



Positive urgency worsens the impact of normative feedback on 21st birthday drinking

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ABSTRACT

Background: The 21st birthday is associated with more alcohol consumption and negative consequences than any other occasion. The current study investigated how positive urgency, the tendency to act rashly in response to positive emotions, influences 21st birthday drinking and the effectiveness of a single event text message intervention designed to reduce 21st birthday drinking and related negative consequences.

Methods: Participants were 183 undergraduate students (69% female, 86% white) about to turn 21. Participants were randomly assigned to either a text message intervention or control condition. Those in the intervention condition received one text message the day before their 21st birthday that provided personalized normative feedback and one text message on the day of their 21st birthday. Participants reported actual alcohol consumption the day after their 21st birthday celebration.

Results: Hierarchical linear regression found that, after controlling for sex, intervention condition, and planned drinking, positive urgency was associated with greater number of drinks ($\beta = .15, p = .031$) and drinking problems ($\beta = .25, p = .001$). A moderated-mediation model was significant ($B = 0.42, CI95 [.10, .76]$): At high levels of positive urgency, the intervention condition was associated with drinking *more* than planned, which significantly mediated the relationship between intervention and alcohol-related consequences; the mediation was not significant at mean or low levels of positive urgency.

Conclusions: These findings are the first to link positive urgency with 21st birthday drinking and to empirically demonstrate that positive urgency negatively impacts the effectiveness of an intervention aimed at reducing alcohol consumption.

1. Introduction

Problematic alcohol use is common among college students (Hingson, 2010; Wechsler and Nelson, 2008; Read et al., 2016) and contributes to a wide variety of negative consequences (Dunne and Katz, 2015; Serowoky and Kwasky, 2017; Cooper, 2002; Rehm et al., 2012; Combs-Lane and Smith, 2002; Abbey et al., 1998; Fair and Vanyur, 2011; Hingson, 2010). The majority of college drinking occurs during weekends, holidays, and special occasions (Del Boca et al., 2004; Greenbaum et al., 2005), with marked increases of overall consumption and subsequent negative consequences observed to cluster around

football games (Glassman et al., 2007), spring break (Grekin et al., 2007; Lee et al., 2009, 2006) and conventional holidays, such as St. Patrick's Day (Henslee et al., 2016), New Year's Eve, and the 4th of July (Neighbors et al., 2011).

The event associated with the greatest rate of alcohol use and problems is the 21st birthday (Neighbors et al., 2011). Four out of five college students consume alcohol to celebrate their 21st birthday (Rutledge et al., 2008), drink more than they had originally intended (Brister et al., 2010), and around half report drinking more on their 21st birthday than on any prior day in their life (Rutledge et al., 2008). Unsurprisingly, 21st birthdays are associated with negative

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consequences such as hangovers, vomiting, black-outs, aggression, vandalism, and engaging in nonconsensual sex (Brister et al., 2011; Neal and Fromme, 2007; Wetherill and Fromme, 2009). Furthermore, recent data indicate that individuals with limited prior alcohol experience and who drink heavily on their 21st birthday report achieving a higher drinking “peak” and more problems related to their drinking over the following year. This suggests that 21st birthday drinking might be a precursor for long-term risky drinking (Geisner et al., 2017).

Given the evidence that 21st birthday drinking is widespread and associated with negative outcomes, some form of intervention is needed to target the 21st birthday celebration. To this end, a number of studies have tested the efficacy of personalized normative feedback interventions. The theoretical foundation of this type of intervention relies on the power of perceived social norms to influence behavior, which has been well-documented in the alcohol literature (e.g., Miller and Brannon, 2015; Neighbors et al., 2014; Patrick et al., 2012; Rodriguez et al., 2016; Schwinn and Schinke, 2013). When applied to student drinking interventions, the personalized normative feedback typically comprises a brief message sent out to students that describes the typical drinking behavior of their peers (Miller and Brannon, 2015; Neighbors et al., 2012). Some studies have also found that the inclusion of protective behavior strategies, or advice on how to moderate drinking such as “avoid taking shots” or “alternate drinks between alcohol and water,” can similarly contribute to reductions in overall consumption (Scott-Sheldon et al., 2014).

