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Testing Daily Associations between Impulsivity, Affect, and Alcohol Outcomes: A Pilot Study

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Abstract

Background: Considerable research has examined impulsivity between individuals, but less research has focused on whether impulsivity fluctuates within a person. Although previous research supports trait levels of impulsivity as a risk factor for increased alcohol involvement, it is unclear whether daily (i.e., state) fluctuations in impulsivity coincide with same-day drinking behaviors. The present pilot study tested (1) the extent to which impulsivity fluctuates within-person; (2) the influence of daily impulsivity on alcohol use outcomes across all days (i.e., whether drinking occurred, the number of drinks consumed, and intentions to drink) and on drinking days only (i.e., whether heavy episodic drinking occurred and the number of problems experienced); and (3) daily affect as moderators of these relationships.

Method: Participants were 24 young adult drinkers without postsecondary education who completed a baseline plus 14 follow-up daily surveys. Each day, participants reported their impulsivity, affect, and drinking behavior.

Results: Multilevel modeling revealed that 42.5% of the variability in daily impulsivity was due to within-person differences. Impulsivity was related to greater odds of heavy episodic drinking and more alcohol-related problems on drinking days. Positive affect moderated the relationship between impulsivity and alcohol-related problems, and the relationship between impulsivity and drinking intentions.

Conclusions: Findings suggest that changes in positive affect and impulsivity may be a risk factor for alcohol problems in a daily context. Future research examining within-person impulsivity and negative outcomes may benefit from considering positive affect.

Keywords

daily impulsivity; state impulsivity; alcohol use; alcohol problems; drinking intentions

Cross-sectional (e.g., Henges and Marczinski 2012; Magid et al. 2007) and prospective (e.g., Kaiser et al. 2016; Quinn et al. 2011; Sher et al. 2000) studies have found that higher levels of impulsivity are associated with greater alcohol use and problems in young adults. Although impulsivity is an important between-person (“trait”) risk factor (see Dick et al. 2010; King et al. 2014 for reviews), little is known about within-person variability of impulsivity and the extent to which this variability may associate with hazardous drinking outcomes from day-to-day. Furthermore, daily examinations of the relationship between impulsivity and drinking have not included relevant factors (i.e., daily affect), which may offer a more fine-grained understanding of daily processes related to same-day alcohol use. Thus, the present pilot study sought to understand whether daily (“state”) levels of impulsivity vary within-person and associate with same-day alcohol outcomes as well as to test daily positive and negative affect as moderators of these associations.

Limited research has examined within-person fluctuations in impulsivity, particularly in a daily context. Impulsivity describes rash action without consideration of negative consequences (The International Society for Research on Impulsivity 2016). Although this broad conceptualization exists, researchers have operationalized impulsivity in a number of ways (e.g., Evenden 1999) with aspects primarily related to either personality (i.e., trait) or behavioral impulsivity (i.e., state). Trait impulsivity generally reflects a stable construct that is assessed via self-report (e.g., Dick et al. 2010) whereby levels of impulsivity are compared between-individuals. State impulsivity generally reflects impulsive behavior *in situ* that is typically assessed behaviorally on computerized tasks (e.g., stop-signal task, go/no-go tasks) with performance varying over time (see Dick et al. 2010 for review). Thus, these measures of state impulsivity may be able to capture within-individual changes over time, but it is important to note behavioral measures of impulsivity have been utilized at the trait-level as well (see Stamates and Lau-Barraco 2017). Although state models are beneficial for capturing a “snapshot of behavior” (Cyders and Coskunpinar 2011), they could lack ecological validity. That is, impulsivity displayed on these tasks may not be generalizable to real-world impulsive behavior. Furthermore, it may be difficult to administer behavioral tasks over time to capture changes in state impulsivity due to fatigue (e.g., King et al., 2014) and practice effects (e.g., Costa and McCrae 1982; Nederkoorn et al. 2006). Thus, whether impulsivity fluctuates from day-to-day has not been well examined. Given these limitations, Tomko et al. (2014) developed a daily measure to assess within-individual changes in general impulsive tendencies that can be used in real-world settings.

