Original Article

Effects of Exposure to Alcohol-Related Cues on Racial Prejudice

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Abstract: Prior research (Stepanova, Bartholow, Saults, & Friedman, 2012) indicates that exposure to alcohol-related cues increases expressions of racial biases. This study investigated whether such effects can be replicated with other tasks assessing racial bias and whether they stem from stereotyping or prejudice. In two experiments participants (N_1 = 118; N_2 = 152) were exposed to either alcohol-related or neutral advertisements, and then completed a race-priming lexical decision task (LDT, Wittenbrink, Judd, and Park, 1997). Experiment 1 provided weak evidence that exposure to alcohol cues decreases positive attitudes toward Blacks, which was not confirmed in a high-powered replication (Experiment 2). Our findings suggest a short-lived nature (if any) of alcohol priming effects on racial bias when measured by the primed LDT.

Keywords: alcohol, priming, racial bias, prejudice and stereotyping

In the wake of recent events when several unarmed African American men died in the hands of police across the United States, issues of racial bias and discrimination were brought into the national spotlight once again. Various factors can moderate expressions of racial bias, and many of them have been addressed, such as individual differences (e.g., motivation to control prejudice; Amodio, Harmon-Jones, & Devine, 2003; Devine, Plant, Amodio, Harmon-Jones, & Vance, 2002), context effects (e.g., Barden, Maddux, Petty, & Brewer, 2004; Maddux, Barden, Brewer, & Petty, 2005; Wittenbrink, Judd, & Park, 2001), and levels of interracial contact (e.g., Correll, Park, Judd, & Wittenbrink, 2002), to name a few. This research investigated whether simple exposure to alcohol-related cues, in the absence of any actual beverage consumption, affects people's racial biases. Additionally, it investigated whether these biases are manifested through attitudes or stereotypes.

One consistent theme in racial bias research is that bias often occurs in situations involving ambiguity, in which the best or most appropriate response is not clear. For example, Correll et al. (2002, 2007) have shown that race influences quick decisions concerning whether or not to shoot potentially armed suspects (i.e., individuals holding objects that might be guns or might be innocuous objects, such as cell phones), resulting in a consistent bias to accidentally shoot unarmed Blacks more often than unarmed Whites (also see Payne, 2001, 2005; Plant & Peruche, 2005).

Payne (2005; also see Payne, Shimizu, & Jacoby, 2005) has argued that the bias to misidentify innocuous objects as guns when paired with Black men (relative to White men) stems from a failure of cognitive control – that participants in such cases correctly perceive that a target object is not a weapon, but the influence of stereotypes biases their responses toward pressing the "shoot" or "gun" button, and the time pressure imposed by a response deadline hinders the ability to interrupt the stereotype-congruent response to make the opposing response. Alternatively, others have provided evidence that racial stereotypes actually guide perception of visual stimuli in ways that produce biased responses (Correll, Wittenbrink, Crawford, & Sadler, 2015; Eberhardt, Goff, Purdie, & Davies, 2004), consistent with the idea that stereotypes provide information under situations of uncertainty, biasing information-processing in stereotype-consistent ways (e.g., Bodenhausen, 1988; Duncan, 1976; Sagar & Schofield, 1980).

Alcohol-Related Cues and Racial Bias

One very common practice that appears to both impair cognitive control (see Giancola, 2000) and bias perception of social information (Steele & Josephs, 1990) is alcohol consumption. Alcohol increases the expression of racial and other social biases, both in the laboratory and field studies (Bartholow, Dickter, & Sestir, 2006; Bartholow, Henry,

Lust, Saults, & Wood, 2012; Loersch, Bartholow, Manning, Calanchini, & Sherman, 2015; Noor, Reed, & Doosje, 2017; Parrott, & Lisco, 2015; Reeves & Nagoshi, 1993; Schlauch, Lang, Plant, Christensen, & Donohue, 2009; Schofield, Unkelbach, & Denson, 2017) and in life (see Huffington Post, 2010; Rosario, 2015).