Although such interventions have been shown to be largely effective at reducing college student alcohol use and negative consequences (see a recent review by Dotson et al., 2015), studies that apply them as single-event interventions tailored to 21st birthday drinking have produced mixed findings (e.g., LaBrie et al., 2009; Lewis et al., 2009, 2008; Neighbors et al., 2007, 2012). It is possible that the questionable efficacy of these single-event interventions on 21st birthday drinking is due to variations in individual characteristics that moderate these effects, given that effect sizes for these treatments vary so greatly across studies and individuals (Dotson et al., 2015). Further, past research has documented the moderating effects of trait-level self-consciousness and embarrassment (Bartholow et al., 2000; Crawford and Novak, 2012; Foster and Neighbors, 2013; LaBrie et al., 2008; Park et al., 2006), perceived social support (Cullum et al., 2013), and self-monitoring (Lin, 2008; Miller and Brannon, 2015) in determining the extent to which social norms impact drinking behavior. This raises the strong possibility that individual differences can at least in part explain the mixed support for the use of single event interventions for 21st birthday drinking.

One untested moderator of the effectiveness of these types of approaches for 21st birthday drinking is the personality trait of positive urgency (Cyders et al., 2007). Positive urgency is the tendency to act rashly in response to extreme positive emotional states and has been long theorized to underlie celebratory drinking, such as that of the 21st birthday celebration, although this specific relationship has not yet been tested (Cyders et al., 2007). Positive urgency has a robust relationship with alcohol-related consequences (Coskunpinar et al., 2013), likely due to its effects on increasing the amount of alcohol consumed in any one drinking episode (Cyders et al., 2009). Positive urgency is hypothesized to increase drinking behavior in part through its effect on alcohol-related learning (e.g., Cyders et al., 2009; Smith and Anderson, 2001; Smith et al., 2006), such that positive urgency leads one to recall more of the positive aspects and fewer of the negative consequences of drinking, which then maintains or increases drinking over time (e.g., Cyders et al., 2010). This makes positive urgency a prime candidate to influence the effectiveness of a personalized normative feedback intervention. We propose that positive urgency could make individuals perceive the alcohol-related personalized normative feedback and protective behavioral strategies used in many of these single-event interventions as more positive, and so consequently affect the number of drinks consumed and the experience of alcohol-related consequences on one's 21st birthday. For example, discussing

normative drinking patterns could serve as an alcohol cue for those high in positive urgency, leading them to seek out and consume alcohol. It has been suggested that positive urgency may negatively impact the outcome of substance use treatments (Hershberger et al., 2017; Loree et al., 2015), but this has yet to be empirically tested.

1.1. Study aims

The goal of the current study was to investigate how positive urgency relates to 21st birthday drinking and related consequences and how it might influence the effectiveness of a 21st birthday text message intervention. Data for the current analyses were taken from a previously reported study, which examined the efficacy of a text message intervention providing personalized normative feedback and protective behavioral strategies to reduce 21st birthday drinking (Bernstein et al., 2018). The current study sought to extend this inquiry to test the following hypotheses: 1) Positive urgency will be positively associated with drinking more than is planned and a greater number of alcohol-related consequences on the 21st birthday and 2) The efficacy of the text message intervention on alcohol-related consequences will be mediated by the number of drinks consumed on the 21st birthday and this mediational relationship will be moderated by positive urgency. We tested two alternative models for Hypothesis 2 (Fig. 1): one in which positive urgency moderated the relationship between intervention and number of drinks consumed during the 21st birthday (Model A) and one in which positive urgency moderated the relationship between number of drinks consumed and alcohol-related consequences experienced during the 21st birthday (Model B).

2. Method

2.1. Participants

Following approval by the Institutional Review Board, undergraduate students at a Northeastern university whose 21st birthday fell during the recruitment period (May 2016 – November 2016) were contacted via email and invited to complete a brief online questionnaire to determine eligibility. Students were eligible to participate if they 1) planned to consume at least two alcoholic drinks to celebrate their 21st birthday and 2) had a mobile phone that could send and receive text messages.

