Impulsivity and Daily Variability in Intentions and Willingness to Drink Alcohol on the Weekend

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Abstract

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Prevention research has utilized the Prototype Willingness Model (PWM) to understand decision-making surrounding adolescent and young adult drinking. The PWM posits a reasoned pathway (intentions), and a social reaction pathway (willingness) to engage in health-risk behavior. Intentions and willingness to drink can depend on context and varies between and within days. Facets of impulsivity, including negative urgency, sensation seeking and premeditation, have predicted willingness and drinking. It is uncertain whether impulsivity is associated with overall levels or daily variability of intentions and willingness. This study used ecological momentary assessment (EMA) to evaluate how impulsivity influences daily variability in intentions and willingness to drink and whether that variability predicts alcohol use and consequences. Participants (N = 124) aged 15-25 (mean age 18.69; 57.3% female) completed impulsivity at baseline and reported on intentions and willingness to drink 3 times a day on Fridays and Saturdays for 3 consecutive weeks. Results revealed average level of

willingness mediated the relationships between premeditation and alcohol use and consequences. Daily variability of willingness mediated the association between negative urgency and consequences but not use. No facets of impulsivity were associated with average level of intentions. Finally, daily variability of intentions mediated the associations between premeditation and both alcohol use and consequences. This study demonstrates the significance of evaluating instability in willingness and intentions to drink along with average levels. Interventions targeting multiple facets of impulsivity may reduce alcohol use and consequences through changes in decision making variables.

Keywords: Impulsivity, prototype willingness model, intentions, alcohol use, alcohol consequences

Introduction

Alcohol use among adolescents and young adults is a serious public health concern (SAMHSA, 2014). Throughout this paper we refer to individuals between 15 – 25 years old as older adolescents. Older adolescents experience significant negative consequences from alcohol including hangovers, blackouts, interpersonal problems, sexual assault, and later development of Alcohol Use Disorder (Hultgren, Canning, & Larimer, 2018). These consequences can be deadly with more than 4,000 alcohol-related fatalities each year among older adolescents (Hingson, Zha & Smith, 2017). Much research has evaluated how older adolescent drinking changes longitudinally (Jackson, Sher, Gotham, & Wood, 2001; Campbell & Demb, 2008; Arria et al., 2016; Lee, Chassin, & Villalta, 2013). Yet, relatively little research has investigated how older adolescents make decisions regarding alcohol on a daily basis and what factors influence their decisions (Lewis, King, Litt, Swanson, & Lee, 2016). This study assessed how variability in decision-making factors mediate the relations between impulsivity and alcohol use and consequences at the daily level.

The Prototype Willingness Model (PWM) is a dual process model of health-related decision making, which assumes that much of adolescent and young adult risky behavior is not planned (Gerrard, Gibbons, Stock, Vande Lune, & Cleveland, 2005; Gibbons, Gerrard, & Lane, 2003). According to the PWM, there are two pathways to health-related behavior, which are often occurring simultaneously (Reyna & Farley, 2006). The reasoned pathway is an analytic process and produces intentional behavior; however, the social reaction pathway is based on heuristic processing characterized by willingness, or openness, to engage in a behavior (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008). The PWM hypothesizes that older adolescents often find themselves in unplanned situations where risky behavior is facilitated but not necessary, like a party with alcohol available. In these contexts, it is often willingness rather than

intentions that influence decision making and this characterizes the social reaction pathway (Gerrard et al., 2008). The PWM has been used to explain alcohol use behaviors and identify targets for prevention in several studies (Gerrard, Gibbons, Zhao, Russell, & Reis-Bergan, 1999; Gerrard et al., 2002; Gerrard et al., 2006; Oulette, Gerrard, Gibbons, & Reis-Bergan, 1999). Intentions and willingness to drink have been found to differentially relate to alcohol outcomes. In a sample of college students, intentions but not willingness predicted days drunk during spring break. Further, willingness to drink but not intentions was predictive of blackouts during spring break (Litt et al., 2014). While this research highlights the importance of both willingness and intentions as proximal predictors of alcohol use and consequences, recent research has indicated that there is variability in these decision-making factors day to day and even within a day (Slavish, Scaglione, Hultgren & Turrisi, 2018). For example, a daily diary assessment found both average and daily levels of willingness predicted the likelihood of drinking and greater amounts of alcohol use on drinking days (Lewis, et al., 2016). This study demonstrated the importance of capturing contextual changes in willingness and how drinking decisions are made on a day to day basis. More research is needed on assessing the daily levels and variability of intentions and willingness and how these mediate predictors of alcohol use and consequences.

