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Daily Patterns of Emotional Functioning on Drinking and Nondrinking Days

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Background: Alcohol misuse continues to be a significant public health problem. Understanding the factors that may contribute to the harmful progression in drinking is an important aspect of public health. Previous research has shown that affect regulation is associated with problematic alcohol use. Additionally, emotion instability has been found as a predictor of alcohol-related problems and may be linked to reinforcement mechanisms.

Methods: The current study examined positive mood, negative mood, and mood instability in real time across drinking and nondrinking days utilizing ecological momentary assessment (EMA). Current drinkers (n = 74) were recruited for a 21-day EMA study. Participants completed up to 10 random assessments of positive mood, negative mood, and alcohol use per day. Mood instability was assessed as the squared difference in current mood from mood in the previous assessment. Data were analyzed using piecewise multilevel regression to examine mood trajectories across drinking and nondrinking days.

Results: Positive emotion across the day was higher on drinking days than nondrinking days and continued to increase after drinking initiation. In contrast, negative emotion across the day was lower on drinking days than nondrinking days and continued to decrease after drinking initiation. Emotional functioning was stable across the day on nondrinking days. However, on drinking days there was a steady increase in emotional instability leading up to drinking initiation, followed by a rapid stabilization after initiation.

Conclusions: This study highlights the potentially reinforcing impact of alcohol via emotional stability. Overall, these findings highlight the importance of mood dynamics when examining the reinforcing effects of alcohol consumption.

Key Words: Alcohol, Positive Emotion, Negative Emotion, Emotional Instability.

ACCORDING TO EPIDEMIOLOGICAL research, alcohol use disorder (AUD) is one of the most prevalent psychiatric conditions in the world (Glantz et al., 2018). There are an estimated 32 million adults in the United States who meet diagnostic criteria for AUD (Grant et al., 2017). Each year approximately 100,000 deaths are linked to AUD (Centers for Disease Control and Prevention, 2013). In addition, the cost of problem alcohol use to society is immense, with annual average estimates approaching $250 billion (Sacks et al., 2015). Compounding this problem, we have seen increases in the prevalence of AUD over the last 2 decades (Grant et al., 2017). Understanding the factors that promote and maintain pathological alcohol use remains a vitally important aspect of public health research. Most prominent models of pathological alcohol use posit that emotion regulation is one of the most important components in the etiology and maintenance of pathological use (Cappell and Greeley, 1987; Koob and Volkow, 2010; Sher and Grekin, 2007).

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Emotion Regulation and Alcohol Use

The complex relationship between mood and alcohol has been widely investigated, with different models of emotion regulation providing more nuanced insight into the factors that contribute to harmful alcohol consumption (Cho et al., 2019; Dvorak et al., 2018; Koob and Volkow, 2010; Sher and Grekin, 2007; Cappell and Greeley, 1987). For instance, the multistage model of addiction highlights how reinforcement can act as a pathway to increased use and consequences (Koob and Volkow, 2010), with positive reinforcement being uniquely associated with the frequency of alcohol consumption and negative reinforcement being associated with alcohol-related problems (Cho et al., 2019). Alternatively, the tension reduction model posits that alcohol consumption is influenced by a need to reduce tension, particularly in the presence of high arousal states, such as stress (Cappell and Greeley, 1987). While early work on this model has yielded inconsistent findings, recent studies have found that mood instability may be a key component in understanding this model (Dvorak et al., 2016; Dvorak et al., 2018; Gottfredson and Hussong, 2013; Greeley and Oei, 1999; Thomas and

Bacon, 2013). In contrast, affect-regulation models focus on reinforcing aspects of consumption to cope with negative affect and/or enhance positive affect. Through this view, positive reinforcement theories attribute alcohol use to reward seeking, such as mood enhancement, while negative reinforcement theories attribute use to mechanisms of coping (Baker et al., 2004; Dvorak et al., 2014; Dvorak et al., 2018; de Wit and Phan, 2010). While these models inform the long-term relationships between mood and alcohol behaviors, it is important to understand the daily impact of mood–alcohol associations.

Ecological momentary assessment (EMA) has been utilized to provide a more proximal examination of the relationship between the indices of mood and alcohol use, in real-time (Dvorak et al., 2018; Jahng et al., 2011; Litt et al., 1998; Mohr et al., 2013; Shiffman, 2009; Stone and Shiffman, 1994; Treloar et al., 2015). EMA allows for snapshots of mood across the day in relation to drinking, thereby allowing researchers to examine changes in behaviors and affect across time, while maintaining naturalistic conditions and improving external validity. Various EMA studies have found associations between alcohol consumption and positive as well as negative affect across clinical, community, and college samples (Dvorak et al., 2018; Litt et al., 1998; Mohr et al., 2013; Shiffman, 2009; Stone and Shiffman, 1994; Treloar et al., 2015; Stevenson et al., 2019). Additionally, EMA techniques have allowed for the mood–alcohol relationship to be examined across both drinking and nondrinking days, leading to more nuanced investigation of mood regulation models (Dvorak et al., 2018; Treloar et al., 2015). For instance, a recent study by Dvorak and colleagues (2018) found that alcohol may act as a reinforcing agent across drinking days by "increasing positive mood, decreasing negative mood, and stabilizing daily stress." Thus, EMA approaches are uniquely suited to the evaluation of different indices of mood processes and changes as they related to alcohol use across time. In an effort to provide more insight to the body of ecological studies, this study utilizes EMA to examine the trajectories of positive emotion, negative emotion, and emotional instability leading up to, and following, drinking initiation across drinking and nondrinking days.

Positive Emotion Regulation

Various studies have focused on associations between positive emotion regulation and alcohol use, as well as the pathways through which positive affect may lead to alcohol misuse (Cheung and Mikels, 2011; Cho et al., 2019; Dvorak et al., 2014; Dvorak et al., 2016; Dvorak and Simons, 2014; Dvorak et al., 2018; Simons et al., 2010; Simons et al., 2014). Enhancement motives have been identified as reasons for alcohol use, as individuals are posited to consume alcohol in efforts to increase positive mood and experiences (Cooper, 1994; Cooper et al., 1995). EMA research has shown that enhancement motives are linked to positive mood throughout the day, and mediate the association between daytime positive mood and later alcohol consumption (Stevenson et al., 2019). Further, enhancement motives are often tied to expectancies, as many drinking expectancies involve positive outcomes (e.g., be more outgoing and have fun; Anthenien et al., 2017; Cooper et al., 1995). Thus, the belief that drinking alcohol can lead to positive feelings (i.e., expectancies) may further influence individuals to drink in pursuit of those anticipated feelings (Magri et al., 2020). Indeed, a recent study assessing daily-level associations between alcohol expectancies and use found stronger positive expectancies to be associated with higher likelihood of use and higher quantity of use on drinking days, both at between-person and within-person levels (Ramirez et al., 2020).

Additionally, it is important to note that daily processes research on positive mood–drinking associations across drinking and nondrinking days has been mostly consistent (Russell et al., 2020). In fact, various studies have found positive emotion to be associated with more drinking, with positive emotion increasing prior to drinking and continuing to increase after consumption across drinking days (Duif et al., 2020; Dvorak et al., 2016; Dvorak et al., 2018; Russell et al., 2020; Treloar et al., 2015). While this work has been fundamental, a deeper understanding of the impact of positive emotion trajectories on alcohol use across the day (as one approaches drinking initiation and after drinking) on drinking and paired nondrinking days is warranted.

