



# Impulsivity moderates the association between racial discrimination and alcohol problems



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## HIGHLIGHTS

- Racial discrimination and impulsivity were associated with alcohol problems.
- Racial discrimination was a stronger predictor when lack of Premeditation was high.
- Results highlight importance of cross-level interactive effects on alcohol problems.

## ARTICLE INFO

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## ABSTRACT

Alcohol use among university students is a serious public health concern, particularly among minority students who may use alcohol to cope with experiences of racial discrimination. Although the impact of racial discrimination on alcohol use has been well-established, individual differences in factors that may act to either attenuate or exacerbate the negative effects of racial discrimination are largely unknown. One potentially fruitful individual differences trait that has repeatedly been found to predict alcohol problems is the multidimensional personality trait of impulsivity. Nonetheless, the ways in which various aspects of impulsivity interact with racial discrimination is yet unknown. The current study, therefore, examined the joint and interactive contribution of racial discrimination and impulsivity in the prediction of alcohol consumption among racial minority university students. Participants included 336 Black/African-American and Asian/Asian-American university students. Results revealed both racial discrimination and impulsivity to be significantly associated with alcohol problems. Further, individuals' responses to racial discrimination were not uniform. Specifically, the association between racial discrimination and alcohol problems was moderated by lack of Premeditation; racial discrimination was most strongly predictive of alcohol problems for those who reported low level of premeditation. Findings from the present study highlight the importance of investigating risk factors for alcohol problems across multiple levels of the ecology as individual personality traits appear to relate to how one might respond to the experience of racial discrimination.

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## 1. Introduction

Underage alcohol use among university students is a serious public health concern. According to the most recent results from the National Survey on Drug Use and Health, close to 50% of young adults aged 18 to 20 years reported current alcohol use (NSDUH, 2010). In addition, young adults who are full-time university students are more likely to binge drink, typically defined as 5 or more drinks for men or 4 or more drinks for women on a single occasion generally within about 2 h (National Institute of Alcohol Abuse and Alcoholism, 2004), than those who are not enrolled in college; the binge drinking rates are 44.2% and 35.6% respectively (NSDUH, 2010). Indeed, as compared to

non-university students, in addition to consuming alcohol at a higher level, university students are more likely to experience alcohol-related problems (Martens, Rocha, Martin, & Serrao, 2008). Besides being one of the leading causes of preventable death in Western societies (Mokdad, Marks, Stroup, & Gerberding, 2004), alcohol use and related problems during emerging adulthood may be particularly concerning as it can hinder a number of important developmental milestones including career building, identity formation, and the establishment and maintenance of close personal relationships (Arnett, 2005; Schulenberg & Maggs, 2002). As such, research into determinants of alcohol use and associated problems is imperative.

One widely studied factor repeatedly shown to be predictive of alcohol use and problems is chronic stress (for a comprehensive review, see Keyes, Hatzenbuehler, & Hasin, 2011). With regard to racial and ethnic minority individuals, in particular, the experience of racial discrimination is a prevalent stressor (Gee, Spencer, Chen, & Takeuchi, 2007; Pieterse,

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Todd, Neville, & Carter, 2012). A recent study of African American university students found that 70% of participants reported experiencing stress because of racial discrimination (Chao, Mallinckrodt, & Wei, 2012). Similarly, Harwood, Huntt, Mendenhall, and Lewis (2012) found the experience of racial discrimination to be extremely prevalent among racial minority students attending a predominantly White university. In fact, findings from focus groups consisting of undergraduate and graduate students uncovered hundreds of incidents of racial discrimination (Harwood et al., 2012). Conceptualized as a psychosocial stressor, racial discrimination is related to a number of poor health outcomes. For example, a recent meta-analysis found that racial discrimination is associated with multiple negative physical and mental health outcomes, such as diabetes, hypertension, depression, and posttraumatic stress symptoms (Pascoe & Richman, 2009). Within a nationally representative sample of Asian Americans, Gee, Spencer, Chen, and Takeuchi (2007), Gee, Spencer, Chen, Yip, and Takeuchi (2007) also found that racial discrimination is associated with cardiovascular disease, pain, and respiratory illnesses after controlling for a variety of demographic variables. Among a plethora of negative health outcomes related to racial discrimination, among university students, alcohol problems are of particular concern (Broman, Mavaddat, & Hsu, 2000; Gee, Spencer, Chen, & Takeuchi, 2007; Gee, Spencer, Chen, Yip et al., 2007; Yoo, Gee, & Lowthrop, 2010).

