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Impulsive Personality Traits and Alcohol Use: Does Sleeping Help with Thinking?

Mary Beth Miller, Ph.D.[a], **Angelo M. DiBello, Ph.D.**[a], **Sarah A. Lust, Ph.D.**[b], **Matthew K. Meisel, Ph.D.**[a], and **Kate B. Carey, Ph.D.**[a]

[a]Center for Alcohol and Addiction Studies, Department of Behavioral and Social Sciences, Brown University School of Public Health, Box G-S121-5, Providence, RI 02912

[b]College of Arts and Sciences, Maryville University, St. Louis, MO 63141

Abstract

Objective—Both impulsivity and sleep disturbance have been associated with heavy alcohol use among young adults; yet studies to date have not examined their interactive effects. The current study aimed to determine if adequate sleep moderates the association between impulsive personality traits and alcohol use among young adults.

Method—College students (N = 568) who had been mandated to alcohol treatment following violation of campus alcohol policy provided information regarding alcohol use and related consequences, impulsive personality traits (measured using the UPPS Impulsive Behavior Scale), and perception of sleep adequacy as part of a larger intervention trial.

Results—Higher urgency, lower premeditation, and higher sensation-seeking predicted greater levels of alcohol consumption, while higher urgency predicted more alcohol-related consequences. As hypothesized, there was a significant interaction between premeditation and sleep adequacy in the prediction of drinks per week; in contrast to hypotheses, however, premeditation was associated with drinking only among those reporting adequate (rather than inadequate) sleep. Specifically, the tendency to premeditate was associated with less drinking among those who reported adequate sleep and was not associated with drinking among those reporting inadequate sleep.

Conclusion—Sensation-seeking and urgency are associated with greater alcohol involvement among young adults, regardless of sleep adequacy. Conversely, the ability to plan ahead and anticipate the consequences of one's behaviors (premeditation) is only protective against heavy drinking among individuals receiving adequate sleep. With replication, these findings may inform alcohol prevention and intervention efforts.

Keywords

mandated college students; drinking; premeditation; sensation-seeking; urgency

Correspondence concerning this article should be addressed to Mary Beth Miller, Center for Alcohol and Addiction Studies, Box G-S121-5, Providence, RI, 02912. Phone: 573.619.1538. Fax: 401.863.6647. millerme04@gmail.com.

Both impulsivity (Ashenhurst, Harden, Corbin, & Fromme, 2015) and poor sleep health (DeMartini & Carey, 2009; DeMartini & Fucito, 2014; Kenney, Lac, LaBrie, Hummer, & Pham, 2013) have been associated with problematic alcohol use among young adults. However, the nature of the association between sleep and impulsivity and the combined impact of these factors on alcohol use is unclear. College students who engage in impulsive decision-making are more than twice as likely to report problematic versus non-problematic drinking (Murphy & Garavan, 2011). Because sleep deprivation has also been associated with impaired decision-making (Killgore, Balkin, & Wsensten, 2006; Schnyer, Zeithamova, & Williams, 2009; Venkatraman, Chuah, Huettel, & Chee, 2007), inadequate sleep may compound the negative effect of impulsivity on decision-making, leading to greater alcohol use and related consequences among individuals who tend to act impulsively.

Impulsivity and Alcohol Use

Impulsivity is well established as a predictor of alcohol involvement among emerging adults (Ashenhurst et al., 2015; Littlefield, Sher, & Steinley, 2010; Murphy & Garavan, 2011). Research in line with the personality-based conceptualization of impulsivity suggests that impulsivity is a multifaceted construct and the personality traits underlying this construct are differentially associated with alcohol use (Lynam & Miller, 2004; Lynam, Smith, Cyders, Fischer, & Whiteside, 2007; Magid & Colder, 2007; Miller, Flory, Lynam, & Leukefeld, 2003). Based on the findings of Whiteside and Lynam (2001), four personality traits that lead to impulsive behavior are urgency, defined as a tendency to behave rashly as a result of negative affect; lack of premeditation, or a failure to consider the consequences of one's actions; lack of perseverance, an inability to persist beyond boredom or fatigue in fulfilling obligations; and sensation-seeking, a preference for stimulating and exciting activities associated with underarousal (Miller et al., 2003; Zuckerman, 1979).