Negative Emotion Regulation

Emotion regulation deficits linked to negative affect have been consistently associated with both alcohol use and alcohol-related problems at the daily level (Dvorak et al., 2014; Jakubczyk et al., 2018; Simons et al., 2005). Indeed, alcohol use can become increasingly reinforcing for individuals that experience difficulty regulating negative emotions by alleviating/ameliorating distressing internal experiences. This pattern of negative reinforcement (i.e., relief from negative affective states) is thought to underlie drinking to cope (Cooper et al., 1988) and self-medication (Khantzian, 1990) models of alcohol use. These models posit that alcohol use may be driven by a desire to alleviate unpleasant internal experiences, resulting in maladaptive coping and various problems across multiple domains of functioning (Cooper et al., 1995; Merrill and Read, 2010; Merrill et al., 2014; Simons et al., 2005).

While daily processes research has provided more insight regarding the link between negative emotion and alcohol use, the outcome of these associations varies across studies. Some studies have shown an increase in negative emotion to be associated with greater alcohol consumption (Duif et al., 2020; Dvorak et al., 2014; Dvorak et al., 2016; Simons et al., 2014), while others have shown that lower negative emotion is associated with greater alcohol consumption (Dvorak et al., 2018; Simons et al., 2010; Treloar et al., 2015). Similarly, many studies support the notion that negative emotion decreases after alcohol consumption (Duif et al., 2020;

Dvorak et al., 2018; Russell et al., 2020), but others do not (Treloar et al., 2015). Interestingly, Todd and colleagues (2009) found that these findings could vary by mood, with high-activation negative moods (i.e., anger) found to be more likely to prompt rapid drinking initiation than low-activation negative moods (i.e., sadness). Nevertheless, when assessed across drinking and nondrinking days, Dvorak and colleagues (2018) found these high-activation negative moods (stress, anxiety, and anger) to be lower at the pre timepoint on drinking days. Reconciling these divergent findings remains important. For example, it is possible that negative emotion is generally lower on drinking days, across the entire day, which could lead to the *appearance* that negative emotion is "lower" after drinking, relative to nondrinking days, when in fact it is just a continuation of low levels of predrinking negative emotion. Thus, these conflicting findings call for a more nuanced understanding of negative affect trajectories throughout the day across drinking and nondrinking days.

Emotional Instability Regulation

Regulation of unstable emotional functioning encompasses both positive emotion regulation and negative emotion regulation, highlighting the extent to which dysregulation in these mechanisms may impact alcohol consumption and related problems. Nevertheless, it has been historically difficult to define emotional instability regulation due to variation in terms used. Marwaha and colleagues (2014) provide a working definition of emotional instability regulation as "the ability (or lack thereof) to manage emotions and moods experienced by humans at the daily level." Due to the individualized ebb and flow of emotional experience (John and Gross, 2007), only a few studies have attempted to elucidate the connection between emotional instability and alcohol use (Dvorak et al., 2016; Dvorak et al., 2018; Gottfredson and Hussong, 2013). Two studies have shown that alcohol use is more likely on days comprised of higher emotional instability (Dvorak et al., 2016; Gottfredson and Hussong, 2013). Further, Dvorak and colleagues (2018) found that after initiation of alcohol consumption, there is a significant reduction in stress instability. In contrast, while the prior 2 studies examined aggregate emotional instability across days, it is unclear how emotional instability unfolds across time on a specific day.

Current Study

To provide a more nuanced understanding of the relationship between alcohol use and emotional regulation, the current study examines the trajectories of positive emotion, negative emotion, and emotional instability across the day for both drinking and nondrinking days. We used ecological momentary assessment to capture indices of emotion and alcohol use across 21 days. To compare days, we utilize a "drinking window" which represents drinking initiation on drinking days, and the average drinking initiation time from drinking days for the window on nondrinking days (described in more detail below). The following specific hypotheses (**H**) were proposed for emotion trajectories across drinking and nondrinking days. **H1**: It was hypothesized that, relative to nondrinking days, positive emotion would increase across drinking days leading up to drinking initiation; this effect was hypothesized to become stronger (i.e., nonlinear change) as the drinking initiation window approached. **H2**: We also hypothesized that, relative to nondrinking days, negative emotion would decrease leading up to drinking initiation on drinking days and that this effect would become stronger as the drinking initiation window approached. **H3**: Further, we hypothesized that, relative to nondrinking days, emotional instability would become increasingly more unstable across the day as the drinking initiation window approached. **H4**: Finally, we hypothesized that emotional instability would decrease (become more stable) after drinking initiation.

MATERIALS AND METHODS

Participants

Participants (n = 74; 58.11% female) were recruited from a Midwest university for a study examining emotion and alcohol use. The sample ranged in age from 18 to 29 years (M = 21.30, SD = 2.07). Ninety-one percent of the sample was White, 1% was Black, 3% was Native American/Alaskan Native, 4% was Asian, and 1% was other. All participants were treated in accordance with American Psychological Association ethical guidelines for research (Sales and Folkman, 2000).

Procedure

This study consisted of 2 parts. During the first part, participants (n = 1,875) completed an online screen for the EMA portion of this study (second part). Inclusion criteria included endorsing consuming 2 to 4 drinks per week (n = 617). Among those that qualified, a random sample of 75% of qualifying individuals (n = 460) were contacted and invited to participate in the study. The first 80 individuals who responded to the invite were scheduled for a laboratory appointment, where they completed informed consent and training in the use of a Samsung Galaxy Tablet. The tablet training included the following: (i) a review of the schedule of events (i.e., random assessments and self-assessments), (ii) education on alcohol consumption, including the definition of a "standard" drink, (iii) a discussion of all questions and completion of mock assessments, and (iv) procedures in the event of loss, theft, or device error. Participants carried the tablet for the next 21 days. Participants were compensated $20 for the initial appointment, $0.50 for each completed random assessment, and $1.00 for each completed morning assessment.

Ecological Momentary Assessments (EMA)

EMA participants responded to 3 assessment types on the tablet: morning (a self-initiated assessment occurring between 8:00 AM to 10:00 AM), random mood/drinking assessments (occurring randomly 9 times per day between 8:00 AM to 2:00 AM), and an evening assessment (not used here). Morning assessments primarily examined alcohol use variables. Random assessments primarily assessed current mood and drinks consumed (if currently drinking). Participants could set the tablet to "Vibrate" and could postpone random assessments for up to 10 minutes. All assessments were date and time stamped.

Measures

Demographic variables included age, race, ethnicity, and biological sex. Both age and biological sex were added as covariates to control for potential differences in emotional functioning across these variables.

Alcohol Use Disorder Identification Test (AUDIT). The AUDIT is a measure of alcohol use pathology (Saunders et al., 1993). The measure consists of 10 items that make up 3 subscales: consumption, dependence, and serious harm (Saunders et al., 1993). Scores (summed) can range from 0 to 40. Previous research indicates that scores of 5 for females and 7 for males may indicate a need for intervention (DeMartini and Carey, 2009). The reliability and validity of the AUDIT with college student samples has been previously established (DeMartini and Carey, 2012). The mean AUDIT score in the analysis sample was 12.05 (range 5 to 27), with acceptable internal consistency ($\alpha = 0.78$).