Racial discrimination does not affect all individuals in the same manner likely resulting in individual variation in the association between the experience of racial discrimination and negative outcomes. Indeed, recent studies suggest that the relationship between racial discrimination and substance use may be moderated by individual-level factors, including identity factors and personality traits (Fuller-Rowell et al., 2012; Gibbons et al., 2012). Specifically, personality traits, such as impulsivity, likely influence how one reacts to racial discrimination that in turn affects one's use and abuse of alcohol (e.g. Gibbons et al., 2012). Although informative, recent findings have a number of limitations including unidimensional measures of self-control that likely includes multiple distinct aspects of the construct and lack of actual participant-reported experiences with racial discrimination and substance use behaviors. The present study addresses these methodological limitations by using a multidimensional measure of impulsivity, which allows for a more refined understanding of how different aspects of impulsivity potentially moderate the relationship between racial discrimination and alcohol use and misuse. Finally, the present study expands the scope of the literature by examining the relationship among racial discrimination, alcohol use, and impulsivity within a diverse sample that includes two racial minority groups: African Americans and Asian Americans. Thus, the purpose of the present study is to investigate how various dimensions of impulsivity influence the association between racial discrimination and alcohol-related problems among African American and Asian American college students.

### 1.1. Racial discrimination and alcohol problems

Racial discrimination has consistently been found to be associated with alcohol use among African Americans and Asian Americans (Broman, 2009; Yoo et al., 2010). For example, the experience of racial discrimination has been found to be associated with both more frequent drinking and higher levels of alcohol-related problems (e.g., neglecting responsibilities, inability to cease drinking) among African American university students (Broman, 2007, 2009). Providing further support for this link, a recent study among rural African American young adults found that a preventive intervention that includes training on problem-focused coping strategies in response to racial discrimination led to lower alcohol use (Brody, Yu, Chen, Kogan, & Smith, 2012). Similarly, the negative effect of discrimination on alcohol use has been found among Asian Americans (Chae, Takeuchi, & Barbeau, 2008; Yoo et al., 2010). After controlling for gender, socio-economic status, and immigration status, Yoo et al. (2010) found that Asian Americans who perceived a higher level of racial discrimination reported higher levels of

alcohol use than those experiencing lower levels. Similarly, using a nationally representative sample of Asian Americans, experiencing racial/ethnic discrimination was significantly associated with a greater probability of having a history of alcohol dependency problems (Chae et al., 2008). Potentially as a result of stress-motivated drinking (Rutledge & Sher, 2001), taken together, results of the extant literature unequivocally suggest exposure to perceived racial discrimination to be a significant risk factor for increased risk of alcohol use and related problems among racial and ethnic minority young adults. However, the extent to which racial discrimination is uniformly putting African American and Asian American students at risk for alcohol problems is less clear.

### 1.2. Impulsivity and alcohol problems

Impulsivity is one of the most widely studied yet poorly agreed upon constructs. Despite varying definitions and structural models within the literature, there is an emerging consensus that this multidimensional construct can be divided meaningfully into distinct dimensions (Roberts, Bogg, Walton, Chernyshenko, & Stark, 2004; Vaidya, Latzman, Markon, & Watson, 2010; Whiteside & Lynam, 2001). As such, a number of structural models have been proposed to characterize the lower-order dimensions or components within this domain. To address this lack of consensus in the literature with regard to impulsivity, Whiteside and Lynam (2001) proposed the UPPS model of impulsive behavior, subsequently revised by Cyders and Smith (2007), which posits five pathways to impulsive behavior: lack of Premeditation, lack of Perseverance, Sensation Seeking, Positive Urgency, and Negative Urgency. Although relatively few studies to date have investigated the relationship between various dimensions of impulsivity and alcohol problems, those studies that have find significant associations between various pathways to impulsive behavior and alcohol problems (e.g., Curcio & George, 2011; Shin, Hong, & Jeon, 2012). For example, consistent with previous studies of impulsivity components and alcohol use disorders (e.g., Whiteside & Lynam, 2003), Shin et al. (2012) found both Urgency, the tendency to act impulsively in the context of emotional states (positive and negative urgency were not assessed as separate components), and Sensation Seeking, the tendency to prefer exciting and risky behaviors, to uniquely predict alcohol problems after controlling for age and race. Further, when Positive and Negative Urgency have been examined as separate pathways, it has been Negative Urgency, the tendency to act impulsively when in a negative mood, that has emerged as a unique predictor of alcohol problems after controlling for demographic variables as well as quantity/frequency of consumption (Curcio & George, 2011). In contrast to Shin et al.'s (2012) findings, others have found that while Sensation Seeking is uniquely associated with alcohol use, it is not associated with alcohol problems as individuals high on Sensation Seeking may be able to limit the negative consequences of this use (Curcio & George, 2011). Further, although outside of UPPS model, low levels of self-control, termed lack of Premeditation in the UPPS model, have been shown to evidence unique associations with both alcohol use (e.g., Latzman, Vaidya, Clark, & Watson, 2011) and problems (Latzman & Vaidya, 2013). Taken together, recent research therefore suggests a more nuanced association between various pathways to impulsive behavior and alcohol problems. It appears that specific pathways emerge as significant unique predictors of alcohol problems while others do not.