Previous work assessing impulsivity at the daily level has indeed shown that impulsivity fluctuates day-to-day (e.g., Ansell et al. 2015; Bresin et al. 2013; Tomko et al. 2014; Trull et al. 2016) and associates with same-day risky behaviors (e.g., substance use, self-injury). However, of the two investigations that have examined daily impulsivity with drinking, findings are mixed. Specifically, Trull et al. (2016) found that daily levels of impulsivity were associated with same-day drinking whereas Ansell et al. (2015) found no association. Given this prior work, examining how daily impulsivity relates to hazardous drinking behaviors (i.e., binge drinking, intentions to drink, problems) in addition to testing moderators of these relationships may elucidate impulsivity’s role in daily drinking patterns. Further, given that associations between various aspects of impulsivity and alcohol use have been found in adolescents (e.g., see Stautz and Cooper 2014 for review), college-attending

emerging adults (e.g., see King et al. 2014; Stamates and Lau-Barraco 2017 for reviews), and treatment-seeking adults (e.g., see Loree et al. 2014; Stevens et al. 2014 for reviews), the present study examined how these factors relate among nonstudent young adults, an understudied population also at-risk for high-risk drinking and problems (e.g., Harford et al. 2006; White et al. 2005).

Another strong correlate of alcohol use and problems is one's affective state. Previous research suggests that individuals commonly endorse enhancing positive affect or coping with negative affect as motives for drinking (e.g., Cooper et al. 1995), and an individual's affect and alcohol use have been shown to covary at the daily level (e.g., Hussong 2007; O'Hara et al. 2014; Park et al. 2004). For example, individuals may consume alcohol to cope on days they experience distress (e.g., Hussong 2007; O'Hara et al. 2014). In contrast, individuals may drink to reinforce or enhance their existing positive affect that day (e.g., Park et al. 2004; Simons et al. 2010).

The relationship between positive/negative affect and alcohol use is important because impulsive individuals may have a heightened vulnerability for engaging in emotion-based drinking. Theoretical assertions on impulsivity suggest that impulsive individuals may engage in rash action when faced with strong emotional states (e.g., positive and negative urgency; Whiteside and Lynam 2001). This is because their over-reliance on affective cues, be it positive or negative, may result in a lower availability of cognitive resources that could be used to control their own behavior (Muraven and Baumeister 2000), and subsequently, the likelihood of engaging in maladaptive behaviors (e.g., problematic drinking) may increase. Additionally, one may become more susceptible to engage in unplanned drinking when experiencing higher levels of impulsivity coupled with stronger negative affect (i.e., Pearson and Henson 2013). Specifically, a cross-sectional study by Pearson and Henson (2013) found that individuals with higher levels of negative urgency reported more alcohol problems, and this association was partially mediated by greater unplanned drinking. Thus, examining one's drinking intentions in a daily context of impulsivity and drinking may offer more firm conclusions about the influence of positive and negative affect in these relationships.

Examining the daily associations between impulsivity, positive and negative affect, and alcohol use outcomes could aid our understanding of the extent to which impulsivity varies within-person and associates with other behaviors in one's daily life. Furthermore, utilizing a nonstudent, non-treatment seeking emerging adult sample, such as the one used in the present study, could allow findings to be more generalizable to the population.

Consequently, the present study had three aims. First, we tested the degree to which impulsivity varied within-person. Second, we examined the association between daily levels of impulsivity and daily alcohol use outcomes (i.e., quantity, whether any drinking occurred, heavy drinking [4+/5+ drinks for women/men], alcohol problems, and drinking intentions). Specifically, we examined whether daily levels of impulsivity were related to the likelihood of any drinking as well as the number of drinks consumed *across all days*. Further, on *drinking days only*, we examined whether levels of impulsivity were associated with whether heavy drinking occurred and the number of alcohol problems experienced. Our third aim investigated daily levels of positive and negative affect as moderators of these

associations. It was hypothesized that there would be intra-individual variability in impulsivity that would associate with greater daily alcohol use, heavy drinking, drinking intentions, and problems. It also was hypothesized that negative and positive affect would moderate these relationships, such that the association between daily impulsivity and alcohol use outcomes would be stronger when experiencing higher levels of negative and positive affect than usual.