Emotional Functioning was assessed by 18 items from subscales of the PANAS-X (Watson and Clark, 1999) and Larsen and Diener's (1987) mood circumplex. Each item asked "How ____ are you feeling right now?" with responses on a scale of 1 (not at all) to 11 (extremely). Five facets of mood were selected. For all indicators, we examined multilevel composite reliability at the within- and between-levels following the recommendations of Geldhof and colleagues (2014). Four negative mood states—anxiety (anxious, nervous, jittery), anger (angry, frustrated, irritated, tense), stress (stressed, overwhelmed), and sadness (down, blue, depressed, sad)—were combined to form a negative mood indicator ($\omega_{within} = 0.91$; $\omega_{between} = 0.94$). Five positive mood states (excited, enthusiastic, energetic, happy, and joyful) were used to form the positive mood indicator ($\omega_{within} = 0.97$; $\omega_{between} = 0.96$). This approach has been used in previous EMA studies of mood–alcohol associations (Dvorak et al., 2014; Dvorak et al., 2016; Dvorak and Simons, 2014; Dvorak et al., 2018; Simons et al., 2010).

Emotional instability was a mean standardized variable formed using the square of successive differences (SSD) for each primary mood state above ($n = 5$) across random assessments ($\omega_{within} = 0.99$; $\omega_{between} = 0.94$). To do this, we formed a mean standardized variable using all 5 moods. Next, we subtracted the previous mood from the current mood. Finally, we squared this value to provide a consistent positive value representing mood fluctuation. While there are a number of ways to calculate instability in mood (Jahng et al., 2008), many rely on a form of variability across measurements (e.g., *SD* and/or variance); however, the momentary approach employed in this study precludes this (i.e., there is only one measurement per time point). Alternatively, we could have used a strict deviance approach (i.e., not squaring the deviation); however, this assumes that increases/decreases from homeostasis are inherently distinct from each other. For the current study, we assume deviations from homeostasis are not directionally distinct. Thus, higher scores indicate more instability from one assessment to the next. Previous research supports the use of SSD as a measure of mood instability (Dvorak et al., 2014; Dvorak et al., 2016; Dvorak et al., 2018; Jahng et al., 2011; Stevenson et al., 2018).

Drinking Days were assessed in 2 ways. First, individuals were asked if they were currently drinking during each random assessment. If they endorsed that they were, this was tagged as a drinking day. Second, during the morning assessment, individuals were asked if they consumed alcohol the previous night. If they reported they had, the previous day was marked as a drinking day. This approach to identifying day-level consumption and tagging those events as "drinking days" has been used in previous EMA studies (Dvorak et al., 2014; Dvorak et al., 2018). For each day, a drinking window was computed for the time that a person initiated drinking on drinking days, or the average drinking initiation time for (i) nondrinking days or (ii) drinking days reported in the morning with no *in situ* drinking assessments the night before (see below).

Data Preparation

The original sample had 80 participants; however, one participant completed no EMA assessments and thus was removed. Two participants reported no alcohol use and were also removed. One participant reported alcohol use, but no daytime mood (this is needed for every analysis), and thus were removed. Finally, two participants had extremely low compliance (i.e., <20% with no self-initiated assessments), and these observations were also removed. This resulted in an analysis sample of $n = 74$. To ensure we were capturing sufficient predrinking mood, we removed days where participants began drinking prior to 12:00 PM. Time of day was centered at the time of drinking initiation on drinking days. For nondrinking days, we utilized the mean drinking time, from each individual's drinking days, to estimate a subject-specific "typical drinking time" in order to compare drinking days to nondrinking days. This approach has been successfully used in prior EMA studies of alcohol consumption (Dvorak et al., 2018; Russell et al., 2020; Treloar et al., 2015). To ensure we were capturing proximal mood, we limited postdrinking mood to the two hours following drinking initiation. Predrinking mood was limited to the 8 hours prior to drinking initiation.

Identification of drinking time on drinking days followed a stepped procedure. For each individual, we marked drinking time as the mean time between the last assessment where they reported they were *not* drinking, and the first assessment that they reported they *were* drinking. For example, if an individual reported that they were drinking at a 6:00 PM assessment, but not at a 4:00 PM assessment, the drinking initiation window was marked as 5:00 PM. Thus, the start of drinking represents a window between the last nondrinking assessment and the most recent drinking assessment. On days in which a person reported that they did drink the previous night but did not record this during a random assessment the night before, we utilized their mean drinking time from reported drinking days as their start drinking window. Obviously, nondrinking days do not contain drinking assessments, thus, for these days we utilized a person's average drinking initiation time window from drinking days in order to compare mood trajectories leading up to their typical drinking initiation time on drinking and nondrinking days. Similar approaches have been used in previous research to capture and compare typical drinking windows on drinking and nondrinking days (see Dvorak et al., 2016; Dvorak et al., 2018; Russell et al., 2020; Treloar et al., 2015).

Analysis Plan

Data were analyzed in Stata 15.0 using the mixed command (StataCorp, 2018). We specified a series of 3-level (moment, day, and person) multilevel models for each of the 3 primary outcomes (positive emotion, negative emotion, and emotional instability). We utilized a first-order autoregressive covariance structure (AR1) to account for serial autocorrelation across level 1 residuals. At all three levels, the intercept was allowed to vary randomly. The level 1 time slope was allowed to vary randomly, and the level 2 drinking day was allowed to vary randomly. We initially tested quadratic and cubic effects of time for random variance components; none had significant random variance, and thus, these variance components were constrained to zero. The analyses followed a stepwise procedure of model building to identify the most parsimonious model. We tested a series of three models for each outcome before selecting the most parsimonious model. Intraclass correlations (ICC) are presented in intercept-only models to show variance across levels of analysis. In each model, day of week was added to control for weekly fluctuations in mood and consumption. Grandmean-centered age, biological sex, and AUDIT scores were included as model covariates. Time was nested within each day and was calculated to be 0 at the drinking window, with negative values prior to the drinking window and positive values following the drinking window; thus, a value of −1 is 1 hour before a drinking window and a value of + 1 is 1 hour after a drinking window. In Model 1, we examine the linear effects of time and drinking day. Next, we test the interaction of time × drinking day. In Model 2, we add the quadratic value of time (time^2) to examine polynomial effects, and then test the time^2 × drinking day interaction. In Model 3, we add a cubic effect of time (time^3) and test the interaction of time^3 × drinking day. Final model selection, for the most parsimonious model, was guided by comparative model fit using likelihood ratio tests.