### 1.3. Interaction of racial discrimination and impulsivity in predicting alcohol problems

Consistent with an ecological systems framework (e.g., Bronfenbrenner, 1979), vulnerabilities to substance use problems are influenced by complex interactions between individual-level and environmental/contextual factors (Gerrard et al., 2012). Indeed, as stress levels increase, one is more likely to engage in impulsive behaviors

(Swann, 2003). It is therefore reasonable to hypothesize that when racial minorities experience racial discrimination (i.e., a stressor), in turn increasing their vulnerability to impulsive behaviors and placing them at increased risk for substance use problems. Nonetheless, there is likely individual variation in the association between racial discrimination and substance abuse behaviors depending on individual differences in the tendency to engage in impulsive behaviors more generally. Indeed, via a laboratory-based study, Gibbons et al. (2012) asked African American adolescents to imagine a situation in which they were experiencing racial discrimination while simultaneously completing a substance use word association task. Those who reported having a lower level of self-control on a short, unidimensional measure of one's ability to control and inhibit behaviors and emotions (i.e., higher impulsivity) had more substance use-related responses in a word association task when imagining a situation involving racial discrimination. This finding provides preliminary evidence to support the hypothesis that the association between racial discrimination and substance use is moderated by self-control. The study by Gibbons et al. (2012) however leaves a number of questions unanswered. First, the unidimensional measure of self-control used in the study does not account for the multidimensionality of impulsivity. Secondly, although the experimental design yields high internal validity, it lacks external validity in that participants did not report their actual experiences of racial discrimination or their actual use of substances. The current study therefore aims to fill these gaps by applying the UPPS model to conceptualize and measure impulsivity with a multidimensional assessment to examine how the five dimensions interact with racial discrimination to explain alcohol problems. In addition, the current study asked participants to report the frequency of perceived racial discrimination and the number of times they have experienced negative consequences as a result of alcohol use.

#### 1.4. Current Study

Although a recent study has found evidence to suggest that self-control moderates the association between racial discrimination and substance use, the lack of specificity in the assessment of self-control and laboratory design limits a comprehensive understanding of these relationships. The primary aim of the current study therefore is to examine the interaction between self-reported impulsivity and racial discrimination on alcohol-related problems among African American and Asian American university students. Specifically, we examined associations between racial discrimination, a multidimensional approach to examining impulsive behavior, and alcohol problems. Consistent with a large body of previous research (e.g., Broman, 2009; Yoo et al., 2010), we expected racial discrimination to be a significant predictor of alcohol problems. Further, we expected impulsivity to evidence significant unique effects beyond racial discrimination in the prediction of alcohol problems. Specifically, consistent with previous findings of distinct associations between various aspects of impulsivity and alcohol problems (e.g., Curcio & George, 2011; Latzman & Vaidya, 2013; Shin et al., 2012), we expected lack of Premeditation and Negative Urgency to evidence significant unique associations with alcohol problems. In contrast to aspects of impulsivity such as lack of Premeditation and Negative Urgency, previous research on the role of Sensation Seeking in alcohol problems is largely equivocal with some research suggesting a positive unique association (e.g., Shin et al., 2012) while others have found no relationship (e.g., Curcio & George, 2011). As such, we advanced no a priori hypotheses with regard to Sensation Seeking. Lastly, consistent with recent moderation findings focusing specifically on difficulties in self-control, as opposed to other aspects of impulsivity (i.e., Gibbons et al., 2012), we expected the positive association between racial discrimination and alcohol problems to be stronger for participants who exhibit low levels of lack of Premeditation, the sole indicator of self-control abilities (e.g., Latzman & Vaidya, 2013).