Method

Participants and Procedure

Participants were young adult drinkers who were former participants in a larger study on nonstudent drinking behavior (Lau-Barraco et al. 2018). For the prior study, participants must have: (1) been 18 to 25 years old, (2) had no post-secondary education, (3) engaged in 2 heavy drinking episodes in the past month, (4) consumed < 40 standard drinks weekly, and (5) had no previous treatment for alcohol use disorders. Participants were recruited from the community via online and print advertisements. Of the 164 participants in the parent study, 33 participants completed a baseline survey and indicated interest in participating in a follow-up study. The computerized baseline assessment was completed remotely and took about 40 minutes. Links to individual daily surveys were sent via email each morning for 14 days. Participants received a daily text message reminder to complete these 5-minute daily surveys between 2:30 and 7:00 pm, after which, the survey link expired. This procedure is consistent with prior research (e.g., Lau-Barraco & Linden-Carmichael in press; Linden-Carmichael & Lau-Barraco 2017; O'Hara et al. 2014). Regarding specific survey items, participants were instructed to report on their alcohol use and experiences with alcohol-related problems *last night*; their mood, impulsivity *so far that day*, and their intentions to drink *in the next 24 hours*. Participants were given a \$20 gift card for completing the baseline survey, \$3 per daily survey, and a \$10 bonus if they completed 12+ daily surveys. The present study was approved by the university's Institutional Review Board and followed APA ethical guidelines (APA 2010).

Of the 33 participants who completed the baseline survey, only those who completed at least two consecutive daily surveys were included in analyses due to the nature of the data structure and research questions. The final analytic sample consisted of 24 (14 women) participants. The sample was 37.5% White, 29.2% African American, 12.5% Hispanic, 4.2% Native American, or 16.7% "other"/biracial. Average age was 23.83 ($SD = 1.83$) years. Average compliance for participants was 8.67 daily surveys per person, ranging from 2 surveys to 13 surveys per person. Participants completed 208 daily reports; 69 of which involved drinking. Of drinking days, 34 involved heavy drinking and 45 involved experiencing at least one alcohol-related problem.

Daily Measures

Impulsivity was measured by The Momentary Impulsivity Scale (MIS; Tomko et al. 2014), a 4-item scale consisting of items such as "I made a 'spur of the moment' decision," tailored to reflect impulsivity so far that day. Responses ranged from 1 (*very slightly or not at all*) to 5 (*extremely*). Positive/negative affect was assessed using items from an adapted Positive

and Negative Affect Schedule (Mohr et al. 2005; Watson et al. 1988). Participants reported the degree they experienced 16 positive (e.g., happy, excited) and negative (e.g., nervous, sad) affects on a response scale from 0 (*not at all*) to 4 (*extremely*) so far that day. Responses were summed for “positive” and “negative” scales. For number of drinks and whether drinking occurred, participants were asked how many standard alcoholic drinks they consumed the day prior. Any drinking was coded as a (1); otherwise drinking was coded as (0). For heavy drinking, if participants reported drinking 4+/5+ (for women/men) drinks, this day was coded as a *heavy drinking day* (1); if not, it was coded as a *non-heavy drinking day* (0). If no drinking was reported, participants were assigned a missing value for that day to exclude this day’s report from analyses including alcohol problems. Regarding problems, participants were provided with a modified version of the Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ; Kahler et al. 2005) if they report prior-day alcohol use. This 24-item measure was adapted to ask about problems that occurred as a result of drinking last night with *yes* (1) or *no* (0) response options. Responses were totaled to reflect the number of alcohol harms experienced. On days in which no drinking was reported, participants were assigned a missing value to exclude this day’s report from analyses. For drinking intentions, each day participants were asked, “What is the likelihood that you will drink in the next 24 hours?” Response options ranged from 0 (*definitely will NOT do*) to 100 (*definitely WILL do*) in increments of 10.