RESULTS

Sample Statistics

There were no differences between individuals invited to participate in the EMA portion of the study (n = 80) and either the full sample that qualified (n = 617), or the randomly selected sample invited to participate (n = 460), in age (qualified sample: p = 0.691; random sample p = 0.621), audit scores (qualified sample: p = 0.112; random sample p = 0.166), or distribution of biological sex (qualified sample: p = 0.237; random sample p = 0.252). Individuals who qualified differed significantly from the those who did not in audit scores (qualified [n = 617] audit: M = 12.03, SD = 5.75; not qualified [n = 1,258] audit: M = 3.98, SD = 4.21; t [1873] = 34.31, p < 0.001, Cohen's d = 1.32). The mean audit score across the entire sample was similar to other college drinking samples (M = 6.63, SD = 6.09). In the larger sample, n = 666 participants (36%) had an audit score ≥ 8 (hazardous drinking), which is slightly lower than that observed by DeMartini and Carey (2009). In the EMA sample, n = 59 (80%; n = 32 women, n = 27 men) met or exceeded the audit threshold for hazardous drinking.

Descriptive and Compliance Statistics for EMA Sample

Table 1 displays the descriptive statistics for all study variables among the EMA sample. Correlations of between- and within-subject variables (as appropriate) are listed in Table 2. Participants carried the mobile device for an average of 20.55 days (SD = 2.80; range 9 to 24) days. There were 1,479 days in the dataset. Participants reported drinking on 46.79% of days (n = 692 drinking days), 25.72% of drinking days were missing a drinking report, and utilized the mean drinking time across drinking days with an *in situ* drinking time. The average drinking start time across all participants was approximately 8:30 PM, and the standard deviation between mean drinking time and actual self-reported drinking time was 2 hours 21 minutes across all participants. Participants completed 86.75% of morning assessments. During the time frame in this analysis, there were 6,951 signaled random assessments. Participants completed 5,970 of these assessments (85.89% compliance). Due to missing and/or incomplete data across the affect measures, there were slightly fewer analysis observations for negative emotion (5,952) than positive emotion (5,970). There were also fewer emotional instability observations (5,080), because the first observation of a day is always missing as this value serves as the start point for calculating instability from time 1 to time 2 each day.

Table 1. Descriptive Statistics for Study Variables

Variables	Mean	*SD*	Range
Between-Subjects			
Age	21.297	2.072	18 to 29
Drinking Days	9.351	3.943	1 to 19
AUDIT	12.054	4.823	5 to 27
EMA Data			
Positive Emotion	5.071	2.031	0 to 11
Negative Emotion	2.123	1.917	0 to 11
Emotional Instability	2.929	4.366	0 to 53.222

AUDIT, Alcohol Use Disorder Identification Test.
n = 74 between-subjects observations. n = 5,970 within-subjects observations for positive emotion; n = 5,952 within-subjects observations for positive emotion; n = 5,080 within-subjects observations for emotional instability.

Emotional Functioning across Drinking and Nondrinking Days

The analyses examined the trajectory of mood across the day for positive emotion, negative emotion, and emotional instability. Days were divided into drinking and nondrinking days with time centered at the estimated drinking window.[1] Across all outcomes, for each model, we begin by testing the main linear effect in Step 1, followed by the interaction between drinking day and the linear effect of time in Step 2. Model 2 tests the quadratic effect of time in Step 3, and the interaction of the quadratic change as a function of drinking day in Step 4. Significant quadratic effects represent the change in linear form of the slope; interactions with drinking day represent differences in this change as a function of drinking day. Model 3 tests the cubic effect of time in Step 5, and the interaction of the cubic change as a function of drinking day in Step 6. Significant cubic effects represent the change in quadratic form of the slope; interactions with drinking day represent differences in this change as a function of drinking day.[2]

[1]We removed drinking days that used a mean drinking window for sensitivity analyses. Across all models, the analyses limited to days with verified drinking windows had direct and interactive effects (i.e., greater differences in slopes across days), and were all directionally consistent. There were no cases were either model differed with regard to statistically significant effects. For positive mood, the Time × Drinking Day slope was (B = −0.16, p < .001) and the Time^2 × Drinking Day slope was (B = −0.01, p = .022). For negative mood, the Time × Drinking Day slope was (B = 0.04, p = .002). For mood instability, the Time × Drinking Day slope was (B = 0.03, p = .774), the Time^2 × Drinking Day slope was (B = −0.10, p = .041), and the Time^3 × Drinking Day slope was (B = 0.01, p = .013). These can be contrasted with Tables 3–5, respectively.

[2]We also tested interactions with all model predictors and person-centered AUDIT scores. No parameters varied by AUDIT score in any of the models (ps = .161-.914).

Table 2. Bivariate Correlations

	1.	2.	3.	4.	5.	6.
1. Age	–					
2. Gender	−0.10	–				
3. AUDIT	0.05	0.21	–			
4. Positive Emotion	−0.15	0.29*	0.04	*0.49*	−0.35*	−0.11*
5. Negative Emotion	0.25*	−0.14	0.04	−0.33*	*0.57*	0.24*
6. Emotional Instability	0.06	−0.05	0.04	−0.20	0.56*	*0.11*

Data below the diagonal use between-subject means; data above the diagonal are moment-level correlations with random intercept. Intraclass correlations (italicized) are on the diagonal where appropriate.
*$p < 0.05$.

Positive Emotion

Each model is depicted in Table 3. A random intercept-only model showed that the variance in positive emotion was distributed approximately equally across person and moment levels (ICC = 0.49). Model 1: Positive emotion at each time point was regressed onto time of day at level 1 and drinking day at level 2. A cross-level interaction of time × drinking day was then added to the model. Model 2: The quadratic effect of time (time^2) and the interaction of time^2 × drinking day were added to the model. This resulted in significant model improvement, $LR\chi^2(2) = 5.96$, $p = 0.050$. Model 3: The cubic effect of time (time^3) and the interaction of time^3 × drinking day were added to the model. This did not result in significant model improvement, $LR\chi^2(2) = 3.13$, $p = 0.209$. The cubic effect and the time^3 × drinking day were removed, and Model 2 was selected as the final model.

The final model indicated that individuals had slightly less positive emotion on Wednesday relative to Sunday ($B = -0.23$, $p = 0.032$); no other days were different from Sunday ($ps = 0.099$ to 0.854). Women reported more overall positive emotion than men ($B = 0.78$, $p = 0.018$). Neither AUDIT scores ($B = -0.01$, $p = 0.985$) nor age ($B = -0.10$, $p = 0.197$) was associated with positive emotion. The trajectory of positive emotion across the day is depicted in Fig. 1. Positive emotion was lower on nondrinking days than drinking days ($B = -0.62$, $p < 0.001$) at the drinking window. Both linear ($B = -0.15$, $p < 0.001$) and quadratic ($B = -0.01$, $p = 0.015$) effects of time differed across days. On nondrinking days, there was a modest decline in positive emotion across time ($B = -0.04$, $p = 0.054$) which did not significantly change across the day ($B = -0.00$, $p = 0.141$). On drinking days, there was a positive linear effect of time ($B = 0.11$, $p < 0.001$) that accelerated modestly ($B = 0.01$, $p = 0.050$) as it approached the drinking window, supporting hypothesis 1.