When examining the relative contributions of these personality traits to drinking outcomes, high sensation-seeking and low premeditation seem to be the strongest predictors of drinking quantity, while high urgency is the strongest predictor of alcohol-related consequences (Kiselica, Echevarria, & Borders, 2015; Magid & Colder, 2007).[1] This is consistent with latent class models, in which high sensation-seeking and low premeditation generally paralleled drinking trajectories of young adults from high school through college (Ashenhurst et al., 2015). Thus, it seems that high sensation-seeking, low premeditation, and high urgency may serve as particularly strong risk factors for heavy drinking and related consequences among young adults in college. Given the negative outcomes associated with heavy alcohol use among college students (Hingson, Zha, & Weitzman, 2009; Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2015), research on behaviors that may exacerbate or minimize this risk is warranted.

[1]Lack of perseverance has also been associated with drinking quantity in a recent meta-analytic review (Coskunpinar, Dir, & Cyders, 2013); however, this association has not replicated in studies specifically using the UPPS Impulsive Behavior Scale (Kiselica et al., 2015; Lynam & Miller, 2004; Magid & Colder, 2007; Miller et al., 2003). Because we used the UPPS Impulsive Behavior Scale in this study, we did not hypothesize a strong association between perseverance and alcohol use.

Sleep and Alcohol Use

Poor sleep health also contributes to problematic alcohol use among adolescents and young adults. Conceptualizing 'sleep health' as a multidimensional pattern of sleep and wakefulness that promotes physical and mental well-being, Buysse (2014) suggests that sleep health may be characterized by (a) subjectively 'good' sleep quality (measured in this study as 'sleep adequacy'), (b) an ability to maintain alert wakefulness during the day, (c) appropriate timing of sleep within the 24-hour day (e.g., consistent bedtimes), (d) easy and efficient sleep onset, and (e) developmentally appropriate sleep duration. Longitudinal and nationally representative studies have found robust associations between dimensions of poor sleep health and alcohol involvement in adolescents and young adults. Specifically, sleep duration has been associated with alcohol and other drug use, with some studies indicating that these associations occur in a dose-response manner (Sivertsen, Skogen, Jakobsen, & Hysin, 2015; Winsler, Deutsch, Vorona, Payne, & Szklo-Coxe, 2015; Wong, Robertson, & Dyson, 2015); delayed bedtimes and circadian rhythms have been associated with alcohol use and related problems (Hasler, Soehner, & Clark, 2015; Pasch, Latimer, Cance, Moe, & Lytle, 2012; Pieters, Van Der Vorst, Burk, Wiers, & Engels, 2010); daytime sleepiness has been associated with the age of onset of alcohol and other drug use (Wong, Brower, & Zucker, 2009); and difficulty initiating/maintaining sleep has been associated with the onset of alcohol use and related problems (Hasler et al., 2015; Wong, Brower, Fitzgerald, & Zucker, 2004; Wong et al., 2015). Of all these components of sleep health, however, sleep quality seems to play a particularly meaningful role in the occurrence of alcohol-related problems. Among college students, for example, poor sleep quality is a significant predictor of alcohol-related consequences, even after controlling for relevant variables such as drinking motives and poor mental health (Kenney, LaBrie, Hummer, & Pham, 2012; Kenney et al., 2013). Collectively, these data suggest that poor sleep health is a risk factor for heavy alcohol use and related problems among adolescents and young adults.

Sleep and Impulsivity

While both sleep and impulsivity have been linked to alcohol use, studies examining the association between sleep and impulsivity have been limited. In exploratory research, higher levels of urgency and lower levels of perseverance were correlated with greater sleep-related distress, whereas high sensation-seeking and low premeditation were unrelated to insomnia severity (Schmidt, Gay, & Van der Linden, 2008). However, these data were limited by the use of statistics that describe only bivariate associations between variables. Experimental studies examining associations between sleep and risk-taking, which may reflect impulsive behavior, are also non-conclusive. Twenty-three hours of sleep deprivation has been found to reduce risk-taking on the Balloon Analogue Risk Task (Acheson, Richards, & de Wit, 2007; Killgore, 2007), but approximately 50 hours of sleep deprivation increased risk-taking on the Iowa Gambling Task (Killgore et al., 2006). The relevance of findings from these behavioral impulsivity tasks to self-reported measures of impulsivity is unclear (Dick et al., 2010).

