 5.92]	< 0.01
Survey submit time	0.01 (0.06)	1.01	[0.90, 1.14]	0.94
Number drinks	0.15 (0.10)	1.17	[0.95, 1.43]	0.13
<b>Level-2 effects</b>				
Negative affect	−0.01 (0.07)	0.99	[0.85, 1.14]	0.85
Sex (male = 1)	−0.26 (0.35)	0.77	[0.39, 1.54]	0.46

Note. *n* observations analyzed = 377. OR = odds ratio. Level-1 effects = within-person; Level-2 effects = between-person. Number drinks = the number of drinks consumed prior to submitting the start drink reports (in which predictors were ascertained). Reference group for outcome is unplanned (vs. planned) drinking. Predictors were ascertained from the start drink report, whereas the dependent variable was constructed using data from the daily diary report. Intraclass correlation coefficient (ICC) = 0.10, which indicates 10% of the variance in the outcome is at the between-person level (Singer, 1998; Sommet & Morselli, 2017). Level-1 effects are person-mean centered. Level-2 effects are grand-mean centered. <sup>†</sup>*p* < .10; \**p* < .05.

regulation models of substance use (Cooper, 1994; Cooper, Frone, Russell, & Mudar, 1995; Simons, Gaher, Correia, Hansen, & Christopher, 2005). Notably, recent work has shown that positive affect is higher before and after a drinking episode (Dvorak et al., 2018; Russell et al., 2020), relative to nondrinking days. Further, Fairlie et al. (2019) found a between-person, but not within-person, effect for positive mood on heavy planned drinking, and did not find significant effects for negative mood. Our findings corroborate this existing evidence and provide further nuance that may inform momentary intervention development.

Taken together, evidence suggests that individuals may be positively anticipating a planned drinking event, unlike an unplanned event that may not yield time for anticipation. Furthermore, planned drinking events themselves may be planned celebrations (e.g., 21st birthday)

that would presumably be linked with higher than average positive affect. That said, qualitative and/or experimental studies are needed to fully understand the fine-grained nature of affect leading up to unplanned/planned drinking events.

### 4.3. Limitations

Findings should be interpreted considering limitations. First, intentions to drink were assessed only at the daily diary report. However, intentions to drink likely shift across the day. Future work is needed to determine within-day variability in intentions and to examine how this variability influences drinking behavior. Second, motives were assessed via single items, which poses limitations. Existing research demonstrates that disparate relations can emerge when single indicators are used to assess drinking motives (Dvorak, Pearson, & Day, 2014) vs. when multiple items are used (Stevenson et al., 2019). Third, the parent study sample was comprised largely of first-year college students who were majority White, thus limiting generalization of study findings to other demographic groups.

Fourth, data were drawn from a larger study, which did not collect the number of drinks students planned to drink on a given day; thus, we were unable to examine planned vs. unplanned heavy drinking. Indeed, impaired control can also be defined by consuming more drinks than intended (e.g., Labhart, Anderson, & Kuntsche, 2017). Future research is needed to extend the present work to include alternative forms of unplanned/planned drinking. Finally, models examined in the present study were largely exploratory. Given some findings were only marginal significant, future studies replicating this work are needed before firm conclusions can be drawn.

### 4.4. Conclusion

The present study extends existing research seeking to understand unplanned vs. planned drinking at the event-level. Findings suggest that drinking to enhance positive mood (i.e., feeling high, buzzed, or drunk) and experiencing higher positive mood than typical are particularly relevant for planned drinking. These factors point to potential cues that could be identified early in a drinking event to trigger targeted and individualized alcohol messaging in the context of a Mobile Health (mHealth) intervention, such as encouraging replacement behaviors (Witkiewitz, Marlatt, & Walker, 2005). Future research is needed to replicate these preliminary findings and extend this work to other manners of drinking (e.g., drinking faster than intended), which may reveal differential effects and provide critical information for enhancing alcohol-related protective behavioral strategies.

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### 6. Contributors

Dr. Merrill designed the study, wrote the EMA protocol, and collected the data. Dr. Stevens conceptualized the research questions, with assistance from Drs. Haikalas and Merrill. Dr. Stevens conducted the literature search and conducted statistical analyses, with guidance from Dr. Merrill. Dr. Stevens wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

## CRedit authorship contribution statement

**Angela K. Stevens:** Conceptualization, Formal analysis, Writing - original draft. **Michelle Haikalis:** Conceptualization, Writing - review & editing. **Jennifer E. Merrill:** Investigation, Supervision, Funding acquisition, Conceptualization, Writing - review & editing.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.addbeh.2020.106592>.

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