Data Analytic Plan

Given the structure of the daily questionnaire (i.e., participants were instructed to report on their alcohol use and experiences with alcohol-related problems *last night*, their mood, impulsivity *so far that day*, and their intentions to drink *in the next 24 hours*), consecutive days were matched in order to determine how impulsivity and affect experiences predicted alcohol use on the same day. Specifically, waking recall assessments were lagged by one day and merged to match with the previous day’s assessment. All days were used in analyses regardless of whether drinking occurred except when alcohol-related problems and heavy drinking were modeled as outcomes, and in these cases, only drinking days were examined. As such, these daily observations were omitted from analyses if they did not drink on this day. Multilevel modeling via HLM 7.01 software (Raudenbush et al. 2013) was used in analyses given that days (level 1) were nested within people (level 2), and simple slope analyses were tested. Simple slopes were estimated using reference points at 1 *SD* above and below the mean. Regarding distributions, a Bernoulli distribution was used to assess any drinking and heavy drinking, a Poisson distribution was used to assess number of drinks and problems due to the count nature of the data, and a normal distribution was used to assess intentions. Impulsivity and affect were person-centered to reflect whether their value was higher or lower than their own typical behavior. Random effects were tested for all models. With the exception of the association between impulsivity and alcohol-related problems, all random effects were found to be nonsignificant. Thus, for all other outcomes tested, each effect included a random intercept and fixed slope in multilevel models.

Results

Descriptive statistics for each of the day-level variables are presented in Table 1. For Aim 1, the intraclass correlation coefficient (ICC) was .575, suggesting that 57.5% of the variability in daily impulsivity could be explained by between-person differences. Thus, 42.5% of the variability in daily impulsivity was due to within-person differences, including any measurement error.

To test Aim 2, impulsivity was entered as a predictor in separate equations for each alcohol use outcome, controlling for average level of impulsivity throughout the two-week period at level 2. Results indicated that higher daily levels of impulsivity were associated with greater odds of heavy drinking, $OR = 1.95$, $CI = 1.08 - 3.54$; as well as number of alcohol-related problems experienced, Event Rate Ratio (ERR) = 1.20, $CI = 1.02 - 1.41$. Daily impulsivity was unassociated with drinking intentions, $B = 0.97$, $SE = 0.69$, $p = .163$; amount of alcohol consumed, $ERR = 0.97$, $CI = 0.86 - 1.09$; or whether they drank, $OR = 0.88$, $CI = 0.73 - 1.06$.

For Aim 3, positive and negative affect were tested as separate moderators of the association between impulsivity and each alcohol outcome. Daily positive and negative affect were entered at level 1 in all models. Results for positive affect as a moderator are provided in Table 2. Findings indicated that positive affect significantly moderated the positive relationship between impulsivity and drinking intentions as well as impulsivity and number of alcohol-related problems. Positive affect did not moderate the association between impulsivity and other alcohol use outcomes (see Table 2). Simple slope analyses revealed that on occasions when individuals reported *lower* positive mood than usual, higher levels of impulsivity were associated with *higher* drinking intentions, $B = 3.23$, $SE = 1.39$, $p = .013$. Conversely, on days in which individuals reported *higher* levels of positive mood than usual, higher levels of impulsivity were unassociated with drinking intentions, $B = -0.11$, $SE = 1.44$, $p = .938$ (see Figure 1). While the interaction between impulsivity and positive mood was significantly associated with alcohol-related problems, simple slope analyses revealed that impulsivity was unassociated with alcohol-related problems at lower positive mood, $B = -0.24$, $SE = 0.19$, $p = .215$ and higher positive mood, $B = 0.33$, $SE = 0.17$, $p = .046$ (see Figure 2). Negative affect did not significantly moderate the relationship between impulsivity and alcohol outcomes (see Table 3).

Discussion

The present pilot study adds to the limited literature on within-person fluctuation in daily impulsivity by examining the daily associations between impulsivity, affect, and drinking outcomes. Findings from the present study identified within-person variability in impulsivity across the 14-day period. Specifically, we found that 42% (almost half, including measurement error) of the variation in daily impulsivity was due to within-person differences over the course of two weeks. This finding is consistent with previous research examining within-person fluctuations in impulsivity at the daily level (e.g., Ansell et al. 2015), and supports the conceptualization that impulsivity may vary from day-to-day.