Although the link between sleep and impulsivity is poorly understood, growing evidence suggests there is an association between sleep and self-control (Meldrum, Barnes, & Hay, 2015; Pilcher, Callan, & Posey, 2015), which has been posited as a component of

impulsivity (Costa & McCrae, 1992). In a recent study, one night of sleep loss was associated with a significant decrease in response inhibition on a Go/NoGo task, such that sleep-deprived participants had more difficulty inhibiting their responses to negative emotional stimuli than participants who had slept (Anderson & Platten, 2011). Thus, it seems acute sleep deprivation may have a negative effect on impulse control.

Current Study

The current study aimed to examine the associations between sleep, impulsivity, and alcohol use among young adults in college. Impulsive decision-making has been associated with heavy alcohol use (Murphy & Garavan, 2011), and sleep deprivation seems to impact one's ability to make decisions (Killgore et al., 2006; Schnyer et al., 2009; Venkatraman et al., 2007). Therefore, we expected past-month sleep adequacy to moderate the association between impulsive personality traits and alcohol use, such that the association between facets of impulsivity and alcohol use would be strongest among those reporting inadequate sleep. Because high sensation-seeking and low premeditation have demonstrated the strongest associations with drinking quantity and high urgency has been most strongly associated with alcohol-related consequences (Kiselica et al., 2015), we hypothesized that sleep adequacy would moderate (a) the effects of sensation-seeking and premeditation on drinking quantity and (b) the effect of urgency on alcohol-related consequences.

Method

Participants and Procedure

Undergraduate students who had violated campus alcohol policy and had been mandated to alcohol treatment by the Office of Community Standards were recruited from a public university in the Northeast to participate in a larger intervention project (Carey et al., 2016). Violations ranged from drinking in the dormitory to ambulance transport to the emergency department. Mandated students had the option of participating in either the research project [involving a brief alcohol intervention (Carey et al., 2016) with email boosters] or the standard alcohol sanction. Participation in the research project involved several online survey assessments over the course of a year, but only data from the baseline assessment was used in this study. A total of 568 students (28% female, 84% White) with a mean age of 19.18 years (SD = 1.16) consented to participate. Participants were primarily freshmen (38%) and sophomores (35%), although juniors (18%) and seniors (9%) were also represented. All procedures were approved by the university's Institutional Review Board.

Measures

Demographic information—Participants provided information regarding their age, gender, year in school, race/ethnicity, and fraternity/sorority affiliation.

Impulsivity—We used the 40-item version of the UPPS Impulsive Behavior Scale (Whiteside & Lynam, 2001) that has been validated with college students who drink alcohol (Magid & Colder, 2007). Participants rate their agreement with statements such as, "I like to stop and think things over before I do them," on a scale from 0 (*not at all*) to four (*very*

much). The four subscales of the UPPS include Urgency (10 items), Premeditation (10 items), Perseverance (8 items), and Sensation-Seeking (12 items). Individuals are characterized as high in impulsivity if they report high urgency and sensation-seeking scores and low premeditation and perseverance scores. These subscales demonstrated good internal consistencies in the current sample (α ranged from .81 to .86).

Sleep adequacy—Past-month subjective sleep adequacy was measured using the item, "How often do you think you get enough sleep?" (Wolfson & Carskadon, 1998). Participants also indicated the time they usually go to bed and wake up on weekdays and weekends. For descriptive purposes, responses to these items were used to calculate the average amount of sleep (across weekdays and weekends) that participants reported getting on a typical night in the past month. Subjective sleep adequacy, rather than average sleep time, was used as the predictor variable in regression models to account for wide variability in individuals' sleep needs (Blunden & Galland, 2014; Carskadon & Short, 2014).

Alcohol use—Participants indicated the amount of alcohol they had consumed over the past month using the Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985). After being provided with standard drink definitions (12 oz. of beer, 5 oz. of 12% table wine, 12 oz. of wine cooler, or 1.25 oz. of 80-proof liquor), participants indicated how many standard drinks of beer, wine, and spirits they consumed on each day of a typical week in the past month. Responses were summed to calculate typical weekly drinking quantity (drinks per week). Participants also indicated how often in the past month they had engaged in heavy episodic drinking (4/5+ drinks on one occasion for women/men). These data are presented for descriptive purposes.