Impulsivity is an important predictor of alcohol use and consequences (Cyders, Flory, Rainer, & Smith, 2009) that should be considered within the PWM framework. Past research has shown associations between willingness to drink and several well studied facets of impulsivity: negative urgency, lack of premeditation, lack of perseverance, and sensation seeking (Whiteside & Lynam, 2001). Negative urgency reflects a tendency to act rashly when experiencing high negative affect. Lack of premeditation captures the inability to consider one's behavior prior to acting. Lack of perseverance describes the inability to see projects through to the end. Finally,

sensation seeking is the tendency to pursue activities that are novel or exciting (Whiteside & Lynam, 2001). Negative urgency and sensation seeking have been associated with willingness to drink more when alcohol is freely available (Kiselica & Borders, 2013). Another study found that in addition to negative urgency and sensation seeking, premeditation was associated with the same measure of willingness to drink in a sample of smokers (Gray & MacKillop, 2014). Further, greater impulsivity at 13 years old predicted willingness to use substances at age 15.5 and drinking at 18.5 years old (Gerrard et al., 2008).

While research has demonstrated a link between impulsivity and willingness, less research has evaluated impulsivity and its relation to intentions to drink. This is likely due to intentions being part of the reasoned pathway to behavior, which reflects planned or non-impulsive action. By definition, individuals high in impulsivity will behave in a manner that suggests rash decision making with little planning or intentions (Whiteside & Lynam, 2001). Prior research on other behaviors, such as intentions to eat high calorie foods, have not found correlations between facets of UPPS and behavioral intentions (Churchill, Jessop, & Sparks, 2008). However, the majority of research assessing associations between impulsivity and decision making factors have utilized cross-sectional or wave-based longitudinal designs and have not accounted for the daily variability in intention and willingness that recent research has shown (Slavish et al., 2018). Therefore, it has yet to be examined whether factors of impulsivity are related to greater variability in intentions and willingness to drink. Daily variability in drinking intentions and willingness reflect stability/instability in one's intentions and willingness, and thus higher impulsivity may be associated with increased variability in these constructs. Kazemi, Wagenfeld, Van Horn, Levine, and Dmochowsi (2011) found those who were readier to change their drinking behavior were less impulsive than those less ready to change, suggesting that

impulsivity may interfere with intentions surrounding drinking. The current study used an ecological momentary assessment (EMA) design to capture both daily averages and variability of intentions and willingness to drink and examined how these mediated associations between factors of impulsivity and alcohol use and consequences.

Hypotheses

The current study was designed to evaluate how impulsivity influences daily variability in intentions and willingness to drink and whether that variability in turn predicts alcohol use and alcohol consequences on weekends. Based on three daily assessments, we predicted the daily average and daily standard deviation of intentions and willingness to drink would mediate UPPS impulsivity from baseline and daily alcohol use and consequences. First, regarding daily average levels of willingness and intentions, we aimed to replicate previous findings (Kiselica & Borders, 2013; Gray & MacKillop, 2014; Churchill, et al., 2008) that facets of impulsivity (i.e. sensation seeking, negative urgency, and premeditation) are associated with willingness but not intentions. However, when looking at daily variability in intentions and willingness to drink, we expected impulsivity may influence greater instability in decision making because of the rash actions observed in those with impulsivity. Further, based on previous empirical support, willingness may be more strongly associated with consequences while intentions may be more strongly associated with alcohol use (Litt et al., 2014). Thus, daily variability in intentions was expected to mediate the relations between impulsivity facets and alcohol use, while daily variability in willingness was expected to mediate the relations between impulsivity facets and consequences.