The direct associations between daily impulsivity and daily alcohol outcomes were mixed. Specifically, we found that across drinking days, daily impulsivity was positively associated with odds of heavy drinking and the number of alcohol-related problems experienced. However, when examining levels of impulsivity across all days (including drinking and non-drinking days), impulsivity was not associated with drinking intentions, whether they drank any alcohol, or the number of drinks consumed. Our significant findings are consistent with a large literature supporting a robust, positive relationship between impulsivity and heavy alcohol use and alcohol problems (e.g., King et al. 2014; Stamates and Lau-Barraco 2017). Further, the present study findings add to an inconsistent literature on the daily associations between impulsivity and substance use (e.g., marijuana, alcohol use; Ansell et al. 2015; Trull et al. 2015). Specifically, Trull et al. (2016) found that daily impulsivity was associated with same-day drinking whereas Ansell et al. (2015) found no association between daily impulsivity and odds of drinking. These discrepant findings may be related to the operational definition of alcohol use in each study, as Trull et al. (2016) and Ansell et al. (2015) used a dichotomous drinking variable (yes/no), and the present study goes beyond this by also looking at hazardous drinking outcomes. Alternatively, differences may be attributed to sample, as Trull et al. (2016) used a sample consisting of psychiatric patients that consumed alcohol at least once during their daily study, Ansell et al. (2015) used a sample of healthy adults who drank at least once per week, and the present study examined heavy drinking young adults specifically. The heavy drinking status of our sample may have limited the level of drinking variability over the 14-day period.

For moderating effects, we found that daily levels of positive affect moderated the association between daily impulsivity and drinking intentions as well as daily impulsivity and alcohol problems. Specifically, regarding intentions, higher levels of impulsivity were associated with higher drinking intentions only on days when individuals reported *lower* positive mood than usual. At *higher* levels of positive mood than usual, the relationship between impulsivity and intentions was unrelated. Our findings are inconsistent with research on affect-related drinking among impulsive individuals, given that higher levels of impulsivity coupled with higher levels of positive mood have been shown to influence drinking involvement (e.g., Cyders and Smith 2007). However, we did not observe this at the daily level. Instead, our findings indicated a positive association between impulsivity and drinking intentions only when low levels of positive mood were experienced. Given that individuals may drink to enhance their positive affect (e.g., Cooper et al. 1995), it may be that impulsive individuals' drinking intentions increase on days when they are not feeling as positive in order to enhance their mood. Regarding alcohol problems, we found that positive affect moderated the association between impulsivity and alcohol problems. Simple slope analyses revealed that the association between impulsivity and alcohol problem was only significant at *high* levels of positive affect. These findings are consistent with previous cross-sectional research suggesting that impulsivity in response to experiencing positive affect may be more associated with problems than with alcohol use (e.g., Coskunpinar et al. 2013; Curcio and George 2011; LaBrie et al. 2014).

In the case of negative affect, it is surprising that a similar pattern of findings did not emerge given strong support for the relationship between alcohol use and impulsivity when experiencing negative emotions from previous cross-sectional research (i.e., negative

urgency; Curcio and George 2011; King et al. 2011; Kiselica and Borders 2013; LaBrie et al. 2014). It is possible that these relationships in the context of negative affect are not as robust as observed with positive affect for this population. Alternatively, results may be due to the reduced variability in daily negative affect in comparison to positive affect observed over the 14-day period (see Table 1).

Findings from the current study offer clinical implications. We found considerable within-person variability in impulsivity; thus, this variability may allow for better timed deliveries of ecological momentary interventions and should be explored further. Additionally, psychoeducation on the relationship between personality constructs and alcohol use may be useful, as it has been shown to be effective in reducing drinking over a six-month period (Conrod et al. 2008, 2011), but it is not included in traditional alcohol interventions for young adults.