Alcohol-related consequences—Participants completed the Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ; Kahler, Strong, & Read, (2005), which is a 24-item measure of alcohol-related consequences. Participants indicated (*yes*/*no*) if they had "felt very sick to my stomach or thrown up" or "woken up in an unexpected place" after drinking in the past month. Affirmative (*yes*) responses were summed to create the alcohol-related consequences outcome used in analyses. The BYAACQ has demonstrated strong psychometric properties (Kahler et al., 2005), and reliability in this sample was high (α = .84).

Data Screening & Analysis Plan

All analyses were conducted in SAS 9.4. Data were screened for missing values, outliers, normality, and multicollinearity prior to analysis. No imputation procedures were used for missing values. For count variables, outliers were trimmed at three times the interquartile range from the 75th percentile. After accounting for outliers in this way, skewness and kurtosis estimates were within the normal range. Based on previous research indicating that the impulsivity subscales measured in the UPPS may be significantly correlated (Coskunpinar et al., 2013; Kiselica et al., 2015), linear regression was used to test for multicollinearity between the UPPS subscales. Diagnostic statistics indicated high levels of tolerance (0.9) among subscales in the current sample, indicating that a substantial amount of variance in each UPPS subscale was unaccounted for by the other subscales.

Participants were categorized into ‘adequate’ or ‘inadequate’ sleep groups based on their responses to the sleep adequacy measure. A recent consensus statement issued by the American Academy of Sleep Medicine and the Sleep Research Society suggests that young adults need 8 to 9 hours of sleep per night (Watson et al., 2015). Collectively, participants reporting that they *never* or *rarely* get enough sleep averaged fewer than 8 hours of sleep per night ($M = 7.84$, $SD = 1.10$), while those reporting that they *sometimes, usually*, or *always* get enough sleep averaged greater than 8 hours of sleep per night ($M = 8.38$, $SD = 0.97$). Thus, participants were grouped as receiving ‘inadequate’ sleep if they reported never or rarely getting enough sleep and ‘adequate’ sleep if they reported sometimes, usually, or always getting enough sleep.

Hierarchical multiple regression analyses were used to test the hypothesized interactions between sleep group and impulsivity subscales on alcohol-related outcomes. Predictor variables were mean centered prior to regression analyses in order to aid in interpretation of interactions. In all models, participant age, gender, ethnicity, Greek status, average sleep time, and any UPPS subscale not already included in the analysis (Urgency, Premeditation, Perseverance, and/or Sensation-Seeking) were included as covariates; in the model predicting alcohol-related consequences, drinks per week was also included as a covariate (see Table 2). In the first model, interactions between sleep group and (a) sensation-seeking and (b) premeditation were modeled as simultaneous predictors of drinks per week. In the second model, the interaction between sleep group and urgency was modeled as a predictor of alcohol-related consequences. Each moderation analysis was conducted in two steps. First, sleep group and the UPPS subscale were regressed onto either drinks per week or alcohol-related consequences. Next, the interaction between sleep group and the UPPS subscale, as well as their respective main effects, were regressed onto the drinking outcome. Tests of simple slopes were conducted using procedures described by Aiken and colleagues (Aiken & West, 1991; Cohen, Cohen, West, & Aiken, 2003). High and low values were specified as one standard deviation above the mean and one standard deviation below the mean, respectively (see Table 1 for standard deviation values).

Results

Descriptive Statistics

Descriptive statistics and zero-order correlations between variables are depicted in Table 1. Most participants reported ‘sometimes’ (38%) or ‘usually’ (37%) getting enough sleep in the past month, while fewer participants reported ‘never’ (2%), ‘rarely’ (18%), or ‘always’ (5%) getting enough sleep.[2] Collectively, they reported moderate levels of sensation-seeking ($M = 29.63$, $SD = 9.27$, range = 0–48), premeditation ($M = 23.12$, $SD = 6.95$, range = 0–40), and perseverance ($M = 20.91$, $SD = 5.48$, range = 4–32) and relatively lower levels of urgency ($M = 12.61$, $SD = 6.99$, range = 0–34). On average, they reported consuming 12.49 ($SD = 9.25$) standard drinks over 2.42 ($SD = 1.22$) days in a typical week. The majority (88%) reported at least one ($M = 4.16$, $SD = 3.77$) heavy drinking episode in the past month. Zero-order correlations revealed significant positive associations between drinks consumed per

[2]Because the majority of participants ($n = 451$, 80%) were included in the ‘adequate’ sleep group, we also ran analyses using weighted means. The pattern and significance of results were unchanged; therefore, unweighted data and results are presented here.

week and (a) sensation-seeking and (b) urgency and significant negative associations between drinks consumed per week and (a) premeditation and (b) perseverance. Sleep adequacy was positively correlated with perseverance and negatively correlated with urgency and alcohol-related consequences; it was not significantly associated with other facets of impulsivity or drinks per week (see Table 1).