Behaviors often associated with alcohol consumption, such as aggression, perceptions of sexual attractiveness, and tension-reduction, can be observed without consumption after exposure to alcohol-related cues such as pictures of alcoholic beverages or words related to alcohol (Bartholow & Heinz, 2006; Friedman, McCarthy, Bartholow, & Hicks, 2007; Friedman, McCarthy, Förster, & Denzler, 2005; Pedersen, Vasquez, Bartholow, Grosvenor, & Truong, 2014; Subra, Muller, Bègue, Bushman, & Delmas, 2010). These findings indicate that perception of alcohol-related cues can trigger cognitive and behavioral scripts related to alcohol's effects (Dijksterhuis & Bargh, 2001). While the replicability of priming effects recently has been disputed for a variety of reasons (Loersch & Payne, 2011; Sherman, 2014), current literature indicates that alcohol priming effects are observed with different priming paradigms and in several behavioral domains.

Merely being exposed to alcohol-related cues increases the expression of racial bias (Stepanova, Bartholow, Saults, & Friedman, 2012), discrimination (Stepanova, Bartholow, Saults, & Friedman, in press), and biases toward lesbians and gay men (Greitemeyer & Nierula, 2016). Stepanova et al. (2012) found that in the Weapons Identification Task (WIT; Payne, 2001) participants who were primed with alcohol-related cues were more likely to misidentify tools when preceded by Black (compared to White) faces than those primed with neutral beverage cues. Modeling task performance data with the Process Dissociation Procedure (PDP; Jacoby, 1991) showed that, unlike the control-impairing effects often seen with alcohol consumption (see Bartholow et al., 2012; Schlauch et al., 2009), alcohol-cue exposure increased bias by increasing the influence of automatic (and not controlled) processes on behavior.

The design of the Stepanova et al. (2012) study did not permit investigation of several key issues of importance for understanding alcohol-cue exposure effects, however. First, its findings are limited to one specific task, the WIT. Second, it did not make a clear distinction between prejudice and stereotyping as components of racial bias (see Amodio & Devine, 2006). It is not clear whether the facilitation of responses to guns on Black-primed trials in the WIT reflects activation of a negative affective reaction to Blacks (as guns are negatively valenced objects for many people) or the activation of stereotypic associations (as part of the stereotype for young Black men involves gun violence; see Devine, 1989; Dovidio & Gaertner, 1986; Niemann, Jennings, Rozelle, Baxter, & Sullivan, 1994). Therefore, enhanced implicit bias following alcohol-cue exposure could result from facilitation of either evaluative associations (i.e., Blacks with general negativity) or semantic associations (i.e., aspects of the Black stereotype). This current work investigated whether exposure to alcohol-related cues increases racial bias in the form of attitudes (affective reactions) or specific stereotypic content using a primed lexical decision task (LDT).

The Current Study

The purpose of this study was to test the effects of simple exposure to alcohol-related cues on the expression of racial biases, and to determine whether such biases operate through activation of attitudes (e.g., positive or negative) or stereotypic associations (Experiments 1 and 2).

In Experiments 1 and 2, participants were exposed to either alcohol-related or neutral content prior to completing a primed LDT with target words varying on valence *and* racial stereotypicality and prime words *Black* and *White*. This design permits us to assess the joint effects of alcohol-cue exposure and prime content (Black vs. White racial category) on facilitation of general affective (i.e., attitudes) and semantic (i.e., stereotype-related) information (see Wittenbrink, Judd, & Park, 1997; Wittenbrink et al., 2001). Differential levels of responding in the LDT on either positive/negative targets or stereotypic targets across the cue priming conditions indicate whether attitudes or stereotypes drive racial bias in the alcohol priming tasks.

We also tested exploratory hypotheses for moderation effects of potentially relevant constructs, such as alcohol-related expectancies, use, and explicit racial biases, on the relationship between alcohol-cue priming and racial biases. Explicit alcohol outcome expectancies are beliefs that people have about the effects of drinking (Goldman, Darkes, & Del Boca, 1999). Sometimes alcohol expectancies moderate the effects of exposure to alcohol cues (Bartholow & Heinz, 2006; Friedman et al., 2005; Moltisanti, Below, Brandon, & Goldman, 2013; Van Koningsbruggen & Stroebe, 2011). However, that is not always the case (Subra et al., 2010; Stepanova et al., 2012, in press).