Several limitations should be noted. First, our sample included heavy drinking, nonstudent young adults which may limit the generalizability to other populations. Similarly, the ethnic composition of our sample included more non-White participants as compared to the U.S. population (U.S. Census Bureau 2018), and as such should be taken into account when interpreting results. The inclusion of a sample with strong minority representation is important given that minorities have been traditionally underrepresented in alcohol research. Second, daily ratings of alcohol use were self-reported and not verified through daily urine or Breathalyzer assessments (Whitford et al. 2009). However, daily diary methods have been shown to be valid for collecting alcohol data (Patrick and Lee 2010). Third, it is possible that participants initiated alcohol use prior to completing their daily survey between 2:30 and 7:00 pm; thus, we cannot make firm conclusions about the temporality between impulsivity and alcohol use. Future research would benefit from including multiple assessments that examine whether alcohol use is occurring at the time of the assessment rather than last night. Fourth, the present study used the MIS measure, which focuses on a general definition of impulsivity. Future research should validate and assess other measures of impulsivity (e.g., sensation seeking), including a specific measure of urgency rather than the interaction between mood and impulsivity. Finally, findings should be cautiously interpreted based on the limited number of drinking days used in the small pilot sample, as it is possible some of the non-significant findings are small effects and may have been detected with a larger sample. Relatedly, our small sample size precluded us from including many other potentially higher-order effects, such as aggregate levels of positive and negative affect. Further replication and extension, such as examining mediators of study associations, is needed.

Conclusion

Our findings offered preliminary evidence that there is significant within-person variability in daily levels of impulsivity. Day-to-day fluctuations in impulsivity alone were associated with odds of heavy drinking and the number of alcohol-related problems experienced. Daily positive affect moderated the association between daily impulsivity and drinking intentions as well as daily impulsivity and alcohol problems. Intervening efforts may want to target positive affect-related drinking to reduce problems among more impulsive drinkers.

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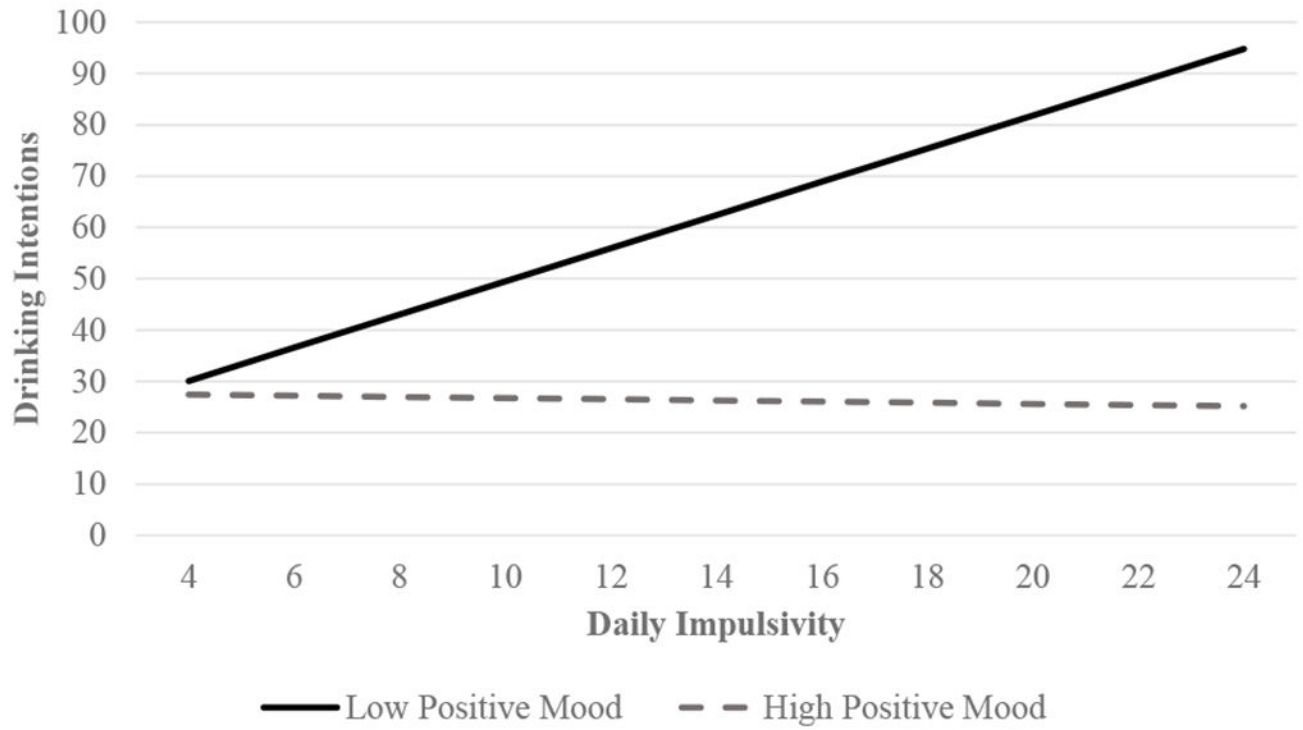


Figure 1. Simple slope analyses testing the association between day-level impulsivity and drinking intentions on days with lower positive mood than usual (solid black line) and higher positive mood than usual (dashed gray line).