Main Effects

Complete data for all main effects and interactions are presented in Table 2. Higher sensation-seeking [$B = .09$, $SE = .04$, $\beta = .09$, $t(529) = 2.09$, $p = .04$], lower premeditation [$B = -.22$, $SE = .06$, $\beta = -.17$, $t(529) = -3.83$, $p < .001$], and higher urgency [$B = .18$, $SE = .05$, $\beta = .14$, $t(529) = 3.44$, $p < .001$] predicted more drinks per week. Perseverance [$B = .01$, $SE = .08$, $\beta = .01$, $t(529) = .12$, $p = .90$] and sleep group [$B = .29$, $SE = .93$, $\beta = .01$, $t(529) = 0.31$, $p = .76$] were not significantly associated with drinks per week.

In contrast to findings for drinks per week, higher urgency [$B = 0.20$, $SE = .02$, $\beta = .33$, $t(528) = 8.61$, $p < .001$] was the only significant predictor of alcohol-related consequences. Sleep group [$B = -0.72$, $SE = .39$, $\beta = -.07$, $t(528) = -1.84$, $p = .07$], sensation-seeking [$B = 0.01$, $SE = .02$, $\beta = .03$, $t(528) = 0.74$, $p = .46$], premeditation [$B = 0.01$, $SE = .02$, $\beta = .02$, $t(528) = 0.46$, $p = .64$], and perseverance [$B = -0.04$, $SE = .03$, $\beta = -.05$, $t(528) = -1.28$, $p = .20$] were not predictive of alcohol-related consequences.

Moderated Effects

Analyses were conducted to determine if sleep group moderated (a) the effect of premeditation or sensation-seeking on drinks per week or (b) the effect of urgency on alcohol-related consequences. Tests of two-way interactions between sleep group and UPPS subscales revealed a significant interaction between sleep group and premeditation in the prediction of drinks per week [$B = -0.25$, $SE = .12$, $\beta = -.16$, $t(529) = -2.05$, $p = .04$]. Follow-up tests of simple slopes indicated that lower premeditation was associated with greater drinks per week among those in the adequate ($B = -0.28$, $SE = .06$, $p < .001$) but not the inadequate sleep group ($B = .21$, $SE = .22$, $p = .34$; see Figure 1). Sleep group did not significantly interact with sensation-seeking [$B = -.06$, $SE = .09$, $\beta = -.06$, $t(529) = -0.64$, $p = .52$] in the prediction of drinks per week. Similarly, there was not a significant interaction between sleep group and urgency [$B = -.07$, $SE = .05$, $\beta = -.10$, $t(528) = -1.37$, $p = .17$] in the prediction of alcohol-related consequences.

Discussion

Published studies to date have not examined sleep as a moderator of the association between impulsive personality traits and alcohol use in young adults. In the current study, we replicated expected main effects of impulsivity on drinking outcomes and found partial support for our moderation hypothesis. Consistent with previous research (Kiselica et al., 2015), high sensation seeking, low premeditation, and high urgency predicted drinking quantity in this sample, and high urgency was the strongest predictor of alcohol-related consequences. Notably, sensation-seeking and urgency were associated with drinking and alcohol-related problems, respectively, independent of participants' subjective experience of

sleep adequacy; however, premeditation was associated with alcohol use only among those reporting adequate sleep.

In contrast to hypotheses, the association between premeditation and alcohol use was significant for those reporting adequate, rather than inadequate, sleep. Based on previous research (Schnyer et al., 2009), we expected inadequate sleep to exacerbate the association between low premeditation and alcohol use. Yet, among those reporting inadequate sleep, the tendency to think (or not think) carefully about one's behaviors was not associated with alcohol use. For those reporting adequate sleep, however, the tendency to plan ahead and consider the consequences of one's behaviors was associated with fewer drinks per week. For the UPPS facet of impulsivity defined as premeditation, the tendency to plan ahead may prevent an individual from drinking heavily because it prompts thoughtful consideration of the consequences of one's behaviors (Magid & Colder, 2007). Our results suggest that these cognitive skills are only protective among individuals reporting adequate sleep; the ability to plan ahead no longer serves a protective function when one is sleep deprived.