Experiment 1

Experiment 1 aimed to assess the effects of exposure to alcohol cues on racial biases and differentiate between prejudice and stereotyping effects. We hypothesized that exposure to alcohol cues would enhance implicit bias, as in prior work (Stepanova et al., 2012), but were also interested in testing whether this bias would emerge in terms of Black primes facilitating responses to Black-stereotypic

words and/or decreasing facilitation to White-stereotypic words regardless of their valence (i.e., stereotyping), or rather in terms of Black primes facilitating responses to negative words and/or decreasing facilitation to positive words regardless of their stereotypicality (i.e., prejudice). The presence of a Cue (alcohol, nonalcohol) × Prime Race (Black, White) × Target Stereotypicality (Black-stereotypic, White-stereotypic) interaction would indicate that alcohol cues increase stereotyping, whereas the presence of a Cue × Prime Race × Target Valence (negative words, positive words) interaction would indicate that alcohol cues increase prejudice. In line with Rosnow and Rosenthal's (1989, 1995) arguments, the presence of one or the other of these interactions will constitute the most meaningful test of the hypothesis that alcohol-cue exposure can increase expression of racial bias, regardless of whether or not relevant simple effect contrasts are statistically significant. Therefore, we specifically tested our data for the presence of the interactions described. Below we report how we determined our sample size, all data exclusions, all manipulations, and all measures in Experiment 1.

Method

Participants

One hundred forty undergraduates (M_{age} = 19.54, SD = 2.67; 27% male) recruited from various Psychology courses at Florida Gulf Coast University participated in exchange for course credit. The sample size used here was determined on the basis of previous work in which the same cue priming procedure has been used (Bartholow & Heinz, 2006; Freeman, Friedman, Bartholow, & Wulfert, 2010; Stepanova et al., 2012). Participants reported their ethnicity as follows: 69.5% European American or White, 14.5% Hispanic or Latino/Latina, 9.3% multiracial, 4.2% Asian American or Asian, 1.7% African American or Black, and 0.8% Other.

Design

The following cells of the design were relevant to testing our hypothesis, specifically, a 2 (Cue Condition: alcohol, nonalcohol) × 2 (Prime: Black, White) × 2 (Target Stereotypicality: stereotypic Black, stereotypic White) × 2 (Target Valence: positive, negative) with the first factor manipulated between participants (see Appendix for a full explanation of design).

Cue Exposure Manipulation

As in previous work (see Bartholow & Heinz, 2006; Stepanova et al., 2012), participants were randomly assigned to view either six advertisements for alcoholic beverages - (alcohol-cue priming condition) or six advertisements for nonalcoholic beverages (e.g., water, juice, etc.; neutral-cue priming condition). Participants rated each advertisement on five dimensions: how pleasing, interesting, and persuasive was each advertisement; how clear the message of the ad was; and how likely the participant would be to purchase the product, using scales anchored at 1 (= *not at all*) and 7 (= *extremely*). Each advertisement was displayed until the participant completed all five ratings.

Racial Bias Task

This task was modeled after the one used in Wittenbrink et al. (1997). Participants were given the following instructions:

> "In this task you will see a number of word and nonword letter strings. At the beginning of each trial, you should focus your eyes on the asterisk that will appear in the center of the screen. You will then see a brief flash, followed by a row of Xs, and then a word or nonword letter string will appear. As quickly as possible, you should press the 'p' key on the keyboard if you see a real word, or the 'q' key if you see a nonword."

On each trial, a centrally-located asterisk appeared for one second, after which one of five prime stimuli – "Black," "White," "XXXXX," "table," or "lemon" – was shown for 25 ms. We employed a very brief and not necessarily subliminal presentation of primes, as we could not verify complete absence of awareness of primes for all participants (10 participants reported seeing the prime words). The mask "XXXX" was shown next for 250 ms. Finally, the target word was shown for 250 ms; participants were given an unlimited amount of time to respond. The prime words "Black" and "White" were shown on 50% of the trials (25% each); the neutral prime "XXXXX" appeared on 25% of the trials, and the control primes "table" and lemon" accounted for the remaining 25% of trials. Each prime was presented 58 times, resulting in 232 trials total. Out of 58 trials, on 10 trials the following target was a nonword. On the remaining 48 trials, target words were adjectives stereotypically associated with Blacks or Whites (analogous to Wittenbrink et al., 1997; see Appendix for the full list of stereotypical targets). Both Black and White stereotypical targets varied on valence as well: half of the targets were positively valenced and half were negatively valenced. The set of 48 positively and negatively valenced words, stereotypically associated with Blacks and Whites, was fully crossed with three prime types (Black, White, and XXXX). When filler items were presented (on 58 trials), on 10 trials the following target was a nonword, and on the remaining 48 trials the following targets were positive and negative adjectives that could not be referred to human beings such as "round" or "deserted." Participants completed 232 trials in each of two blocks.