2.2. Procedure

Eligible participants provided informed consent, completed a battery of questionnaires (those relevant to the current analysis are described below) and were randomly assigned to either a text message intervention or an assessment-only control condition (see Bernstein et al., 2018, for more details). Participants in the intervention condition received two text messages from the research team. The first message was sent at 16:00 the day before their intended birthday celebration and provided personalized normative feedback, which referenced the normative drinking behavior among URI students on their 21st birthday ($M = 8.1$ drinks for men, $SD = 7.3$ and 5.2 drinks for women, $SD = 4.2$). Percentile ranks for comparison were drawn from these norms.

Hi [participant name]. Happy almost birthday from the URI Young Adult Birthday Study! Earlier, you said you would have W drinks on your 21st birthday celebration. This is more than what X% of URI [males/females] drink on their 21st birthday. If you drink this much over Y hours, you will have a blood alcohol content of Z. This may result in [list of typical effects of alcohol at varying concentrations] PLEASE RESPOND "OK" so we know you got our message.

The second message was sent at 16:00 on the day of the participant's 21st birthday celebration and provided protective behavioral strategies:

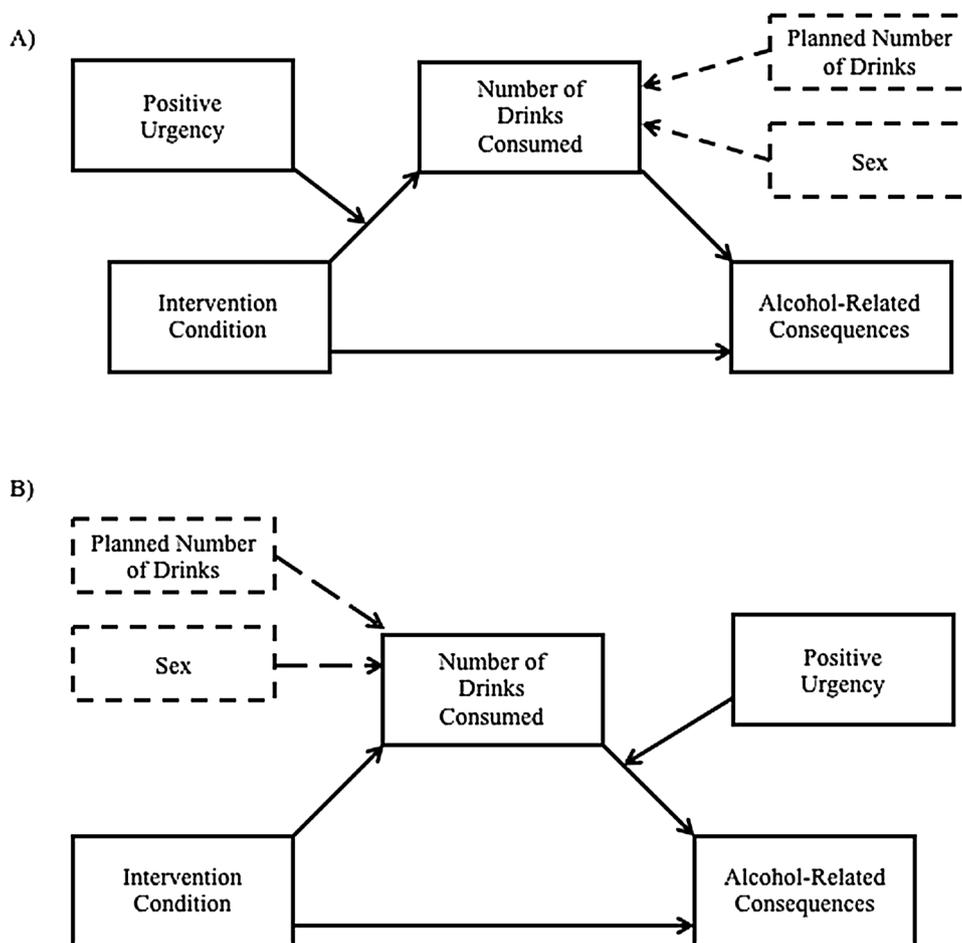


Fig. 1. Conceptual diagrams of moderated mediation models with positive urgency and drinks consumed.

Hi [participant name]. Here are some tips to stay safe from the URI Young Adult Birthday Study: Keep track of how many drinks you have and space them out with water, eat beforehand, and have a sober driver ready. Enjoy your time with friends and make it a night to remember! PLEASE RESPOND "OK" so we know you got this.