Further, based on recent findings suggesting that individual variation in reflexive responding to emotion is captured by Urgency (e.g., Smith, Guller, & Zapolski, 2013), we expected individuals higher on negative, but not positive, Urgency to report higher levels of alcohol problems in the context of higher levels of racial discrimination. We did not expect the association between discrimination and alcohol problems to vary by levels of lack of Perseverance or Sensation Seeking.

## 2. Materials and methods

### 2.1. Participants

Participants were drawn from a sample of 1169 undergraduates who completed an online survey in partial fulfillment of a research requirement at a large public Southeastern university. African American and Asian American students who reported having at least 1 alcohol related problem were included in the current study resulting in a sample of 336 participants (70.5% female; 69% African-American) between the ages of 18 and 48 years ( $M_{age} = 20.40 \pm 3.78$ ). All students accessed a secure website where they provided informed consent and completed the surveys. All study procedures were approved by the University Institutional Review Board.

### 2.2. Measures

#### 2.2.1. Perceived racial discrimination

Perceived racial discrimination (Noh & Kaspar, 2003) was assessed with a widely-used 7-item 5-point Likert-type scale. The scale first defines discrimination as "when people insult other people, make fun of them, or treat them unfairly because they belong to a certain racial or ethnic group". Participants were then asked to indicate how often they have been discriminated against in terms of having been (1) hit or handled roughly, (2) insulted or called names, (3) treated rudely, (4) treated unfairly, (5) threatened, (6) refused services in a store or restaurant or subjected to delays in services, and (7) excluded or ignored. Items are rated on a 5-point Likert scale (ranging from 1 = "Never" to 5 = "All of the Time"). This 7-item scale has been shown to have good internal consistency (Noh & Kaspar, 2003). In the current sample, the internal consistency was excellent.

#### 2.2.2. UPPS-P Impulsivity Scale

The UPPS-P Impulsivity Scale (UPPS-P; Cyders et al., 2007; Whiteside & Lynam, 2001) is a 59-item instrument designed to assess distinct personality pathways to impulsive behavior and is comprised of five subscales; Negative Urgency (12-items), lack of Perseverance (11-items), lack of Premeditation (10-items), Sensation Seeking (12-items), and Positive Urgency (14-items). Participants responded to items using a 4-point Likert-type scale ranging from "1" = Strongly Agree to "4" = Strongly Disagree to indicate the extent to which they agree with each statement. The UPPS-P has been shown to demonstrate excellent internal consistency and convergent validity with other measures that tap impulsivity-related traits (Cyders et al., 2007; Whiteside & Lynam, 2001). In the current sample, internal consistencies were good to excellent across all subscales.

#### 2.2.3. Rutgers Alcohol Problem Index

The Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989) consists of 23-items that ask participants to indicate how many times each negative consequence (e.g., "neglected responsibilities," "felt you were going crazy," "relatives avoided you") happened while drinking or because of drinking during the last year. Participants responded to the items on a 5-point scale ("0" = Never, "1" = 1–2 times, "2" = 3–5 times, "3" = 6–10 times, and "4" = more than 10 times). The RAPI has been shown to demonstrate adequate reliability in terms of both internal consistency (White & Labouvie, 1989) and test-retest



reliability (Miller et al., 2002). In the current sample, the internal consistency was excellent.

2.3. Analyses

First, zero-order correlations were performed to examine the relationships among perceived racial discrimination, five distinct pathways to impulsivity, and alcohol problems. Then, hierarchical multiple regression analyses were performed to examine how racial discrimination and specific pathways to impulsivity jointly and interactively predicted alcohol problems. In preparation, all variables were standardized (i.e., computed z-scores). Five interaction terms were also calculated by multiplying each dimension of impulsivity by racial discrimination to test the moderating effect of impulsivity. Variables were entered in the hierarchical regression in the following order: Step 1) age, race, and sex, Step 2) racial discrimination and the five impulsivity dimensions, and Step 3) the interaction terms between racial discrimination and specific impulsivity dimensions. Further, to probe the effect of any significant interactions, a simple slopes analysis was conducted to examine the nature of the interaction between racial discrimination and impulsivity at a high level (at 1 standard deviation above mean) and a low level (at 1 standard deviation below mean) of a specific impulsivity dimension.