Table 1. Drinking measures in Experiment 1

Variable	Alcohol-cue condition *M, SD*	Neutral-cue condition *M, SD*
Drinking occasions per week, last 3 months	1.14, 1.24	0.98, 1.36
Number of drinks on any one occasion, last 3 months	3.24, 2.21	3.57, 2.77
Drinking occasions per week, last 12 months	1.14, 1.30	0.87, 1.26
Number of drinks on any one occasion, last 12 months	3.27, 2.08	3.28, 2.57

Note. $N = 118$.

Questionnaire Measures

To characterize the alcohol use behaviors of the sample and ensure that participants assigned to different priming conditions did not differ in their typical alcohol use behaviors, participants were asked to complete six questionnaire items (adapted from the NIAAA Task Force on Recommended Alcohol Questions, 2003) assessing their alcohol use. Participants reported the average number of drinking occasions experienced per week, average number of drinks consumed per occasion in both the past 3 months and 12 months, and maximum number of drinks consumed in one sitting in the past 30 days and in lifetime.

To permit tests of exploratory hypotheses concerning potential moderation of alcohol-cue exposure effects on implicit racial biases, participants completed self-report measures designed to assess their explicit racial biases and alcohol-related expectancies. Participants were asked to complete the Symbolic Racism Scale (Henry & Sears, 2002), the Modern Racism Scale (McConahay, 1986), feeling thermometers (asking participants to respond how they feel toward several social groups, including Whites and Blacks, using responses from 1 = *very cold/unfavorable* to 7 = *very warm or favorable*), the Social Dominance Scale (Pratto, Sidanius, Stallworth, & Malle, 1994), and the Motivation to Control Prejudice questionnaire (Plant & Devine, 1998). Alcohol-related expectancies tapping social disinhibition were measured using questions such as: I would act without thinking, often doing the first thing that comes to mind; I would be unconcerned about how I should behave in certain situations; I would find it difficult to stop myself from doing something, even if I knew I shouldn't; I would be unaware of, or unconcerned about, how others feel about my behavior; I would do or say embarrassing things in the company of others; and I would freely express my attitudes regarding socially-sensitive subjects with response options from 1 = *strongly disagree* to 5 = *strongly agree*. These measures were ordered randomly for each participant and collected after the LDT so that they would not sensitize participants or cause inadvertent priming effects. Lastly, we also assessed participants' awareness of our experimental manipulations by asking them the following questions:

(a) Was there anything strange or suspicious about this experiment? If yes, what was it?;
(b) Did you think that you participated in two separate unrelated studies? If no, what did you think? Was there any theme?;
(c) Do you feel that any task in this experiment influenced your responses on another part of the experiment? If yes, how so?

Procedure

Participants were run in groups ranging in size from one to six individuals, each seated in individual cubicles. Participants were told that they were partaking in two different studies. It was explained that the first study was to evaluate advertisements on several dimensions. The second study, they were told, was to examine their judgments of various lexical stimuli. The participants were first randomly assigned to one of the two cue priming conditions, after which they were asked to provide demographic information. They then completed the cue exposure task (i.e., advertisement ratings), followed immediately by the primed LDT. Finally, participants completed the self-report questionnaire measures, were debriefed and dismissed.

Results

Lifetime alcohol abstainers ($n = 22$) were excluded from the final sample used for analyses, based on the logic that implicit memory associations formed via repeated pairing of alcohol and its behavioral effects differ qualitatively for abstainers (who have only indirect knowledge of such associations) as compared to individuals with personal drinking experience, and more generally on the idea that abstention from a behavior represents a qualitative departure from low levels of a behavior (see Krueger et al., 1994). The final sample, therefore, included 118 participants. There were no significant differences between the two cue priming conditions in drinking habits among participants, ts < 1.17, ps > .24 (see Table 1). Due to several extreme values for answers on a number of drinks consumed in one sitting in the past 30 days and in lifetime and our inability to determine if these values are typos, we decided not to compare values on those answers.