Participants in the control condition were not contacted by researchers before or on the day of their 21st birthday celebration. At 16:00 on the day after the participant's 21st birthday celebration, all participants received a link to complete the follow-up battery of questionnaires online.

2.3. Measures

2.3.1. Positive urgency

Participants completed an abbreviated version of the UPPS-P Impulsive Behavior Scale (Lynam et al., 2006). Only the 14 items assessing positive urgency were included (e.g., "When I am very happy, I can't seem to stop myself from doing things that can have bad consequences"). Coefficient alpha of this subscale in the current sample was 0.95. Mean scores were calculated for each participant and normalized into z-scores.

2.3.2. Drinking more alcohol than planned on the 21st birthday

At baseline, participants were asked, "In total, how many standard drinks do you plan on consuming during your 21st birthday celebration?" and then at follow-up, participants were asked, "In total, how many standard drinks did you consume during your 21st birthday celebration?" Standard drink estimates were provided. "Drinking more

alcohol than is planned" was assessed by the residual in the number of drinks consumed during the 21st birthday celebration after controlling for the number of drinks that participants intended to drink.

2.3.3. Alcohol-related consequences

At follow-up, participants completed an abbreviated version of the 24-item Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ; Kahler et al., 2005). Directions were modified to only assess problems the day of or day after their 21st birthday celebration, and items only applicable to drinking over a long period of time (e.g., weight gain) were deleted. Seventeen items remained and coefficient alpha of this modified scale (17 items) in the current sample was 0.76.

2.3.4. Typical drinking behavior

Participants' normal drinking behavior was assessed as 1) number of drinks consumed over the past two weeks, itemized to each day, and 2) "drinks per drinking day," calculated as a mean of the number of drinks consumed over the past two weeks divided by the number of drinking days reported.

2.4. Data analysis plan

First, frequencies of demographics (sex, race, Greek involvement) and measures of central tendency for relevant variables (e.g., normal drinking habits) were calculated and compared across the intervention and control conditions using independent t-tests and chi-square tests for independence. Second, to examine hypothesis 1 (Positive urgency will be related to drinking more than is planned on their 21st birthday and alcohol-related consequences on the 21st birthday), hierarchical

multiple regression analyses were performed to examine the relationship between positive urgency and 21st birthday drinking behavior and alcohol-related consequences (entered in step 2), after controlling for sex, intervention condition, and planned drinking on the 21st birthday (all entered in step 1). Third, to examine hypothesis 2 (The effectiveness of the text message intervention on alcohol-related consequences will be mediated by the number of drinks consumed during the 21st birthday and will be moderated by positive urgency), we tested two models of moderated mediation using PROCESS (Hayes, 2017) (Fig. 1). Both models tested whether the relationship between intervention condition (independent variable) and alcohol-related consequences (dependent variable) was mediated by number of drinks consumed on the 21st birthday (mediator), after controlling for sex and planned drinking during their 21st birthday. Model A tested whether positive urgency moderated the relationship between intervention condition (independent variable) and number of drinks consumed during the 21st birthday (mediator). Model B tested whether positive urgency moderated the relationship between number of drinks consumed during the 21st birthday (mediator) and alcohol-related consequences. Models were then probed for individual moderating effects of positive urgency.

3. Results

3.1. Sample characteristics and comparisons between intervention and control groups

Of the total number of students initially enrolled ($N = 200$), only participants who completed the entire study were included in the present analyses; those who did not complete the final questionnaire ($n = 17$) were excluded. Participants who were included in the study did not differ from excluded individuals on any study variables (all p 's > 0.17). Sample characteristics for the final sample ($n = 183$) are presented in Table 1. Participants were primarily white (86.3%) and female (69.9%). At baseline, participants reported an average of 9.21 drinks ($SD = 9.87$) per week and had a mean positive urgency score of 2.3 ($SD = 1.03$). Shapiro Wilks tests for normality showed non-normal distribution of intended number of drinks to be consumed, actual number of drinks consumed, number of alcohol-related consequences following the 21st birthday celebration, and level of positive urgency (all p 's $< .001$). Log transformations were performed on these variables. Analyses using transformed and untransformed data yielded equivalent results; therefore, we retain the untransformed results for ease of interpretation.

There were no significant differences between participants assigned

Table 1
Sample Characteristics by Intervention Group.