Methods

Participants & Procedures

Additional procedural details are available in Lewis et al., (under review). All procedures were approved by the local Institutional Review Board. Recruitment was conducted locally via online and print advertisements, participant referrals, and in-person recruitment. Advertisements were targeted toward parents of teens 15-17 years old to recruit their children and directly to participants 15-25 years old. The study was marketed as a research study about health and risk behaviors and advertised compensation up to $111. A total of 422 individuals completed the screening survey, of whom 134 eligible participants were invited to baseline and 124 participants aged 15-25 (mean age 18.69; 57.3% female) completed the in-person baseline survey and enrollment session. Racial demographics of the final sample were 59.7% White, 15.3% Asian, 13.7% Multiracial, 7.3% African American, and 4% other; 7.3% of participants reported Hispanic ethnicity. Regarding educational status, 40.3% of participants were in high school, 4.8% in the running start program (dual enrollment in high school and college), 4.8% in community college, 33.9% in 4 year college, 1.6% in graduate school, and 13.7% not in school.

Initial eligibility criteria for 18-25 year old participants was as follows: 1) must have (over the last 6 months) consumed alcohol at least once a month, 2) reside in the Seattle metro area, 3) provide a birthdate consistent with their reported age, 4) provide a valid phone number for a cell phone and agree to receive text messages, 5) provide a valid email address, 6) provide first and last name, 7) provide birth sex (to calculate BAC), 8) provide gender (for gender based questions), 9) if female, must not be pregnant or trying to get pregnant, 10) must correctly answer validity check questions (i.e., select 2 for what is 4 minus 2), and 11) be willing to come into a lab at the University of Washington for 1-1.5 hour in-person baseline assessment session. If a screening completer was 15-17 years old, they were also required to provide valid contact

information for at least one parent/guardian and the parent/guardian must provide consent over the phone. Additionally, there were no drinking criteria for 15-17 year old participants.

Participants attended an in-person session where they completed baseline assessment on a computer and were trained on how to complete the ecological momentary assessment (EMA) portion of the study. For EMA, participants received daily burst surveys, which took approximately 5 minutes to complete and could be completed on a cell phone or computer. They received up to 11 surveys per week for 3 consecutive weeks, for a possible total of 33 surveys. They always received 3 surveys on Friday and Saturday, and 1 survey on Sunday. For two of the three weeks, participants received 3 surveys on a random weekday between Monday and Thursday. This random day of 3 surveys was always followed by 1 morning survey (i.e., 3 surveys on Tuesday, 1 survey on Wednesday morning). The random day was associated with the primary study aims (Lewis et al., under review). Given the focus on weekend drinking in the present study, only the weekend assessments were used in this study.

Survey invitations were sent via text and email and were delivered using the following schedule: 1) morning- between 6:00 AM-12:00 PM (at a time chosen by the participant), 2) afternoon – random time between 12:00 PM-4:00 PM, and 3) evening – random time between 5:00 PM-10:00 PM. Participants were given a two hour window from the time of invitation to complete each survey and received a reminder text and email 30 minutes prior to the close of this window if they had yet to complete the survey. If a participant missed a survey, they were asked additional questions in the next survey, to account for questions missed in the previous survey. Participants who missed multiple surveys were contacted by the research team. Participants were given a pre-loaded US Bank Card at the end of their baseline session. The cards had $50 on them, and participants could gain further compensation by completing their daily surveys: $1 for

every morning survey and $2 for every afternoon or evening survey. If a participant completed 90% or more of their daily surveys, they earned a $10 bonus, for a possible total of $111.

Measures

Baseline.

UPPS Impulsive Behavioral Scale. The UPPS (Whiteside & Lynam, 2001) was assessed at baseline to capture trait-level impulsivity on four facets. The UPPS consists of 45 items total, rated on a scale from 0 = "Not at all" to 4 = "Very much". Premeditations consists of 11 items, such as "My thinking is usually careful and purposeful". Negative urgency consists of 12 items, such as "When I get upset, I often act without thinking". One item, "I am always able to keep my feelings under control" was reverse coded so that higher scores on negative urgency reflect greater impulsivity. Sensation seeking consists of 12 items, such as "I'll try anything once". Mean scores for each subscale are calculated. Internal consistency reliability was reported as α = .91 for premeditation, α = .86 for negative urgency, and α = .90 for sensation seeking. Whiteside and Lynam (2001) demonstrated good convergent and discriminant validity with other measures of personality.