3. Results

3.1. Preliminary analyses

There were significant differences in reports of racial discriminations between males ( $M = 2.29, SD = .79$ ) and females ( $M = 2.09, SD = .75$ ) ( $t(334) = -2.18, p < .05$ ) but no significant differences in racial discrimination between African Americans ( $M = 2.15, SD = .75$ ) and Asian Americans ( $M = 2.14, SD = .80$ ), ( $t(334) = .07, p = ns$ ). Additionally, Asian Americans ( $M = 13.84, SD = 13.56$ ) and African Americans ( $M = 11.52, SD = 12.59$ ) did not differ in reported alcohol problems ( $t(334) = -1.53, p = ns$ ). As shown in Table 1, with the exception of Sensation Seeking which was found to be negatively associated ( $r = -.19$ ), racial discrimination was positively associated with all four other dimensions of impulsivity. Additionally, racial discrimination was moderately and positively associated with alcohol problems. Again, with the exception of Sensation Seeking, which surprisingly evidenced a relatively smaller, yet significant negative association ( $r = -.14$ ), the four remaining dimensions of impulsivity were found to be positively associated with alcohol problems ( $Mdnr = .54$ ). Prior to conducting multiple regression analyses, we examined the degree to which predictors are correlated. Variance Inflation Factor (VIF) and Tolerance indices of all five subscales of UPPS-P Impulsivity Scale confirmed that our data did not have issues related to multicollinearity ( $Mdn VIF = 1.99$  and  $Mdn Tolerance = .50$ ; Cohen, Cohen, West, & Aiken, 2003).

**Table 1**  
Associations among racial discrimination, impulsivity, and alcohol problems.

	1	2	3	4	5	6	7
1. Racial discrimination	<b>.89</b>						
2. Alcohol problems	.56**	<b>.95</b>					
3. Negative Urgency	.12*	.15**	<b>.83</b>				
4. Lack of Premeditation	.43**	.58**	.24**	<b>.82</b>			
5. Lack of Perseverance	.39**	.49**	.27**	.66**	<b>.81</b>		
6. Sensation Seeking	-.19**	-.14**	.28**	-.12*	-.11	<b>.82</b>	
7. Positive Urgency	.15**	.27**	.70**	.29**	.39**	.43**	<b>.94</b>
Mean	2.15	12.24	2.44	1.96	2.02	2.73	2.18
Standard deviation	.76	12.92	.54	.50	.48	.52	.70

Note:  $N = 336$ . Scale reliabilities (Coefficient Alpha) are shown in **boldfaced italics** on the diagonal. \* $p < .01$ .

3.2. Predicting alcohol problems from racial discrimination and pathways to impulsive behavior

As shown in Table 2, racial discrimination and impulsivity contributed an additional 44% of the variance in alcohol problems beyond demographic variables. Gender evidenced a significant main effect ( $\beta = -.19, t = -3.43, p < .01$ ) with males reporting more alcohol problems than females. Further, racial discrimination ( $\beta = .33, t = 7.25, p < .001$ ), lack of Premeditation ( $\beta = .34, t = 6.09, p < .001$ ), and Positive Urgency ( $\beta = .16, t = 2.88, p < .01$ ) evidenced significant main effects. Further, consistent with the bivariate findings, Sensation Seeking ( $\beta = -.10, t = -2.14, p < .05$ ) surprisingly evidenced a significant negative association with alcohol problems. Neither of the other two impulsivity dimensions emerged as significant unique predictors of alcohol problems ( $\beta s < |.09|, t s < |1.12|, p s > .14$ ). In addition to main effects, the association between racial discrimination and alcohol problems was found to be significantly moderated by impulsivity. Specifically, lack of Premeditation was found to interact with racial discrimination in the prediction of alcohol problems ( $\beta = .20, t = 2.36, p < .05$ ). To probe the nature of this interaction, as described above, a simple slopes analysis was conducted. As shown in Fig. 1, results of simple slopes analysis indicated that racial discrimination was a significant predictor of alcohol problems. However, the slope was steeper at low levels of Premeditation ( $\beta = .45, t = 9.52, p < .001$ ), than at high levels of Premeditation ( $\beta = .17, t = 2.96, p < .01$ ).<sup>1</sup>