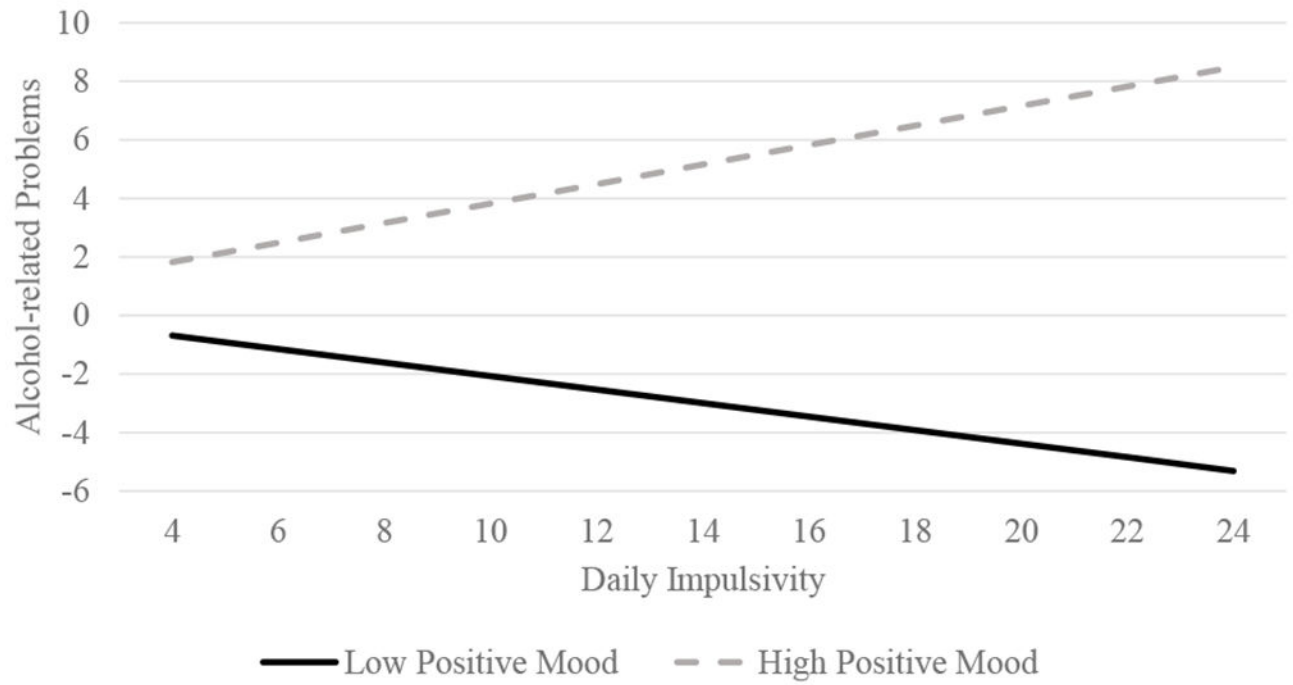


Figure 2. Simple slope analyses testing the association between day-level impulsivity and alcohol-related problems on days with lower positive mood than usual (solid black line) and higher positive mood than usual (dashed gray line).

Table 1.

Aggregated Day-level Study Variables

Variable	<i>M</i>	<i>SD</i>	Actual Range
Proportion of drink days	0.29	0.26	0 – .80
Proportion of heavy drinking days (across drink days only)	0.43	0.42	0 – 1
Number of drinks (across all days)	1.35	1.83	0 – 18
Number of alcohol-related problems (across drink days only)	1.90	1.91	0 – 10
Aggregate level of drinking intentions (across all days)	19.51	21.74	0 – 100
Impulsivity	6.99	2.75	4 – 18
Positive affect	20.93	7.20	0 – 32
Negative affect	3.25	4.57	0 – 21

Note. Mean values were calculated by averaging participant responses across all days, then averaging across the entire sample. Heavy drinking = 4+/5+ drinks for women/men.