Ecological Momentary Assessment. EMA assessments occurred three times a day: morning, afternoon, and evening. Three assessments per day, two days a week for three weeks resulted in up to 18 assessments per individual. Alcohol outcomes were assessed in the morning or were asked at one of the following assessments (afternoon/evening) that day if not completed in the previous assessment. One assessment per day, two days a week for three weeks resulted in up to six observations of alcohol outcomes per individual.

Willingness. Willingness consists of 3 items, assessing how willing the participant was to drink a set amount of alcohol (e.g. 4/5 (female/male) or more alcoholic drinks tonight) rated

from 0 = “Not at all willing to drink” to 4 = “Extremely willing to drink”. A sum score of all three items was created for each time point. Then, the average daily willingness and standard deviation (SD) of daily willingness was also scored.

Intentions. Intentions consisted of 4 items. Three items assessed whether participants intended to drink a set amount of alcohol (e.g. 4/5 (female/male) or more alcoholic drinks tonight) and are rated from 0 = “Strongly Disagree” to 4 = “Strongly Agree”. A sum score of all three items was created for each time point. Then, the average daily intentions and standard deviation (SD) of daily intentions was also scored.

Alcohol Use. Participants were asked to report on the previous day’s drinking. Participants were asked if they consumed any alcohol on the previous day and if so were asked, “How many drinks did you consume yesterday?”. Response options ranged from “1” to “15 or more” in one drink increments.

Consequences. Participants were asked to report the occurrence of 12 potential consequences that resulted from the previous day’s drinking with binary “yes/no” response options. Example consequences are “I had a hangover” and “I couldn’t remember what I did while drinking”. A sum score of all 12 consequences was used in the current analyses.

Analyses

Multilevel modeling in MPlus 8.0 was used to test direct effects of impulsivity on daily average levels and variability of intentions and willingness to drink, as well as indirect effects of impulsivity on alcohol use and consequences through intentions and willingness. Bayesian estimation using Markov chain Monte Carlo (MCMC) algorithms with noninformative priors was used to obtain asymmetrical bootstrapped 95% credibility intervals to account for the non-normality of alcohol use. Two MCMC chains and 10,000 iterations were used for all models and

the default burn-in period of half the iterations was used. Convergence was assessed by proportional scale reduction (PSR) close to 1.0 and evaluating trace plots. Model fit was assessed by the posterior predictive p-values (Yuan & Johnson, 2012). Significance for each parameter was determined by the one-tailed p-value less than 0.025. For a positive estimate, the p-value represents the proportion of the posterior distribution below zero, and for a negative estimate, the p-value represents the proportion of the posterior distribution above zero (Muthén, 2010). For ease of interpretation, each subscale of the UPPS was grand mean centered, and survey day as centered such that day 1 = 0. Within-person effects are at level 1 and between-person effects are assessed at level 2.

To test multilevel mediation, daily average levels of willingness, daily average levels of intentions, daily SD of willingness, and daily SD of intentions were individual mean centered at level 1 and the individual means were then grand mean centered and at level 2, consistent with methods from (Curran & Bauer, 2011). Level 1 variance in the daily average levels and SD of willingness and intentions was estimated by the random intercept. Level 2 variance in daily average levels and SD of willingness and intentions was estimated by negative urgency, premeditation, sensation seeking (i.e. a paths). Level 1 variance in alcohol use and consequences was estimated by a random intercept and fixed slope of daily average willingness, daily average intentions, SD of willingness, SD of intentions and survey day. Level 2 variance in alcohol use and consequences was estimated by negative urgency, premeditation, sensation seeking (i.e. c' paths), and person means of daily average willingness, daily average intentions, SD of willingness, and SD of intentions (i.e. b paths). Indirect effects were specified and tested as new parameters using model constraints by multiplying the a path effects and b paths effects.

Significance was determined by using the same p-value from the posterior distribution of these constrained parameters. Age and gender were used as covariates at level 2.