	Total sample	Intervention	Control	t (X^2)	p
Gender (%)				(.189)	.663
Male	55 (30.1)	26 (28.6)	29 (31.5)		
Female	128 (69.9)	65 (71.4)	63 (68.5)		
Greek Life (%)				(.357)	.837
No	111 (60.7)	54 (59.3)	57 (62)		
Yes	65 (35.5)	34 (37.4)	31 (33.7)		
No, but attend activities	7 (3.8)	3 (3.3)	4 (4.3)		
Race (%)				(2.874)	.579
White/Caucasian	158 (86.3)	77 (84.6)	81 (88)		
Black/African American	6 (3.3)	2 (2.2)	4 (4.3)		
Asian	9 (4.9)	5 (5.5)	4 (4.3)		
American Indian	1 (0.5)	1 (1.1)	n/a		
Other	9 (4.9)	6 (6.6)	3 (3.3)		
Drinks per drinking day (SD)	2.99 (2.37)	2.97 (2.38)	3.02 (2.38)	-.144	.886
Drinks per week (SD)	9.21 (9.87)	9.87 (10.64)	8.57 (9.06)	.892	.373
Planned drinks on 21 st birthday (SD)	10.54 (7.49)	10.88 (8.49)	10.21 (6.38)	.606	.545
Positive urgency (SD)	2.30 (1.03)	2.26 (1.06)	2.34 (1.01)	-.483	.629

Note. For the Total sample, Intervention, and Control columns, numbers inside of the parenthesis indicate percentages while those outside indicate N. For the test column, numbers inside of the parenthesis indicate results from a Chi square test, numbers outside of parenthesis are results from a t-test.

to the text-message condition and those assigned to the control condition in the usual number of drinks consumed in a week ($t(181) = -0.89$, $p = .37$, $d = -0.13$), estimated number of drinks per drinking day over the last two weeks ($t(181) = 0.14$, $p = 0.89$, $d = 0.021$), intended number of drinks to be consumed during their 21st birthday ($t(181) = -0.61$, $p = 0.55$, $d = -0.09$), or positive urgency ($t(176) = 0.48$, $p = 0.63$, $d = 0.07$).

3.2. Hypothesis 1: Positive urgency will be related to drinking more than is planned and a greater number of alcohol-related problems on the 21st birthday

This hypothesis was supported. After controlling for sex, intervention condition, and planned drinking on the 21st birthday (R^2 total of 0.19, $p < .001$), positive urgency was significantly associated with greater number of drinks consumed on the 21st birthday ($B = 0.82$, $F(1, 173) = 4.72$, $p = .031$) (Table 2, top panel). After controlling for sex, intervention condition, and planned drinking on the 21st birthday (R^2 total of 0.02, $p = 0.30$), positive urgency significantly predicted alcohol-related consequences experienced on the 21st birthday ($B = 0.612$, $F(1, 173) = 11.8$, $p = .001$) (Table 2, bottom panel).

3.3. Hypothesis 2: the efficacy of the text message intervention on drinking problems will be mediated by the number of drinks consumed on the 21st birthday and will be moderated by positive urgency

In Model A (Fig. 1, top panel), the moderated-mediation model was significant (Table 3, Fig. 2), such that drinks consumed on one's 21st birthday significantly mediated the relationship between intervention condition and alcohol-related consequences, but only at high levels of positive urgency ($B = 0.42$, $CI95$ [.10, .76]). This mediation was not significant at mean ($B = 0.04$, $CI95$ [-.28, .32]) or low ($B = -0.39$, $CI95$ [-.85, .04]) levels of positive urgency. The relationship between intervention and drinks consumed was probed at mean, high, and low levels of positive urgency. At high levels of positive urgency (+1 SD above the mean), the intervention was associated with more drinks consumed on the 21st birthday ($B = 2.35$, $p = .04$); at mean and low levels of positive urgency, the intervention was not significantly related to drinks consumed (Fig. 3).

In Model B (Fig. 1, bottom panel), the model as a whole was not significant. Although this model also suggested a significant interaction with positive urgency ($B = -.06$, $p = .005$), indirect effects of intervention on alcohol-related consequences through drinks consumed during the 21st birthday were not significant at any level of the

Table 2
Hierarchical linear regression for positive urgency on drinking outcomes.