4. Discussion

The current study represents the first investigation to date of the joint and interactive contribution of self-reported racial discrimination and a multidimensional conceptualization of impulsivity in the prediction of alcohol consumption among minority university students. To date, previous research on contributors to alcohol problems have examined racial discrimination and impulsivity separately (for an exception, see Gibbons et al., 2012). Such investigations are limited with regard to their implications as risk factors across different levels of the ecology are likely to interact (e.g., Bronfenbrenner, 1979) in the explanation of important outcomes including alcohol problems. By examining both individual and contextual level factors in the explanation of this important health-related outcome, results of the present study bear clear empirical and applied implications. Overall, we found both self-reported racial discrimination and impulsivity, factors at various levels of proximity to the individual within the ecology, to be significantly associated with alcohol problems. Further, individuals' responses to racial discrimination were not uniform. Alcohol-related responses to racial discrimination appear to vary depending on individual characteristics, such as the personality trait of impulsivity. Specifically, we found the association between racial discrimination to be significantly moderated by lack of Premeditation.

The experience of racial discrimination is a common stressor in the lives of many racial minorities (Gee, Spencer, Chen, & Takeuchi, 2007; Gee, Spencer, Chen, Yip et al., 2007; Pieterse et al., 2012). With regard to differences in the experience of racial discrimination between groups, we did not find differences in the level of racial discrimination reported by Asian and African American participants. The lack of differences in the reported levels of discrimination is consistent with previous findings on the racial reality of Asian Americans: they do indeed experience racial discrimination running contrary to the notion that they are immune to racism (e.g., Gee, Spencer, Chen, & Takeuchi, 2007; Young & Takeuchi, 1998). Similarly, no racial differences emerged with regard to self-reported alcohol problems. Further, results of the current study

<sup>1</sup> We also tested potential racial differences via three-way interactions (impulsivity \* discrimination \* race). Neither the additional step nor any of the individual three-way interactions emerged as significant.

**Table 2**  
Predicting alcohol problems from impulsivity and racial discrimination.

Predictors	Step 1 ( $R^2 = .04$ )		Step 2 ( $\Delta R^2 = .44$ )		Step 3 ( $\Delta R^2 = .04$ )	
	$\beta$	$t$	$\beta$	$t$	$\beta$	$t$
<b>Demographics</b>						
Age	-.05	-.85	-.01	-.18	-.01	-.15
Sex	-.19	-3.43*	-.11	-2.42***	-.10	-2.43***
Race	.02	.34	-.03	-.66	-.04	-.84
<b>Main effects</b>						
Racial discrimination			.33	7.25**	.28	6.05**
Negative Urgency			-.08	-1.47	-.01	-.23
Lack of Premeditation			.34	6.09**	.27	4.83**
Lack of Perseverance			.07	1.12	.06	1.04
Sensation Seeking			-.10	-2.14***	-.07	-1.44*
Positive Urgency			.18	2.79*	.18	2.82*
<b>Discrimination <math>\times</math> impulsivity interactions</b>						
Racial discrimination $\times$ Negative Urgency					.01	.18
Racial discrimination $\times$ Lack of Premeditation					.20	2.36***
Racial discrimination $\times$ Lack of Perseverance					.05	.70
Racial discrimination $\times$ Sensation Seeking					.01	.12
Racial discrimination $\times$ Positive Urgency					-.02	-.25

Note:  $N = 336$ .  $F$ -test of change from Step 2 to Step 3:  $F = 16.73$ ;  $df = 5, 321$ ,  $p < .001$ .

\*\*\*  $p < .05$ .