Negative Emotion

Each model is depicted in Table 4. A random intercept-only model showed that the variance in negative emotion was distributed approximately equally across person and moment levels (ICC = 0.57). Model 1: Negative emotion at each time point was regressed onto time of day at level 1 and drinking day at level 2. A cross-level interaction of time × drinking day was then added to the model. Model 2: The quadratic effect of time (time^2) and the interaction of

Table 3. Multilevel Model of Positive Emotion Across the Day on Drinking and Nondrinking Days

Predictor Variables	Model 1 *B* (*SE*)	Model 2 *B* (*SE*)	Model 3 *B* (*SE*)	Final Model *B* (*SE*)
Fixed Effects				
Intercept	5.396 (0.18)***	5.402 (0.18)***	5.430 (0.18)***	5.402 (0.18)***
Time	0.077 (0.01)***	0.110 (0.02)***	0.085 (0.02)***	0.110 (0.02)***
Time^2	–	0.005 (0.00)*	−0.011 (0.01)	0.005 (0.00)*
Time^3	–	–	−0.002 (0.00)	–
Drinking Day	−0.608 (0.08)***	−0.621 (0.08)***	−0.658 (0.08)***	−0.621 (0.08)***
Time × Drinking Day	−0.088 (0.01)***	−0.146 (0.03)***	−0.114 (0.03)***	−0.146 (0.03)***
Time^2 × Drinking Day	–	−0.009 (0.00)*	0.011 (0.01)	−0.009 (0.00)*
Time^3 × Drinking Day	–	–	0.002 (0.00)	–
Level 1 Random Effects				
Intercept	0.669 (0.04)***	0.669 (0.04)***	0.669 (0.04)***	0.669 (0.04)***
Time	0.014 (0.00)***	0.014 (0.00)***	0.114 (0.00)***	0.014 (0.00)***
Level 2 Random Effects				
Intercept	1.78 (0.31)***	1.78 (0.31)***	1.78 (0.31)***	1.78 (0.31)***
Drinking Day	0.096 (0.06)***	0.095 (0.06)***	0.095 (0.06)***	0.059 (0.06)***
Model Fit				
Wald χ^2(*df*)	154.14 (12)	160.39 (14)	163.65 (16)	160.39 (14)

Drinking Day (uncentered) was coded as follows: 1 = nondrinking day, 0 = drinking day; thus, time slopes in each model are the trajectory of emotion on drinking days (trajectories on nondrinking days are in text). Six dummy-coded day of week variables were included as covariates to control for weekly variation in emotion-drinking patterns. Age, biological sex, and AUDIT scores were also included as model covariates. n = 74 between-subjects observations; n = 5,970 within-subjects observations.
***$p \leq 0.001$; **$p \leq 0.01$; *$p \leq 0.05$.

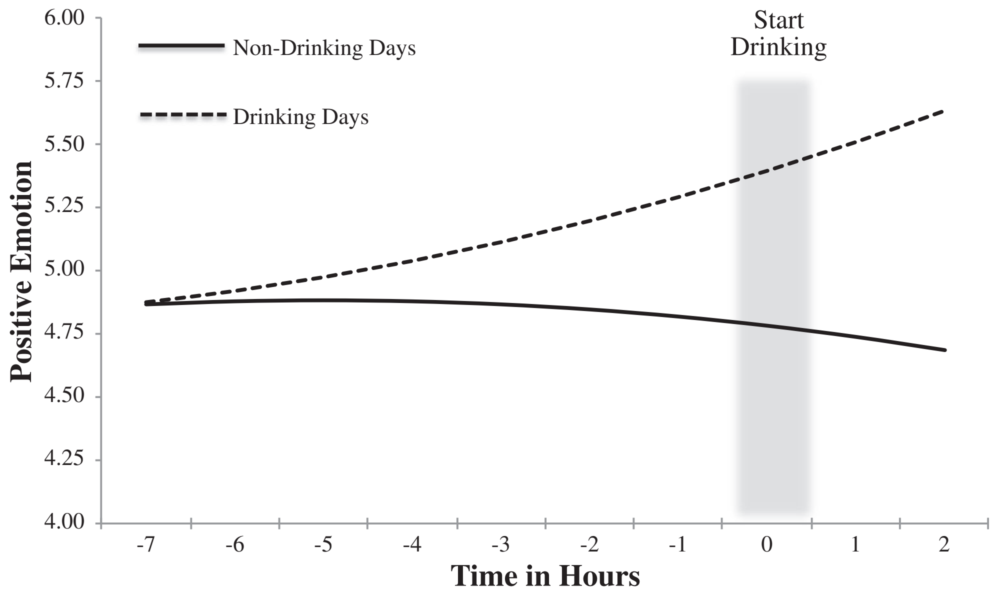

Fig. 1. Positive emotion across the day on drinking and nondrinking days. *Note*. Drinking day linear slope: $b = 0.11$, SE = 0.02, $p < 0.001$. Drinking day quadratic slope: $b = 0.01$, SE = 0.00, $p = 0.050$. Nondrinking day linear slope: $b = -0.04$, SE = 0.02, $p = 0.054$. Nondrinking day quadratic slope: $b = -0.00$, SE = 0.00, $p = 0.141$. Age, sex, and AUDIT score were included as covariates. Six dummy-coded day of week variables were included to control for weekly variation in emotion-drinking patterns.

Table 4. Multilevel Model of Negative Emotion Across the Day on Drinking and Nondrinking Days

Predictor Variables	Model 1 *B* (*SE*)	Model 2 *B* (*SE*)	Model 3 *B* (*SE*)	Final Model *B* (*SE*)
Fixed Effects				
Intercept	1.836 (0.18)***	1.827 (0.18)***	1.821 (0.18)***	1.828 (0.18)***
Time	−0.052 (0.07)***	−0.096 (0.02)***	−0.091 (0.02)***	−0.089 (0.01)***
Time^2	–	−0.007 (0.00)***	−0.004 (0.01)	−0.006 (0.00)***
Time^3	–	–	0.000 (0.00)	–
Drinking Day	0.271 (0.08)***	0.272 (0.08)***	0.267 (0.08)***	0.269 (0.08)***
Time × Drinking Day	0.033 (0.01)***	0.047 (0.02)*	0.052 (0.03)	0.032 (0.01)*
Time^2 × Drinking Day	–	0.002 (0.00)	0.006 (0.01)	–
Time^3 × Drinking Day	–	–	0.000 (0.00)	–
Level 1 Random Effects				
Intercept	0.668 (0.04)***	0.669 (0.04)***	0.669 (0.04)***	0.669 (0.04)***
Time	0.011 (0.00)***	0.011 (0.00)***	0.011 (0.00)***	0.011 (0.00)***
Level 2 Random Effects				
Intercept	1.881 (0.32)***	1.877 (0.32)***	1.878 (0.32)***	1.877 (0.32)***
Drinking Day	0.111 (0.06)***	0.111 (0.06)***	0.111 (0.06)***	0.111 (0.06)***
Model Fit				
Wald $\chi^2(df)$	105.32 (12)	120.22 (14)	121.05 (16)	119.61 (13)

Drinking Day (uncentered) was coded as follows: 1 = nondrinking day, 0 = drinking day; thus, time slopes in each model are the trajectory of emotion on drinking days (trajectories on nondrinking days are in text). Six dummy-coded day of week variables were included as covariates to control for weekly variation in emotion-drinking patterns. Age, biological sex, and AUDIT scores were also included as model covariates. $n = 74$ between-subjects observations; $n = 5{,}952$ within-subjects observations.