Dependent variable		b	B	t	p	ΔR^2	p	R ²	p
Drinks consumed on 21st birthday	Step 1: Gender	−3.33	−.274	−3.99	< .001	.194	< .001		
	Condition	.133	.012	.175	.861				
	Planned drinks	.236	.320	4.68	< .001				
	Step 2: Positive urgency	.822	.147	2.17	.031	.021		.216	.031
Alcohol-related consequences on 21st birthday drinking	Step 1: Gender	−.676	−.127	−1.69	.093	.021	.302		
	Condition	−.227	−.047	−.622	.535				
	Planned drinks	.011	.033	.442	.659				
	Step 2: Positive urgency	.612	.250	3.430	.001	.062		.083	.001

Note. Hierarchical regression results with gender, condition, and intended number of drinks entered at step 1 and positive urgency at step 2, gender coded as 1—female, 0—male; condition coded as 1—intervention, 0—control; positive urgency entered as mean z-score.

Table 3
Moderated mediation analysis Model A.

	Coefficient	SE	P	Bootstrap 95% CI	
				Lower	Upper
Total effect on drinks consumed on 21st birthday					
Condition	.266	.738	.720		
Positive urgency	−.245	.530	.645		
Intercept	2.10	.744	.005		
Model R ²	.250	24.04	< .001		
Covariates					
Gender	−3.11	.811	< .001		
Planned number of drinks	.249	.049	< .001		
Total effect on alcohol-related consequences					
Condition	−.254	.332	.446		
Drinks consumed on 21 st birthday	.202	.033	< .001		
Model R ²	.195	4.88	< .001		
Covariates					
Gender	−.002	.381	.997		
Planned number of drinks	−.037	.023	.115		
Direct effect of condition on alcohol-related consequences	−.254	.332	.446		
Conditional indirect effect of condition on alcohol-related consequences through number of drinks consumed at varying levels of positive urgency					
−1 SD	−.387	.222		−.848	.039
M	.035	.151		−.284	.320
+1 SD	.457	.223		.012	.886
Index of moderated mediation	.424	.165		.103	.758

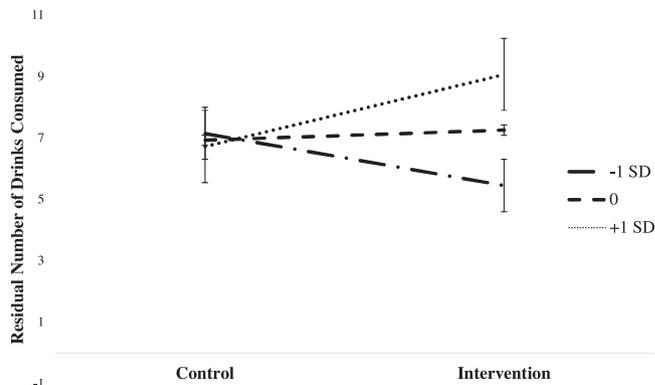


Fig. 3. Conditional Effects of Intervention on Drinks at Levels of the Moderator. Note. Conditional effects of treatment condition on number of drinks consumed at three levels of trait positive urgency: the overall mean Z-score, and the two scores designated as “high” and “low” positive urgency in this sample; marked at one standard deviation above, and one standard deviation below the mean. Effects were insignificant at low ($p = .14$) and average ($p = .69$) levels of positive urgency, but a significant effect of the intervention was observed at high levels of positive urgency ($B = 2.35, p = .04$).

moderator (CI95 s of [−.33, .48], [−.30, .36], and [−.30, .26]).

4. Discussion

4.1. Summary of findings

The current study found that positive urgency is significantly associated with drinking more than planned on one’s 21st birthday and the experience of more negative alcohol-related consequences. This suggests that positive urgency is a risk factor for problematic alcohol use during the 21st birthday. Importantly, for those at high levels of positive urgency, being in the intervention condition was associated with drinking more than planned during the 21st birthday, which significantly explained the relationship between intervention and worse