Example equations for SD of willingness:

$$SD\_WILLINGNESS_{ij} = \beta_{0j} + e_{ij} \quad \text{(Level 1)}$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}Urgency + \gamma_{02}AGE + u_{oj} \quad \text{(Level 2: Individual; } \gamma_{01} \text{ is the a path)}$$

$$Alc_{ij} = \beta_{0j} + b_i(SD\_WILLINGNESS - M_j.SD\_WILLINGNESS) + e_{ij}$$

(Level 1: M centered by person mean)

$$\beta_{0j} = \gamma_{00} + \gamma_{01}Urgency + \gamma_{02}AGE + \gamma_{03}M_j.SD\_WILLINGNESS + u_{oj}$$

(Level 2: Ind; γ_{03} is the b path and γ_{01} is the c' path)

Results

Daily average willingness. All significant pathways with estimated fixed effects (β) are displayed in Figure 1. The model fit according to the posterior predictive p-value indicated some evidence of inadequacy (p = .162). The model converged normally. PSR values approached 1 (iteration 10,000 = 1.003). Trace plots for each estimate showed a high degree of overlap between both chains and variability within each chain. Given we do not have strong evidence for the use of specific priors and the model converged normally, subsequent analyses to assess the sensitivity of estimates using different priors was not completed. Age was the only significant covariate for daily average willingness, alcohol use, and consequences. At level 1, days with higher average willingness was associated with more alcohol use (β = 1.261, p < .001, 95% CI[1.068, 1.449]) and more consequences experienced that night (β = 0.366, p < .001, 95% CI[0.260, 0.471]). At level 2, Higher levels of premeditation is associated with lower average willingness (β = -0.446, p = .002, 95% CI[-0.736, -0.157]. Higher average willingness was associated with greater alcohol use (β = 1.112, p < .001, 95% CI[0.828, 1.393]). Higher sensation seeking was also associated with greater alcohol use (β = 0.381, p = .024, 95% CI[0.052, 0.703]).

Premeditation did not have a direct relation with alcohol use or consequences when average willingness was accounted for. The estimate for the indirect effect revealed that high levels of premeditation were linked to less alcohol use through less average willingness (indirect effect = -0.488, p = .002, 95% CI[-0.870, -0.167]). Higher levels of premeditation were also indirectly linked to less consequences through less average willingness (indirect effect = -0.086, p = .004, 95% CI[-0.191, -0.020]).