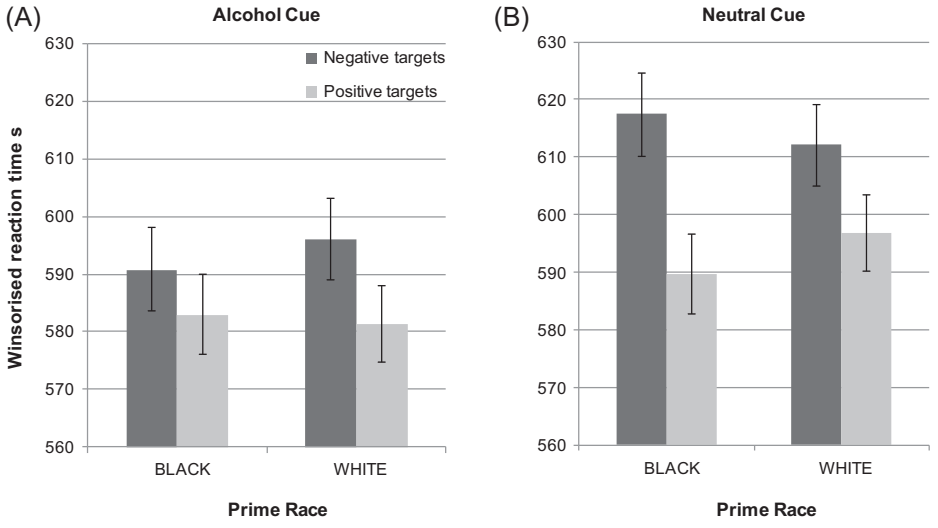

Figure 1. Winsorized reaction times as a function of target valence and race of prime in the alcohol-cue priming condition (A) and the neutral-cue priming condition (B), Experiment 1. Error bars represent standard errors.

Means for each of the Prime Race (Black, White) × Target Stereotypicality (stereotypical Black, stereotypical White) × Target Valence (positive, negative) combinations were calculated, aggregating across the 12 items for each of the stereotypicality and valence cells of the design. That produced a set of eight reaction times score means: Prime Race (Black, White) × Target Stereotypicality (stereotypical Black, stereotypical White) × Target Valence (positive, negative). Only responses on correct trials were included.

Inspection of the reaction time (RT) distributions across conditions indicated they were not normally distributed and were unduly influenced by a few outliers. Thus, RT distributions were trimmed, first, by deleting trials with RTs < 100 ms (to eliminate fast guessing responses) and trials with RTs > 1,500 ms. Next, RT values > 2 *SD* from each participant's mean were replaced with values = 2 *SD* from their mean (see Barnett & Lewis, 1978; Ratcliff, 1993). The resulting distributions were suitable for analyses of variance (ANOVA).

The winsorized RT scores were submitted to a 2 (Cue Condition: alcohol, nonalcohol) × 2 (Prime Race: Black, White) × 2 (Target Sterotypicality: Black, White) × 2 (Target Valence: positive, negative) mixed ANOVA with the first factor manipulated between participants and all the other factors-within participants.[1] A marginally significant Cue Condition × Prime Race × Target Valence interaction[2] emerged, $F(1, 116) = 3.21$, $p = .076$, $\eta^2_p = .027$, 90% CI = [0.00, 0.09].

On Black prime trials, the difference between RTs on positively and negatively valenced targets, regardless of their stereotypicality, was greater in the neutral priming condition, $t(58) = 4.06$, $p < .001$, than in the alcohol priming condition, $t(58) = 1.27$, $p = .21$. Specifically, RTs on negative targets ($M_{neg} = 617.45$, $SE_{neg} = 14.48$) were longer than on positive targets ($M_{pos} = 589.77$, $SE_{pos} = 13.89$, 90% CI = [−0.36, 0.74]) on Black primes in the neutral, but not in the alcohol priming condition ($M_{neg} = 590.78$, $SE_{neg} = 14.48$ and $M_{pos} = 582.96$, $SE_{pos} = 13.89$, 90% CI = [−0.40, 1.54]). There were no statistically significant differences between RTs to positive and negative targets for White primes in each of the cue priming conditions. The data suggests that participants had less positive attitudes toward Black primes in the alcohol than in the neutral-cue priming condition (see Figure 1).