Given that adequate sleep influenced drinking quantity only as a moderator of the association between premeditation and alcohol use (i.e., there was no main effect of sleep on drinking quantity), the mechanism by which adequate sleep exerts this effect is unclear. Both Cognitive-Motivational Theory (Finn, 2002) and dual process models (Wiers, Gladwin, Hofmann, Salemink, & Ridderinkhof, 2013) suggest that working memory capacity moderates the association between impulsive personality traits and behavioral regulation (in this case, alcohol use). Consistent with these models, the association between impulsivity and problematic alcohol use is strongest among those with poorer working memory capacity (Ellingson, Fleming, Verges, Bartholow, & Sher, 2014; Finn & Hall, 2004). Notably, sleep deprivation also has a negative impact on working memory capacity (Chee et al., 2006; Gohar et al., 2009). Thus, receiving adequate sleep may buffer the effects of poor working memory on alcohol use, leading to decreased alcohol use among those with the skills and cognitive resources necessary to consider the consequences of their drinking. Such findings would be consistent with the idea that sleep replenishes one's capacity for self-control (Pilcher et al., 2015).

Adequate sleep did not impact the association between sensation-seeking and alcohol use in the current study, suggesting that sensation-seeking acts independently of sleep adequacy in its influence on drinking quantity. This is somewhat consistent with previous research, in which sensation-seeking and sleep exert independent effects on delinquent behavior (Peach & Gaultney, 2013). The differential effect of adequate sleep on premeditation and sensation-seeking is also consistent with research indicating a decoupling of the premeditation/planning and sensation-seeking facets of impulsivity (Smith et al., 2007). Recent research suggests that substance abuse treatment enhances planning but not necessarily sensation-seeking among those with substance use disorders (Littlefield et al., 2015). Thus, sensation-seeking may represent a risk factor that is both less influenced by sleep adequacy and less amenable to change.

Urgency also had an independent effect on alcohol-related outcomes that was unaffected by sleep adequacy, suggesting that individuals who tend to act rashly in response to strong

negative emotions drink more and experience more alcohol-related consequences regardless of adequate sleep. This finding is consistent with literature indicating that difficulty identifying and tolerating negative emotions is associated with alcohol-related problems among young adults (Emery, Simons, Clarke, & Gaher, 2014; Kaiser, Milich, Lynam, & Charnigo, 2012). However, it seems to contradict evidence that sleep influences emotion regulation among adolescents and young adults (Baum et al., 2014; Tavernier & Willoughby, 2015). It is plausible that the protective effect of sleep on emotion regulation is predicated on the individual's ability to regulate their emotions when rested; specifically, individuals who tend to respond rashly to emotions may not have the skills (or may have limited skills) to control those emotions, regardless of how much or how well they slept.

The results of this study have implications for clinical assessment as well as alcohol prevention and intervention among young adults. First, the majority of participants reported that they only sometimes get enough sleep to feel well-rested. Given the negative consequences associated with chronic sleep restriction (Watson et al., 2015), health care providers are encouraged to assess regularly for subjective perceptions of sleep among young adults and intervene when appropriate. Second, the tendency to consider the consequences of one's behavior was associated with less alcohol use, but only if individuals were receiving adequate sleep. This suggests that assessment of sleep may be important in alcohol-related treatment planning. Finally, because the associations between (a) sensation-seeking and alcohol use and (b) urgency and alcohol-related consequences persisted in spite of adequate sleep, alcohol interventions may benefit from treatment components targeting impulsive decision-making (Morrison, Madden, Odum, Friedel, & Twohig, 2014). Similarly, individuals who tend to respond abruptly to intense emotions may benefit from skills training interventions that focus on emotion regulation.