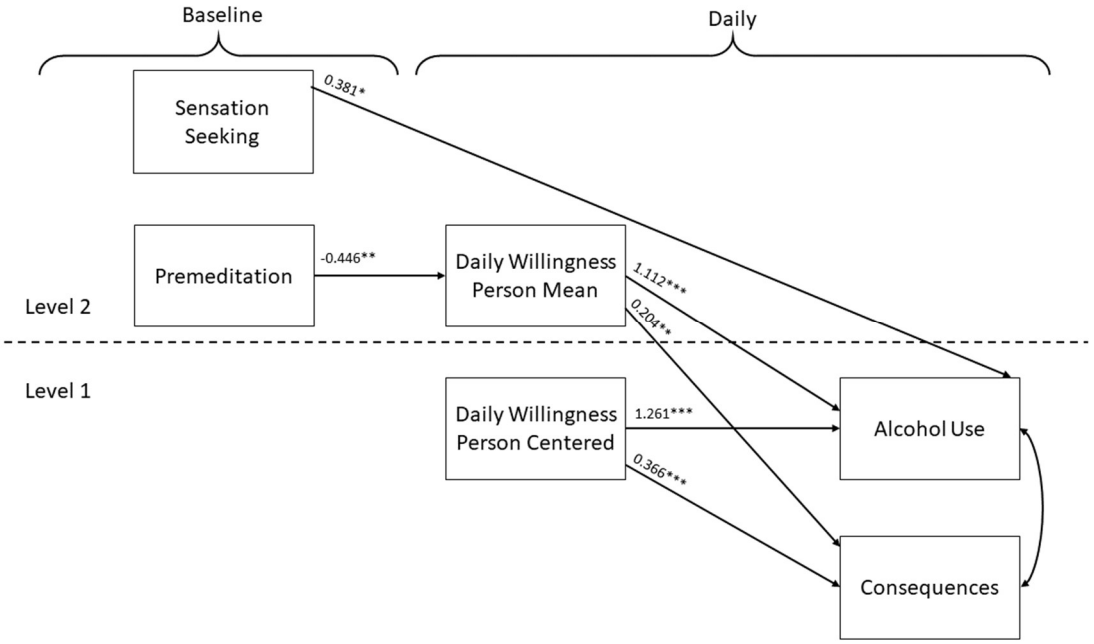

Figure 1. Fit model for daily willingness. Covariates were omitted for clarity. Significance of fixed effects are indicated by asterisks: * p < .05, ** p <.01, *** p < .001.

Daily SD of willingness. All significant pathways with estimated fixed effects (β) are displayed in Figure 2. The model fit the data adequately (p = .490). The model converged normally. PSR values approached 1 (iteration 10,000 = 1.006). Trace plots for each estimate showed a high degree of overlap between both chains and variability within each chain. Age was the only significant covariate of SD of willingness, alcohol use, and consequences. At level 2, greater negative urgency was associated with higher SD of willingness (β = 0.088, p =.014, 95%

CI[0.0202, 0.157]). Higher SD of willingness was associated with more consequences (β = 0.467 p = .018, 95% CI[0.081, 0.852]) but was not associated with greater alcohol use. Higher negative urgency was directly associated with greater consequences (β = 0.165, p =.022, 95% CI[0.022, 0.314]). Higher negative urgency was also indirectly associated with greater consequences through higher SD of willingness (indirect effect = 0.038, p = .030, 95% CI[0.003, 0.099]).

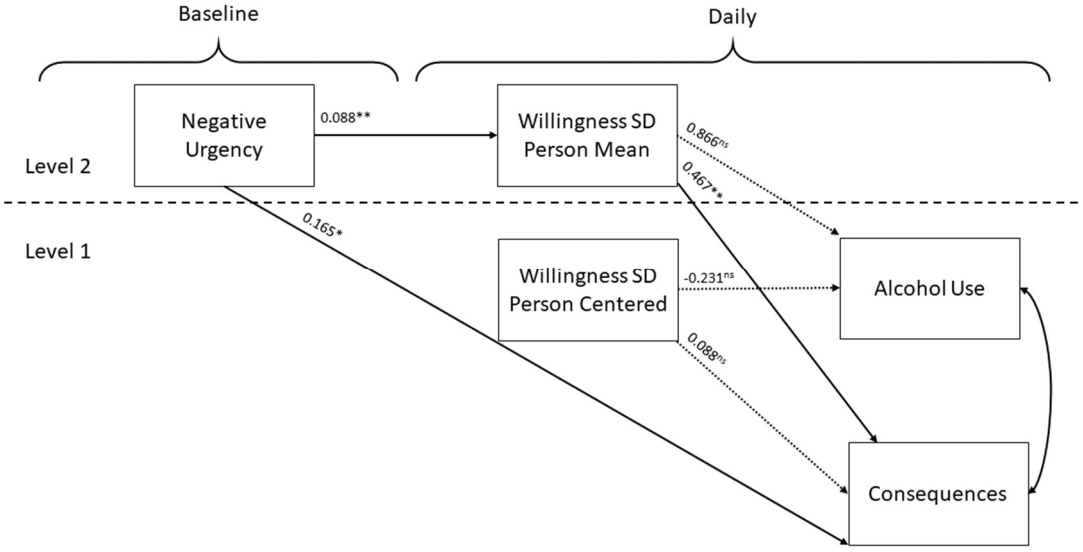

Figure 2. Fit model for SD of willingness. Covariates were omitted for clarity. Significance of fixed effects are indicated by asterisks: * p < .05, ** p <.01, *** p < .001.

Daily average intentions. Age was the only significant predictor of average intentions. No facets of impulsivity were directly related to average intentions, therefore, indirect effects were not assessed.