Table 2. Daily Positive Mood as a Moderator of Daily Impulsivity and Daily Alcohol Use Outcomes

	Whether drank OR (CI)	Number of drinks ERR (CI)	Heavy drinking OR (CI)	Number of problems ERR (CI)	Drinking intentions B (SE)
Level 1					
Intercept	0.60 (0.33-1.11)	1.32 (0.74-2.35)	0.45 (0.03-6.62)	1.44 (0.84-2.46)	22.51 (5.41)***
Day-level impulsivity	0.93 (0.76-1.13)	0.98 (0.87-1.11)	5.23 (2.10-13.05)***	1.05 (0.75-1.48)	1.56 (1.09)
Day-level positive mood	1.08 (1.00-1.16)	1.03 (0.98-1.07)	0.89 (0.74-1.07)	1.03 (0.97-1.09)	1.13 (0.44)*
Day-level negative mood	0.90 (0.77-1.05)	0.95 (0.86-1.04)	0.60 (0.41-0.88)*	1.07 (0.95-1.21)	-1.39 (0.83)
Day-level impulsivity x day-level positive mood	0.99 (0.96-1.02)	0.99 (0.97-1.01)	1.05 (0.96-1.16)	1.07 (1.03-1.10)**	-0.35 (0.18)*
Level 2					
Aggregate impulsivity	0.97 (0.75-1.24)	0.88 (0.68-1.15)	0.51 (0.11-2.34)	1.00 (0.77-1.29)	-0.68 (2.19)

Note. A Bernoulli distribution was used for outcomes of whether individuals drank and whether individuals engaged in heavy drinking (4+/5+ drinks for women/men). A Poisson distribution was used for the outcomes of number of drinks consumed and number of problems reported. A normal distribution was used for the outcome of drinking intentions. OR = Odds Ratio. ERR = Event Rate Ratio.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3. Daily Negative Mood as a Moderator of Daily Impulsivity and Daily Alcohol Use Outcomes

	Whether drank OR (CI)	Number of drinks ERR (CI)	Heavy drinking OR (CI)	Number of problems ERR (CI)	Drinking intentions B (SE)
Level 1					
Intercept	0.60 (0.33-1.11)	1.31 (0.74-2.34)	1.67 (1.44-1.94) ***	1.38 (0.74-2.57)	22.86 (5.46) ***
Day-level impulsivity	0.92 (0.76-1.23)	0.97 (0.86-1.10)	1.10 (1.00-1.21) *	1.14 (0.94-1.40)	1.71 (1.12)
Day-level positive mood	1.07 (0.99-1.16)	1.02 (0.98-1.07)	0.99 (0.96-1.01)	1.00 (0.95-1.05)	1.01 (0.44) *
Day-level negative mood	0.90 (0.76-1.06)	0.94 (0.85-1.04)	0.98 (0.92-1.05)	1.00 (0.84-1.18)	-1.34 (0.86)
Day-level impulsivity x day-level negative mood	1.01 (0.94-1.10)	1.01 (0.97-1.06)	0.99 (0.96-1.03)	1.02 (0.93-1.12)	0.16 (0.43)
Level 2					
Aggregate impulsivity	0.96 (0.76-1.23)	0.88 (0.68-1.14)	0.93 (0.86-1.00)	1.04 (0.79-1.36)	-0.72 (2.19)

Note. A Bernoulli distribution was used for outcomes of whether individuals drank and whether individuals engaged in heavy drinking (4+/5+ drinks for women/men). A Poisson distribution was used for the outcomes of number of drinks consumed and number of problems reported. A normal distribution was used for the outcome of drinking intentions. OR = Odds Ratio. ERR = Event Rate Ratio. HED = heavy episodic drinking.

* $p < .05$.
 ** $p < .01$.
 *** $p < .001$.
 * $p < .05$.
 ** $p < .001$.