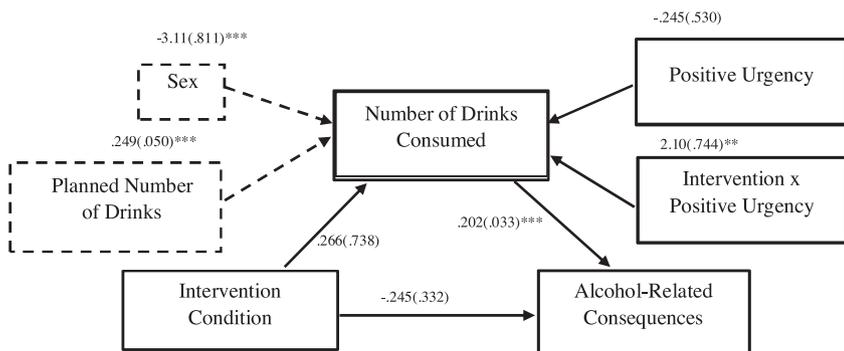


Fig. 2. Statistical Diagram of Model A. Note. Numbers outside of parentheses represent standardized coefficients. Those inside of parentheses represent standard error. Solid lines are used to mark variables entered into the model directly, while dashed lines indicate covariates. In coding for sex, male sex was entered as “0” and female sex was entered as “1.” ** indicates $p < .05$, *** indicates $p < .001$.

alcohol-related consequences. The mediation was not significant at mean or low levels of positive urgency. These findings indicate that 21st birthday drinking interventions that include personalized normative feedback and protective behavioral strategy components may pose risk and have a worsening effect for individuals high in positive urgency.

4.2. General discussion

This study was the first to empirically show that positive urgency is associated with drinking more than planned and experiencing a greater number of alcohol-related consequences on one's 21st birthday, supporting previous theory (e.g., Cyders et al., 2007). Additionally, because 21st birthday drinking is associated with more drinking and drinking problems over the following year (Geisner et al., 2017), understanding risks for 21st birthday drinking can help to identify those at greatest risk not only on the birthday itself, but also for subsequent drinking escalation and problems. Positive urgency is an easily assessed risk factor, already associated with drinking escalation over college years, and so is a prime candidate to consider in identifying those with escalating risk of drinking and negative consequences (e.g., Cyders et al., 2009).

Given the high risk of 21st birthday drinking, attempts to prevent or reduce this risk have been studied in a handful of prior interventions (e.g., LaBrie et al., 2009; Lewis et al., 2009, 2008; Neighbors et al., 2007, 2012). Importantly, we found that not only did the intervention fail for those with high levels of positive urgency, the intervention was associated with *more* drinking and consequences than the control condition in this high-risk group. This is especially concerning, given that providing personalized normative feedback and protective behavioral strategies worsened their already negative 21st birthday drinking outcomes. This suggests that this text message approach exacerbates problematic 21st birthday drinking in this high-risk group.

Why normative drinking feedback and protective behavioral strategies would increase 21st birthday drinking and consequences for those high in positive urgency is a matter for some conjecture. Previous work has documented that positive urgency increases drinking risk, in part through the learning process, by leading one to encode more positive aspects about drinking and to interpret ambiguous information related to alcohol in a more positive light (Settles et al., 2010; Smith et al., 2006). As such, the content of the text message itself, particularly "Enjoy your time with friends and make it a night to remember!" may have been interpreted more positively for those high in positive urgency, thus "activating" this trait in this scenario. Their interpretation of the text message might have increased excitement for the 21st birthday and/or served as an alcohol cue for those high in positive urgency, which further fueled drinking and worsened associated consequences. Finally, it's possible that providing normative drinking feedback might have motivated those high in positive urgency to drink in a way that seeks to drink in excess of these norms.

Although more work is needed to determine the precise mechanisms, these empirical data are the first to show that positive urgency is associated with worsened drinking outcomes from an intervention combining personalized normative feedback and protective behavioral suggestions. It had been previously suggested that positive urgency may negatively impact the outcome of treatments (Hershberger et al., 2017; Loree et al., 2015), but this had yet to be empirically tested. The implications of this finding are significant and fall in line with a general philosophy of treatment that has recently generated a great deal of interest in the field of health care, known as personalized medicine (e.g., Katsanis et al., 2008). Personalized medicine is a concept referring to the technique of using individual characteristics (e.g., genetics, personality) in order to identify which treatments might be most effective to treat the patient (Joyner and Prendergast, 2014). This type of focus is important, in that no intervention is equally effective for everyone, and therefore should be chosen with the individual in mind in order to maximize effectiveness. Recent interest in personalized