Daily SD of intentions. All significant pathways with estimated fixed effects (β) are displayed in Figure 3. The model fit the data adequately (p = 0.541). The model converged normally. PSR values approached 1 (iteration 10,000 = 1.003). Trace plots for each estimate showed a high degree of overlap between both chains and variability within each chain. Age was the only significant covariate for SD of intentions, alcohol use and consequences. At level 2,

higher levels of premeditation were associated with lower SD of intentions (β = -0.080, p = .036, 95% CI[-0.154, -0.005]). Higher SD of intentions was associated with greater alcohol use (β = 2.0, p = .002, 95% CI[0.716, 3.262]) and more consequences (β = 0.885, p < .001, 95% CI[0.449, 1.319]). Premeditation was not directly associated with alcohol use or consequences. Higher levels of premeditation were indirectly associated with less alcohol use through lower SD of intentions (indirect effect = -0.148, p = .040, 95% CI[-0.369, -0.007]). Higher premeditation was also indirectly associated with lower consequences through lower SD of intentions (indirect effect = -0.068, p = .036, 95% CI[-0.158, -0.004]).

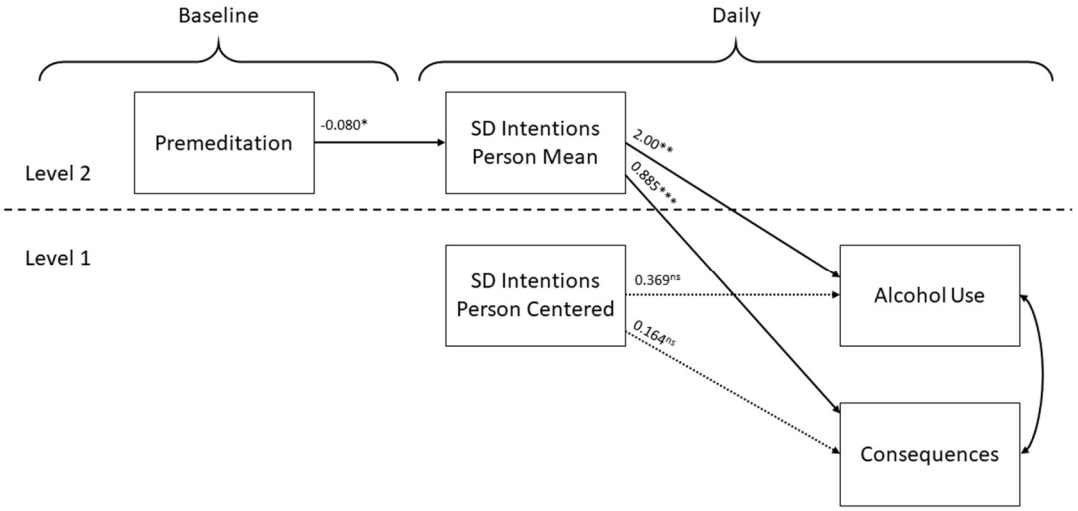

Figure 3. Fit model for SD of intentions. Covariates were omitted for clarity. Significance of fixed effects are indicated by asterisks: * p < .05, ** p <.01, *** p < .001.

Discussion

The present study tests whether between-person differences in daily average levels and variability in intentions and willingness to drink are predicted by baseline facets of impulsivity. Further, indirect effects of impulsivity on daily alcohol use and consequences through variability in intentions and willingness to drink were assessed. We posited that negative urgency, sensation

seeking, and premeditation would be directly linked to daily average levels of willingness but not intentions to drink. Facets of impulsivity were expected to be directly associated with greater daily variability in willingness to drink and indirectly associated with greater alcohol consequences on nights with greater variability in willingness. Facets of impulsivity were expected to be directly linked to variability in intentions to drink and indirectly associated to greater alcohol use on nights with higher variability in intentions.