Interpretation of these results must be considered in the context of several limitations. First, because data were collected as part of larger research trial on college student drinking, only a single item representing sleep adequacy was available for the present analysis; therefore, findings should be replicated using a reliable measure of subjective sleep quality. Second, we used self-report measures of sleep adequacy and alcohol use. However, young adults' self-reported estimates of sleep patterns (Wolfson et al., 2003) and alcohol use (Leffingwell et al., 2013) correspond with objective measures of each behavior, so it is unlikely that objective measures of the same constructs would produce meaningfully different results. Third, because predictor and outcome variables for this study were measured concurrently, we are unable to determine causality in these associations. Finally, participants were recruited from one campus, were predominantly White underclassmen, and were mandated to participate in an alcohol intervention after violating campus alcohol policy. Future replication of our findings in more diverse samples and with more reliable assessment measures is necessary to confirm these results.

Conclusion

The link between sleep and impulsivity – and the impact of this association on alcohol use among young adults – is poorly understood. Current findings suggest that sensation-seeking and urgency are associated with greater alcohol involvement among young adults, regardless

of sleep adequacy. However, adequate sleep seems to enable individuals who tend to plan ahead to moderate their drinking. The interactive effects of sleep and impulsive personality traits on alcohol involvement suggest that both may be appropriate targets for interventions designed to decrease high-risk drinking among young adults.

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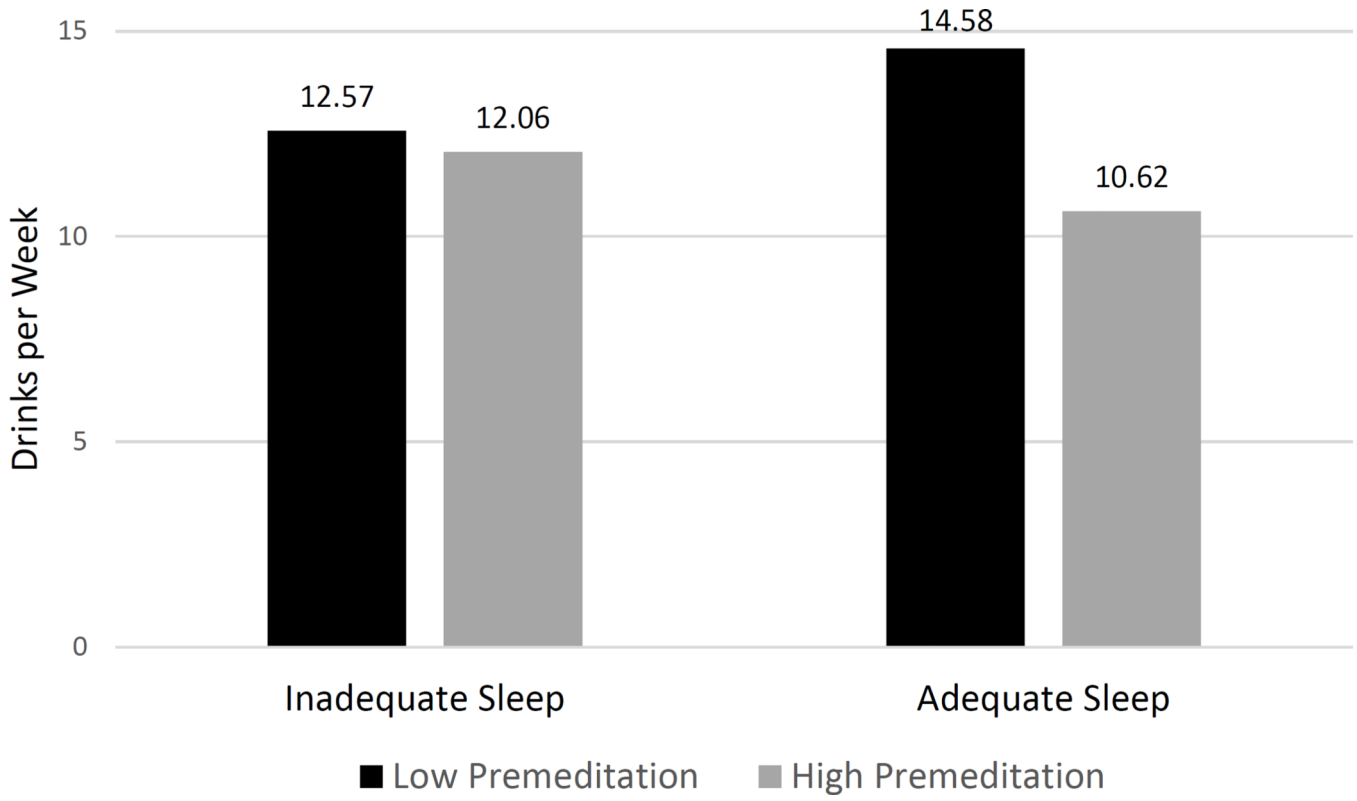

Figure 1.
Group differences in the premeditation by sleep group interaction on drinks per week.