***$p \leq 0.001$; **$p \leq 0.01$; *$p \leq 0.05$

time^2 × drinking day were added to the model. This resulted in significant model improvement, $LR\chi^2(2) = 14.76$, $p < 0.001$. Model 3: The cubic effect of time (time^3) and the interaction of time^3 × drinking day were added to the model. This did not result in significant model improvement, $LR\chi^2(2) = 0.82$, $p = 0.665$. The cubic effect and the time^3 × drinking day were removed. In addition, the nonsignificant interaction of time^2 × drinking day was removed for the final model. The final model was significantly better than Model 1 $LR\chi^2(1) = 14.17$, $p < 0.001$; however, it was no different than model 2 $LR\chi^2(1) = 0.58$, $p = 0.446$ or model 3 $LR\chi^2(3) = 1.141$, $p = 0.704$, making the final model the most parsimonious.

The final model indicated that individuals experienced slightly more negative emotion on Tuesday ($B = 0.23$, $p = 0.024$) and Wednesday ($B = 0.35$, $p = 0.001$) relative to

Sunday; no other days were significantly different from Sunday (*ps* = 0.823 to 0.065). Age was significantly associated with overall more negative emotion ($B = 0.16$, $p = 0.042$). However, neither gender ($B = -0.34$, $p = 0.310$) nor AUDIT scores ($B = 0.017$, $p = 0.63$) were associated with negative emotion. The trajectory of negative emotion across the day is depicted in Fig. 2. Negative emotion was found to be higher on nondrinking days than drinking days ($B = 0.33$, $p < 0.001$) at the drinking window. There was a significant difference in the trajectory of negative emotion across days ($B = 0.03$, $p = 0.002$), with drinking days having a more robust negative linear slope across the day. On drinking days, there was a negative linear effect of time ($B = -0.09$, $p < 0.001$) that became more negative across the day ($B = -0.01$, $p < 0.001$) as it approached the drinking window. On nondrinking days, there was a significant decline in negative emotion across time ($B = -0.05$, $p < 0.001$) that also became more negative across the day ($B = -0.01$, $p < 0.001$) as it approached the drinking window, partially supporting hypothesis 2.

Emotional Instability

Each model is depicted in Table 5. A random intercept-only model showed that the majority of variance in emotional instability was at the moment level (ICC = 0.11). Model 1: At each time point, emotional instability was regressed onto time of day at level 1 and drinking day at level 2. A cross-level interaction of time × drinking day was then added to the model. Model 2: The quadratic effect of time (time^2) and the interaction of time^2 × drinking day were added to the model. This did not result in significant model improvement, $LR\chi^2(2) = 0.44$, $p = 0.802$. Model 3: The cubic effect of time (time^3) and the interaction of time^3 × drinking day were added to the model. This resulted in significant model improvement, $LR\chi^2(2) = 7.94$, $p = 0.019$. In this model, there were significant interactions of time^2 × drinking day and time^3 × drinking day; thus, Model 3 was selected as the final model.

The final model indicated that individuals had slightly less emotional instability on Monday relative to Sunday ($B = -0.58$, $p = 0.050$); no other days were different from Sunday (*ps* = 0.766 to 0.126). Neither AUDIT scores ($B = 0.01$, $p = 0.775$), gender ($B = -0.24$, $p = 0.545$) nor age ($B = 0.03$, $p = 0.734$) was associated with emotional instability. Figure 3 depicts the trajectory of emotional instability across the day. Emotional instability was lower on nondrinking days than drinking days ($B = -0.58$, $p = 0.019$) at the drinking window. There were differences across days on both the quadratic ($B = 0.11$, $p = 0.021$) and cubic ($B = 0.01$, $p = 0.010$) slopes. On nondrinking days, there was a nonsignificant positive linear effect on emotional instability across time ($B = 0.04$, $p = 0.612$) and no significant quadratic ($B = 0.03$, $p = 0.413$) or cubic ($B = 0.00$, $p = 0.311$) change across the day. On drinking days, there was a nonsignificant negative linear effect of time ($B = -0.04$, $p = 0.610$). However, there was a significant nonlinear change in emotional instability of both the quadratic slope, as it approached the drinking window ($B = -0.08$, $p = 0.014$), and the cubic slope as it passed the drinking window ($B = -0.01$, $p = 0.009$). To further examine drinking days, we calculated linear contrasts in the time window from −5.5 to 0 and from 0 to 2. From −5.5 to 0, the simple linear slope was positive and significant ($b = 0.22$, SE = 0.05, 95%

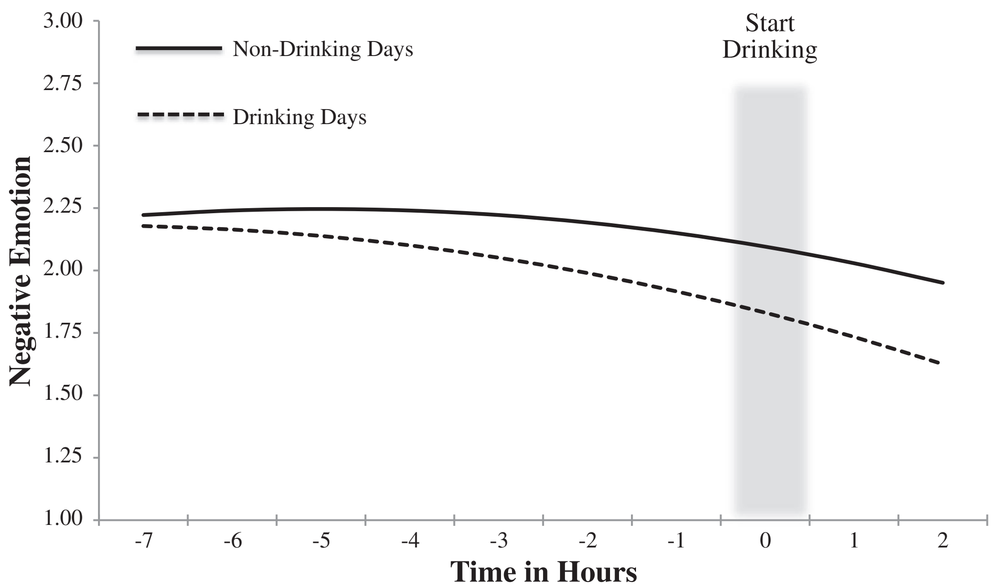

Fig. 2. Negative emotion across the day on drinking and nondrinking days. *Note.* Drinking day linear slope: $b = -0.09$, SE = 0.01, $p < 0.001$. Drinking day quadratic slope: $b = -0.01$, SE = 0.00, $p < 0.001$. Nondrinking day linear slope: $b = -0.05$, SE = 0.01, $p < 0.001$. Nondrinking day quadratic slope: $b = -0.01$, SE = 0.000, $p < 0.001$. Age, sex, and AUDIT score were included as covariates. Six dummy-coded day of week variables were included to control for weekly variation in emotion-drinking patterns.