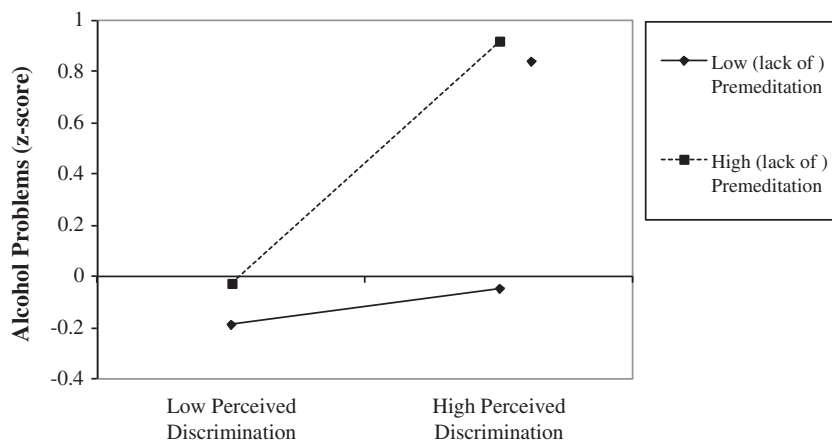
\*\*  $p < .001$ .

\*  $p < .01$ .

are consistent with previous findings (e.g., Broman, 2009; Yoo et al., 2010) of significant associations between the experience of racial discrimination and alcohol problems for both African American and Asian American young adults. Specifically, in addition to a significant zero-order correlation, we found exposure to racial discrimination to be significantly and uniquely associated with increased alcohol problems beyond individual differences in impulsivity across racial groups. Understanding the mechanisms through which racial discrimination increases racial minority college students' likelihood to use alcohol is an important next step as minority students perceive high levels of racial discrimination on college campuses and underage drinking is particularly pervasive among college students (Chao et al., 2012; Harwood et al., 2012; NSDUH, 2010).

In addition to racial discrimination, consistent with expectations, the current study confirms the contribution of impulsivity to alcohol problems. Results confirm this association at the zero-order level where alcohol problems were found to be significantly correlated with four of the five impulsive behavior pathways as well as at the multivariate level where lack of Premeditation and Positive Urgency were found to be significantly associated with alcohol problems after accounting for demographics as well as racial discrimination. When considered within the larger literature, results were not entirely consistent with previous

findings. Specifically, although previous studies have found Negative Urgency to evidence significant unique positive associations with alcohol problems (e.g., Curcio & George, 2011; Shin et al., 2012), Negative Urgency did not emerge as a significant unique predictor in our regression analyses. Nonetheless, it did evidence a significant bivariate association. Further, Sensation Seeking, while found to be significantly associated with alcohol problems, the direction of the association was negative. This is partially consistent with previous research suggesting that individuals higher on Sensation Seeking may be able to limit the negative consequences of their drinking behaviors. Nonetheless, the significant negative association was still unexpected but could potentially be a result of the minority sample used in the current study as well as the fact that racial discrimination was accounted for in these models. Additionally, it is possible that aspects of impulsivity function differently for racial minorities, a potential avenue for future research. Nonetheless, findings with regard to lack of Premeditation were consistent with expectations. Specifically, consistent with previous findings of Premeditation-related traits (i.e., self-control; Latzman & Vaidya, 2013; Latzman et al., 2011) lack of Premeditation emerged as the strongest predictor of alcohol problems in both the univariate and multivariate analyses confirming the central role of diminished self-control abilities with regard to alcohol problems.



**Fig. 1.** Interaction between lack of Premeditation and perceived racial discrimination: associations with alcohol problems. High and low values correspond to +1.0 and -1.0 SD from the mean, respectively. Alcohol problem scores are standardized,  $M = 0$ ,  $SD = 1$ .