Table 1

Descriptive statistics and zero-order correlations between variables (N = 568).

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.	Female gender	--											
2.	Age	−.05	--										
3.	White race	−.08	.03	--									
4.	Fraternity/sorority affiliation	−.04	.03	−.01	--								
5.	Average sleep time	**−.08**	−. 02	−.01	.05	--							
6.	Sleep adequacy	**−.09**	***.10***	.13	−. 01	***.21***	--						
7.	Urgency (UPPS)	−.03	−.06	−.01	.01	.05	***−.16***	--					
8.	Premeditation (UPPS)	.06	−.05	−.08	−.03	−.04	.02	***−.23***	--				
9.	Perseverance (UPPS)	.08	−.03	.02	−.08	**.08**	*.13*	*−.24*	*.41*	--			
10.	Sensation-seeking (UPPS)	***−.13***	.07	**.10**	.01	−.03	.01	***.11***	−.12	.25	--		
11.	Drinks per week	***−.28***	*.14*	*.20*	*.18*	.07	.06	***.18***	*−.24*	−. 11	***.18***	--	
12.	Alcohol-related consequences	.04	.04	.02	**.09**	.00	***−.14***	*.42*	*−.17*	*−.17*	.08	***.43***	--
	N or mean	40	19.2	475	94	8.27	2.2	12.6	23.12	20.9	29.6	12.5	5.4
	% or *SD*	71.7	1.2	83.6	16.5	1.02	0.9	9.3	7.0	5.5	7.0	9.2	4.3

Note. Bold print indicates $p < .05$. Bold italicized indicates $p < .01$. Bold italicized with underline indicates $p < .001$.

UPPS = UPPS Impulsive Behavior Scale.

Table 2

Main effects and interactions for drinking quantity and alcohol-related consequences.

Drinks per Week						
	B	***SE***	**β**	***t***	***p***	***Adj. R^2***
Step 1: Main Effects						.21
Age	0.91	0.31	.12	2.95	.01	
Female gender	−.4.82	0.80	−.24	−.5.99	<.001	
White race	3.94	1.00	.15	3.93	<.001	
Fraternity/sorority affiliation	4.23	0.97	.17	4.38	<.001	
Average sleep time	0.25	0.36	.03	0.69	.49	
Sensation-seeking	0.09	0.04	.09	2.09	.04	
Perseverance	0.01	0.08	.01	0.12	.90	
Urgency	0.18	0.05	.14	3.44	<.001	
Premeditation	−.0.22	0.06	−.17	−.3.83	<.001	
Sleep group	0.29	0.93	.01	0.31	.76	
Step 2: Interactions						.22
Sleep X Sensation-seeking	−.0.06	0.09	−.06	−.0.64	.52	
Sleep X Premeditation	−.0.25	0.12	−.16	−.2.05	.04	
Alcohol-Related Consequences						
	B	***SE***	**β**	***t***	***p***	***Adj. R^2***
Step 1: Main Effects						.35
Age	−.0.02	0.13	−.01	−.0.17	.87	
Female gender	1.57	0.35	.17	4.51	<.001	
White race	−.0.54	0.43	−.05	−.1.27	.20	
Fraternity/sorority affiliation	0.07	0.41	.01	0.18	.86	
Average sleep time	−.0.13	0.15	−.03	−.0.85	.40	
Drinks per week	0.21	0.02	.45	11.2	<.001	
Sensation-seeking	0.01	0.02	.03	0.74	.46	
Perseverance	−.0.04	0.03	−.05	−.1.28	.20	

Urgency	0.20	0.02	.33	8.61	<.001	
Premeditation	0.01	0.02	.02	0.46	.64	
Sleep group	−.0.72	0.39	−.07	−1.84	.07	
						.35
Step 2: Interactions						
Sleep X Urgency	−.0.07	0.05	−.10	−1.37	.17	