Table 5. Multilevel Model of Emotional Instability Across the Day on Drinking and Nondrinking Days

Predictor Variables	Model 1 *B* (*SE*)	Model 2 *B* (*SE*)	Model 3 *B* (*SE*)	Final Model *B* (*SE*)
Fixed Effects				
Intercept	3.684 (0.30)***	3.685 (0.30)***	3.860 (0.31)***	3.860 (0.31)***
Time	0.067 (0.03)*	0.083 (0.06)	−0.037 (0.08)	−0.037 (0.08)
$Time^2$	–	0.003 (0.01)	−0.083 (0.03)*	−0.083 (0.03)*
$Time^3$	–	–	−0.009 (0.00)**	−0.009 (0.00)**
Drinking Day	−0.328 (0.23)	−0.337 (0.23)	−0.576 (0.25)*	−0.576 (0.25)*
Time × Drinking Day	−0.041 (0.04)	−0.093 (0.09)	0.080 (0.11)	0.080 (0.11)
$Time^2$ × Drinking Day	–	−0.008 (0.01)	0.112 (0.05)*	0.112 (0.05)*
$Time^3$ × Drinking Day	–	–	0.013 (0.00)**	0.013 (0.00)**
Level 1 Random Effects				
Intercept	3.159 (0.34)***	3.159 (0.34)***	3.169 (0.34)***	3.169 (0.34)***
Time	0.031 (0.01)***	0.031 (0.1)***	0.031 (0.01)***	0.031 (0.01)***
Level 2 Random Effects				
Intercept	2.085 (0.44)***	2.085 (0.44)***	2.082 (0.44)***	2.082 (0.44)***
Drinking Day	0.643 (0.40)***	0.646 (0.40)***	0.660 (0.40)***	0.660 (0.40)***
Model Fit				
Wald χ^2(*df*)	16.05 (12)	16.50 (14)	24.48 (16)	24.48 (16)

Drinking Day (uncentered) was coded as follows: 1 = nondrinking day, 0 = drinking day; thus, time slopes in each model are the trajectory of emotion on drinking days (trajectories on nondrinking days are in text). Six dummy-coded day of week variables were included as covariates to control for weekly variation in emotion-drinking patterns. Age, biological sex, and AUDIT scores were also included as model covariates. n = 74 between-subjects observations; n = 5,080 within-subjects observations.

***$p \leq 0.001$; **$p \leq 0.01$; *$p \leq 0.05$.

CI = 0.12 to 0.32, $p < 0.001$). From 0 to 2, the simple linear slope was negative and significant ($b = -0.39$, SE = 0.18, 95% CI = −0.75 to −0.03, $p = 0.032$). Thus, the changes in emotional instability prior to and leading up to the drinking window support hypothesis 3. Similarly, the changes in emotional instability at the drinking window and after drinking initiation support hypothesis 4.[3]

DISCUSSION

The current study examined emotional functioning across the day for 21 days using ecological momentary assessment (EMA). Across positive emotion, negative emotion, and emotional instability, we found different trajectories as a function of drinking day. This study is one of a few studies to assess the relationship between emotional instability and alcohol use (Dvorak et al., 2016; Gottfredson and Hussong, 2013), and the first to show increasingly unstable functioning leading up to a drinking event followed by stabilization after drinking initiation.

As predicted, positive emotion increased across drinking days, relative to nondrinking days, accelerating as it approached the drinking window. These findings are consistent with other EMA studies that assessed mood across drinking and nondrinking days (Dvorak et al., 2014; Dvorak et al., 2016; Dvorak et al., 2018; Russell et al., 2020; Treloar et al., 2015). Additionally, the modest acceleration in positive emotion leading up to the drinking window was sustained after drinking initiation, as positive emotion continued to increase 2 hours after drinking started. These findings are consistent with the affect-regulation model, highlighting how the relationship between positive mood and alcohol consumption can be positively reinforcing via mood enhancement (Dvorak et al., 2018; Sher and Grekin, 2007). While previous research has indicated that the link between positive mood and alcohol use may be simply an anticipatory effect (Dvorak et al., 2018), the current results suggest that positive mood trajectories actually become stronger after initiation, consistent with mood enhancement/positive reinforcement models. Though, there is research indicating that the velocity of change in positive mood slows after initiation, which may indicate that the anticipatory effect is more robust than the enhancement/reinforcing effect (Russell et al., 2020).

Additionally, it was hypothesized that negative emotion would decrease across drinking days, compared to nondrinking days, and that this decrease would continue to accelerate leading up to the drinking window. However, our study found a modest decrease in negative emotion that became more negative across the day among both drinking and nondrinking days. Negative emotion was also found to be significantly lower across drinking days compared with nondrinking days, continuing to decrease after drinking initiation. This is consistent with other studies (Russell et al., 2020; Simons et al., 2010; Treloar et al.,

[3]We also examined instability in each mood separately. The observed effects for the combined mood instability variable were largely consistent across emotions of anxious, positive mood, and stress, though not all predictors/interactions reached conventional levels of statistical significance. The effects were weaker, and essentially nonexistent for sadness instability and anger instability. We also examined a combined negative mood instability, which was nearly identical to the total mood instability model across all predictors (including the same significant interactions). Given the high internal consistency of the mood instability variable, and the consistent effects across the various instability indicators, we opted to retain the full mood instability variable for the final analysis.

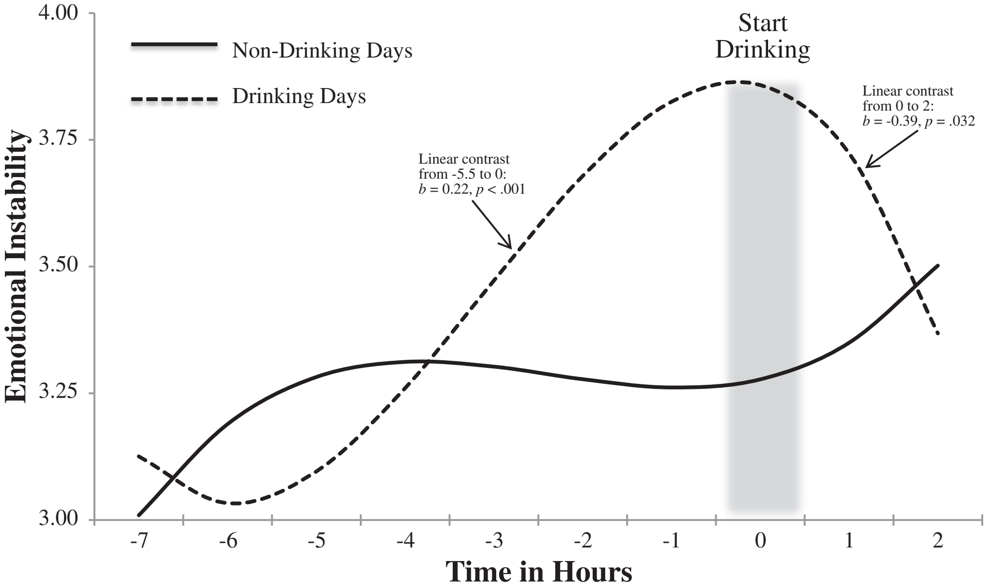

Fig. 3. Emotional instability across the day on drinking and nondrinking days. *Note*. Drinking day linear slope: $b = -0.04$, SE = 0.02, $p = 0.636$. Drinking day quadratic slope: $b = -0.08$, SE = 0.03, $p = 0.014$. Drinking day cubic slope: $b = -0.01$, SE = 0.00, $p = 0.009$. Nondrinking day linear slope: $b = 0.04$, SE = 0.08, $p = 0.604$. Nondrinking day quadratic slope: $b = 0.03$, SE = 0.04, $p = 0.406$. Nondrinking day cubic slope: $b = 0.00$, SE = 0.00, $p = 0.303$. Age, sex, and AUDIT score were included as covariates. Six dummy-coded day of week variables were included to control for weekly variation in emotion-drinking patterns.