#### 4.1. Interaction between racial discrimination and impulsivity

To our knowledge, this is the first study to examine the interaction between self-reported racial discrimination and impulsivity on alcohol problems among racial minority young adults. As has been previously found with a laboratory-based paradigm (i.e., Gibbons et al., 2012), and consistent with expectations, in addition to unique contributions of various pathways to impulsive behavior and racial discrimination to alcohol problems, the association between racial discrimination and alcohol problems was significantly moderated by impulsivity. The association between racial discrimination and alcohol problems was found to vary by level of lack of Premeditation, but, contrary to theoretically-based expectations, not any of the other aspects of impulsivity. Specifically, racial discrimination was more strongly associated with alcohol problems for minority students high on lack of Premeditation than those who are low on lack of Premeditation. In other words, the ability to think clearly about consequences prior to taking action appears to attenuate the negative impact of racial discrimination on alcohol problems for racial minority college students. Racial minority individuals who have higher levels of Premeditation may be more capable of using more adaptive coping strategies when faced with racial discrimination; whereas, those who have lower levels of Premeditation (i.e., lack of Premeditation) may be more likely to choose more maladaptive coping methods, such as using alcohol to cope with racial discrimination. These findings likely represent the influence of individual differences in levels of impulsivity on stress-motivated drinking behaviors (e.g., Rutledge & Sher, 2001). Recent research underscores the importance of premeditation-related processes in this context. For example, African American adolescents and young adults have been prospectively found to be more likely to use alcohol and other illegal drugs after experiencing racial discrimination when previously reporting an inclination to using substances (i.e., maladaptive coping) to cope with stressful events more generally (Gerrard et al., 2012). Results of the current study, as well as previous findings, suggest the need for additional research on associations between premeditation and adaptive and maladaptive coping strategies in the face of stress associated with racial discrimination. Further, the emergence of a significant interaction between discrimination and impulsivity, the self-control aspect of impulsivity specifically, highlights the importance of examining interactions between individual level and environmental/contextual factors.

#### 4.2. Limitations and future directions

Due to the cross-sectional, correlational nature of our data, causal conclusions are not possible. Further, as racial discrimination was assessed as a lifetime variable, the temporal sequence of racial discrimination and alcohol problems is unclear. As such, it is important for future longitudinal work to examine prospectively the prediction of alcohol problems from impulsivity and racial discrimination. For example, it is possible that as racial minorities are exposed to a prolonged period of racial discrimination, they are likely to become more impulsive and reactive in response to discrimination and to stressors in general. Moreover, a recent study found that self-control mediates the relationship between racial discrimination and substance use for African American adolescents (Gibbons et al., 2012). More longitudinal studies are needed to further delineate the complex relationships among racial discrimination, impulsivity, and alcohol use among minorities. Although the effects of gender and race as covariates were examined, the use of a predominantly female (73.9%) African American (71.7%) undergraduate sample may limit the generalizability of our findings to more diverse populations, including those who are less educated, have clinical levels of symptomatology, and are comprised of a greater proportion of male subjects. Further, the current study included students attending an unusually ethnically diverse university (i.e., the undergraduate population has an equal proportion of White and African American students and a substantial population of Asian American

and Latino students). Racial minority students who attend colleges that are majority White often report higher levels of racial discrimination (Harwood et al., 2012). Thus, future studies should include college students from institutions with varying degrees of diversity to examine the extent to which student diversity may affect the relationship between racial discrimination and alcohol problems. Further, alcohol problems represent only one of many potential negative outcomes associated with the experience of racial discrimination. As such, it will be important for future studies to include a wider range of potential outcomes to confirm the generalizability of the current findings to maladaptive outcomes beyond alcohol problems. Finally, the current study examined different pathways to impulsivity as risk factors for alcohol problems. Additional research is needed to explore the extent to which other conceptualizations of impulsivity-related traits (e.g., Vaidya et al., 2010), as well as additional individual-level factors beyond impulsivity, such as neurocognitive functioning (e.g., Giancola & Tarter, 1999), influence how racial minority young adults choose to use alcohol to cope with racial discrimination.

### 5. Conclusions

Results of the current study confirm unique associations between racial discrimination and impulsivity and alcohol problems among minority students highlighting the importance of including multiple risk factors from different levels of the ecology. In addition to unique main effects, results of the current study imply differences in responses to the experiences of racial discrimination depending on individual levels of impulsivity, lack of Premeditation, specifically. This suggests that individual personality traits relate to how one might respond to this stressful experience. These findings help to potentially elucidate important avenues for prevention and intervention efforts aimed at protecting racial minorities against the negative effects of discrimination. This is of particular importance among college students as underage drinking is a serious public health concern on college campuses while racial discrimination continues to be a chronic stressor for this population.

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#### Contributors

Robert Latzman designed the initial study. Robert Latzman and Wing Yi Chan jointly wrote the Introduction and Discussion. All authors, Robert Latzman, Wing Yi Chan, and Yuri Shishido, jointly wrote the Method and Results section, conducted statistical analyses, and approved the final manuscript.

#### Conflict of interest

All authors declare that they have no conflicts of interest.

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