medicine has resulted in an increased emphasis among some researchers of discovering which traits or individual characteristics may impact treatment outcome (Schneider et al., 2015; Cuijpers et al., 2012, 2016). The importance of such considerations is particularly evident in the findings from this study. In this case, even if these interventions were to be more consistently effective at curbing alcohol use, there would still be the concern that they may not be safe to apply to everyone. Giving personalized feedback and behavioral strategies to those high in positive urgency may be counter-indicated, in that it might inadvertently increase drinking and risk of negative consequences. This should be a matter of particular concern, considering that individuals at high levels of positive urgency have already been shown to be at greater risk for exactly the type of problem drinking and subsequent behaviors that this intervention is trying to reduce.

4.3. Future directions

Given the robust link between positive urgency and problematic alcohol use (Coskumpinar and Cyders, 2012; Cyders et al., 2010, 2009; Smith and Cyders, 2016), there is a critical need to develop an appropriate intervention strategy tailored to this high-risk population. Although there has been some evidence to suggest that dispositional impulsiveness in general may be improved during substance use treatment (Hershberger et al., 2017) and that such reductions may in turn reduce problematic alcohol consumption (Blonigen et al., 2011; Blonigen et al., 2013), very few studies have examined how targeting positive urgency in particular may impact treatment outcome (Loree et al., 2015). One such study by Zapolski and Smith, 2017 Zapolski and Smith (2017), found that Dialectical Behavior Therapy can reduce risky behaviors among adolescents, including problem drinking, by teaching skills to improve emotional regulation and thereby reduce impulsive behavior. Dialectical Behavior Therapy (DBT) is a cognitive-behavioral treatment program that was originally developed for chronically suicidal adults with Borderline Personality Disorder (Linehan, 1993). DBT is also one of the leading modes of treatment to address difficulty in regulating strong emotion. Since individuals high in positive urgency are more likely to engage in risky behavior during heightened emotional states, it is viable that DBT could reduce such behaviors through the mechanism of emotion regulation. These are promising findings, since they show that dispositional impulsiveness can, in fact, be improved through therapy. Unfortunately, however, there is still no treatment option designed for those high in positive urgency or to directly target positive urgency. Based on the findings of this study, personalized normative feedback and protective behavioral strategies, at least as implemented in the current study, are likely not good options. We also suggest that using positive or celebratory language may pose additional risk for those high in positive urgency and should be avoided. Research has not yet determined which treatment might be more effective for those in positive urgency; however, some prime candidates include teaching more adaptive techniques for savoring positive affect; identifying alternative, safer means of celebrating; or learning to use cues indicating risk for maladaptive behavior (see Zapolski et al., 2010). These strategies should be tested empirically in this high-risk group.

4.4. Limitations

While the findings of the current study have important implications in both research and clinical interventions, they should be considered with the following limitations. First, the current study used participant self-report, which comes with accuracy and reporting bias limitations; however, since alcohol variables were assessed very soon after the events took place (i.e., the next day), the reports are likely an adequate, although approximate, estimate. A limitation of the sample is the pre-dominance of white females in the dataset; future work should examine whether the same effect is observed in other subgroups. Third, the

period of follow-up was quite short, limiting the examination of long-term effects following one's 21st birthday. Fourth, the intervention combined normative feedback with protective behavioral suggestions, which does not allow for isolating these treatment components effects.

4.5. Conclusion

In conclusion, these findings are the first to link positive urgency with 21st birthday drinking and to empirically demonstrate that positive urgency negatively impacts the effectiveness of an intervention aimed at reducing alcohol consumption. This suggests the need for developing and testing interventions that can be effectively used with those high in positive urgency in order to reduce problematic 21st birthday drinking in the high-risk group.

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Contributors

ZW and MC provided the main conceptualization of the manuscript. MB and NS provided guidance and feedback in structuring the manuscript. Data used are from a study conducted by MB, LS, CN, and BS. ZW is a major contributor in drafting this manuscript. MC drafted sections of this manuscript and provided guidance throughout. MB, NS, LS, BS, MS, and MC critically reviewed the manuscript for revision. All authors approved the final manuscript.

Declaration of Competing Interest

No conflict declared.

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