2015), which have found negative emotion to be lower on drinking days and continue to decrease prior to and after drinking. It appears that negative emotion is simply lower on drinking days than nondrinking days. While this may be linked to the sample in this study (college student drinkers), it is worth noting that this sample was specifically recruited because they drank at high rates (note the mean AUDIT was 12.05). Further, Russell and colleagues found a similar pattern in a large sample of heavy drinking community members (Russell et al., 2020). They further found that the reduction in negative affect was more robust on heavier drinking days. Thus, the negative reinforcing aspects of alcohol use may be both nonlinear in nature and more robust at higher consumption rates.

One intriguing notion, for both the positive and negative mood trajectories across days, is the possibility of diurnal mood fluctuations (Murray, 2007). Research has shown that high negative mood (mostly depression) and low positive mood are elevated in the morning, and then improve across the day. This is especially true for individuals with heightened levels of depressive pathology (Murray, 2007). In the current study, days characterized by expected diurnal trajectories also tended to be drinking days. Thus, there is an alternative interpretation, whereby adverse mood trajectories, at least with regard to momentary mood states, lead to a *lower* likelihood of consumption. Future research comparing trajectories of mood across drinking and nondrinking days among individuals with varying levels of mood pathology (e.g., depression) may be helpful in teasing out this possibility.

Lastly, our findings showed that on both drinking and nondrinking days emotions started out relatively stable. This pattern continued on nondrinking days. However, on drinking days instability began to increase approximately 5.5 hours before the drinking window, following a more positive trajectory as it approached the drinking window. Emotional instability peaked right as individuals began to drink. This is consistent with an emotional instability regulation model. This is also consistent with recent studies which have found that emotional instability may predict alcohol consumption (Dvorak et al., 2016; Dvorak et al., 2018; Greeley and Oei, 1999). Further, on drinking days, emotions stabilized within hours of drinking initiation, reaching a similar level of emotional instability found on nondrinking days 2 hours postdrinking initiation. This suggests a negative reinforcement model, which may ultimately lead to negative outcomes, such as alcohol dependence and the maintenance of addiction, as later stages of addiction are posited to be maintained by compulsions, which are often focused on reducing tension and negative affective states (Koob and Volkow, 2010; Kwako and Koob, 2017). Furthermore, this may explain why emotional instability is so frequently linked to dependence symptoms and alcohol pathology (Dvorak and Simons, 2008; Simons et al., 2009; Simons et al., 2014; Stevenson et al., 2015). Further, this link may be mediated via drinking to cope (Dvorak et al., 2015). However, the links between emotional instability and dependence are typically observed at the between-subject level. Thus, the current findings suggest that this pattern may become increasingly common, as it is reinforced, leading a greater propensity to drink for coping reasons and subsequently leading to the development of more severe alcohol pathology. Future research is needed to link within-subject emotional instability and affect-regulation drinking to broader alcohol pathology across time. Alternatively, this drop may have nothing to do with alcohol consumption and may just be a return to homeostasis due to a ceiling effect on emotional instability. This remains a question for future research.

Treatment Implications

These results emphasize the importance of mood on alcohol use. Combined with previous studies showing that stress instability decreases following consumption, these data would suggest that emotion regulation training that focuses, not only on improving negative mood, but also on stabilizing global emotional functioning, may be a key aspect in the treatment of alcohol-related pathology (Cappell, 1987; Dvorak et al., 2018). Additionally, approaches that seek to reduce the positive, anticipatory, effects of consumption may also be beneficial. In this regard, interventions that specifically target enhancement drinking motivation (Blevins and Stephens, 2016) and/or alcohol-related expectancies (Dunn et al., 2020) may be especially efficacious.

Limitations

The findings of the current study should be interpreted in the context of its limitations. While the sample consisted of moderate to heavy drinkers, the sample was comprised of mostly Caucasian college students from a single Midwest university. Thus, the findings may not be generalizable to other ethnic/racial and noncollege student populations. Additionally, the data were obtained by self-report and data collection only lasted about 21 days per participant. However, the utilization of EMA allowed us to assess the relationship between emotional functioning and alcohol consumption in real time, giving us greater confidence in the examination and interpretation of this relationship. Nonetheless, these results do not prove causality, as there is the possibility that events (e.g., drinking intentions and planned events) that may set daily mood on specific trajectories well before the drinking episode. Future research is needed to clarify these associations. More important is the lack of clarity of the exact drinking window. We used a proxy for drinking initiation, based on the time between a nondrinking assessment and a drinking assessment. Future research should seek to identify a more exact drinking initiation time point. Similarly, our assessment of mood was fairly spread out around the drinking window. A more nuanced examination of mood just prior to and immediately following the drinking event would allow for a more fine-grained analysis of immediate reinforcing effects. Additionally, it is important to note that the PANAS-X measures positive affect and negative affect as independent constructs, which leads to lower covariance between these mood states (Watson et al., 1988). This is different from what may be seen in a model of circumplex mood, whereby these mood states may be seen as more interrelated (Russell, 1980). Thus, our utilization of the PANAS-X to measure these mood states may have influenced our findings. Future research should consider using a more diverse model of circumplex mood to assess mood states. Further, we utilized a combined measure of emotional instability. This was done due to concerns with statistical power due to the relatively small level-2 sample size and the single positive affect variable. Previous research has examined multiple indices of mood instability and found that only stress instability decreases following consumption (see Dvorak et al., 2018). However, this research was also conducted with a lighter drinking sample. Thus, future research should examine these associations across multiple indices of affective instability among larger and more diverse samples. Finally, our measure of instability assumed positive and negative deviations from homeostasis is not qualitatively distinct. Future methodological research is needed to identify the best approach for capturing emotional instability both in the moment and across time. Of note, the findings here were relatively consistent when analyzing instability across the various mood indices (see footnote 3) and internal consistency of the measure of global instability was excellent; both of which give us confidence in this approach.

CONCLUSIONS

The current study examined indices of emotional functioning across the day on drinking and nondrinking days. The results suggest that positive mood increases leading up to a drinking event, becomes stronger as the event approaches, and continues to increase sharply after drinking initiation. This is suggestive of both anticipatory effects and positive reinforcement mechanisms. In contrast, negative mood is lower on drinking days than nondrinking days and decreased at a similar rate across days. This is may be consistent with an affect-regulation model whereby individuals simply have less negative affect if they know they will be drinking that day. The most interesting results were those for emotional instability. The analysis suggests that emotions remain fairly stable on nondrinking days. However, on drinking days emotions become increasingly more unstable as the drinking event approaches. This is followed by a rapid stabilization in emotion after drinking is initiated. We would caution against interpreting these results as causal. It is plausible that the mood trajectories are a product of decisions to drink made well before drinking was initiated. This remains a question for future research. The results highlight the importance of emotion dynamics for alcohol consumption and suggest interventions targeting emotional instability may be especially effective.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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