Hypotheses were partially supported. The present study replicates previous findings from the literature on intentions to consume high calorie foods (Churchill et al., 2008) that no facets of impulsivity were related to daily average intentions to drink, and premeditation was associated with daily average willingness. Contrary to cross-sectional findings (Kiselica & Borders, 2013; Gray & MacKillop, 2014), negative urgency was not related to daily average willingness. However, negative urgency was related to greater variability in willingness. One study used an experimental negative mood induction and found those higher in negative urgency experience greater increase in negative affect compared to those low in negative urgency (VanderVeen et al., 2016). Taken together with results from the current study, this may suggest that individuals with greater negative urgency are more reactive to contextual factors that influence willingness to drink on the weekend. The current study is novel in that it demonstrates variability in willingness mediates the relation between negative urgency and alcohol-related consequences, but not alcohol use. This was expected given one study found willingness was related to both alcohol use and consequences, but had a stronger association with consequences (Litt et al., 2014). It may not be that individuals high in negative urgency will simply drink more, but rather may change their willingness to drink despite their negative context, which puts them at an increased risk for experiencing consequences. Future research is needed to explore which

contexts (e.g. social, location, mood) those high in negative urgency are most reactive to and how this changes their willingness to drink.

Another unexpected finding was the relation between premeditation and daily variability in intentions. Those higher in premeditation had less variability in intentions to drink within each day. While associations in the literature were limited, and thus not predicted, this finding is supported by the rationale of the reasoned pathway of the PWM. Presumably, premeditation is required to set consistent intentions about drinking, which are plans for future behavior. Further, both daily average willingness and daily variability in intentions mediated the relations between premeditation and alcohol use and consequences. These are novel findings that help us understand how premeditation is protective of alcohol use and consequences through the dual processes of alcohol decision making. Planning ahead may allow individuals to set stronger intentions to drink and are overall less willing to drink, which may lead to less drinking because they adhere to this planned behavior. Interventions that target increasing planning, such as goal setting and planning (GAP) skills (MacLeod, Coates & Heatherton, 2008), could be beneficial if integrated into alcohol prevention and intervention programs.

This study has methodical strengths and weaknesses. The EMA framework for this study allowed us to evaluate important variations in decision making, which contributes to our understanding of how alcohol-related decisions are made each day. Also, this allowed us to capture data from naturally occurring behavior without intervening on the environment, increasing the ecological validity for our findings. Generalizability was facilitated by the diversity and broad age range in the current sample. However, impulsivity was only assessed at baseline, which does not allow us to investigate within-person effects of impulsivity on intentions and willingness. Further, the perseverance facet of the UPPS impulsivity scale was

excluded from current analyses. Perseverance is not typically associated with either alcohol use or alcohol consequences above and beyond the other three facets of impulsivity and therefore was not included (Kiselica & Borders, 2013; Adams, Kaiser, Lynam, Charnigo, & Milich, 2012; Gonzalez, Reynolds, & Skewes, 2011; King, Karyadi, Luk & Patock-Peckham, 2011). We did not use the full PWM, with the antecedents to intentions and willingness. Given limited research on within-day variance of intentions and willingness to drink, this study chose to focus on the first step of evaluating direct relations with impulsivity. Future research should investigate whether impulsivity influences the SD of intentions and willingness through the same mechanisms as those identified by the PWM (e.g., attitudes, norms, prototypes). The variance of intention and willingness may have been limited with only three time points per day and only on weekend days. Finally, many of our measures have not been previously validated in other samples, likely because the PWM is relatively new in comparison to other theories of decision making, and established measures have not yet been widely distributed, especially those for EMA studies.

This study helps elucidate how intentions and willingness to drink varies within weekend days and if personality influences this variability. The relation between impulsivity and SD, or instability, of intentions to drink within a day opens up interesting future directions for research. Understanding this instability in intentions and willingness to drink may help us to understand, on any given day, when individuals are more likely to make decisions within the reasoned or social reaction pathways. Future research should evaluate whether instability in one of these pathways predicts the relation between the other pathway and actual behavior. For example, if intentions are more unstable on a given day, individuals may be more likely to use the social reaction pathway (i.e. willingness) to make decisions about drinking that evening. Additionally,

this research has implications for clinical prevention and interventions. A recent qualitative study begun developing an adolescent prevention program for alcohol use following the prototype willingness model (Davies, 2018). This prevention program includes a 'planning' topic, which is consistent with findings of this study. However, prevention programs may also benefit from exploring affect laden impulsivity and incorporating emotional regulation skills. Overall, this study advances our understanding of how personality impacts decisions regarding drinking behavior using the PWM.

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