The Cue Condition × Prime Race × Target Stereotypicality interaction was not significant, $F(1, 116) = 0.98$, $p = .32$, $\eta^2_p = .008$, 90% CI = [0.00, 0.05], nor was the higher-order interaction involving all predictors, $F(1, 116) = 1.75$, $p = .19$, $\eta^2_p = .015$, 90% CI = [0.00, 0.07]. Note that inclusion of the 22 abstinent participants reduced the magnitude of the Cue Condition × Prime race × Target Valence interaction, $F(1, 138) = 1.12$, $p = .29$, $\eta^2_p = .008$, 90% CI = [0.00, 0.05].

[1] The full design also included nonwords and fillers as targets and filler primes. Responses on these trials were not analyzed (per Wittenbrink et al., 1997). We also decided not to include responses on neutral primes "XXXXX." Our decision was based upon a short-lived nature of alcohol priming effects (Pedersen et al., 2014), so we strived to have a more direct race-based comparison (i.e., responses on BLACK vs. WHITE primes) to detect the effect.

[2] When all participants who reported seeing the prime words were also excluded (resulting in a sample size of $N = 110$), the values for the interaction in question were the following: $F(1, 116) = 2.07$, $p = .15$, $\eta^2_p = .019$, 90% CI = [0.00, 0.07]. Information on prime awareness was gathered by reviewing answers given to the questions assessing experimental manipulation awareness (see Questionnaire Measures section).

When Gender of Participants was entered as a factor, no interactions with Gender emerged. We recoded Race of Participants, creating White and non-White groups, and ran parallel analyses with it as a fixed factor. No interactions with Race emerged.

Exploratory hypotheses concerning potential moderation of predicted effects (i.e., the Cue Condition × Prime Race × Target Valence, the Cue Condition × Prime Race × Target Stereotypicality interactions, or the interaction involving all the predictors) by alcohol expectancies, use, and explicit race bias were tested. None of these analyses produced any significant interactions indicating moderation of the effects in question. However, there was one significant interaction involving one question assessing prior alcohol use (i.e., Think of all the times in the past twelve months when you had something to drink. How often have you had some kind of beverage containing alcohol?) and Prime race, $F(1, 115) = 4.77$, $p = .031$, $\eta^2_p = .04$, 90% CI = [0.002, 0.1]. For those who indicated lower alcohol usage, there were no significant differences in reaction times on trials with Black ($M = 596.83$, $SE = 12.11$) and White primes ($M = 593.19$, $SE = 11.71$), $F(1, 116) = 1.05$, $p = .31$, $\eta^2_p = .009$, 90% CI = [0.00, 0.06]. For those who indicated higher alcohol usage, participants responded faster on trials with Black ($M = 593.27$, $SE = 16.91$) than White primes ($M = 602.63$, $SE = 16.36$), $F(1, 116) = 3.57$, $p = .06$, $\eta^2_p = .03$, 90% CI = [0.00, 0.09]. Given that (a) higher order interactions with these factors involving either Target stereotypicality or valence did not reach significance and (b) such effects were not obtained with other questions assessing alcohol use or the sum of four alcohol use questions, we will not discuss this interaction any further.

Discussion

When participants had been exposed to alcohol-related images, they had less positive attitudes toward Black primes in the LDT compared to when they had been exposed to neutral images, as indicated by the difference in RTs on positively and negatively valenced targets for Black primes. The effects obtained indicate that simple exposure to alcohol-related cues might affect attitudes toward and not necessary stereotypes of Blacks.

While attitudes toward and not stereotypes of Blacks differed across two cue exposure conditions, participants in the neutral-cue condition showed no evidence of racial bias, at least not a negative, anti-Black bias. Instead, they showed a positivity bias toward Black targets, which was attenuated after exposure to alcohol cues. That pattern of results raises concerns that the task we employed does not tap into racial bias. To address that, in the LDT we used target words that were stereotypes of Blacks and Whites to increase accessibility of race concept. Additionally, the cues used in the neutral priming condition (water, PowerAde, tea, juice, and coffee) might have produced this positivity bias for Black primes. Specifically, simple exposure to nonalcoholic beverages followed by the race bias task might have made a particular Black stereotype accessible, that of the Mammy (Bobo, 1995; Collins, 1990), a hospitable and nurturing figure, producing a positivity bias toward Blacks in the neutral-cue condition. Perhaps a different control condition (i.e., presentation of no ads at all) could have produced results in line with the typical negativity bias toward Black primes.

More importantly, given a fairly complex design of the study, the statistical power to detect the effects might have been low. The key Cue Condition × Prime Race × Target Valence interaction was marginally significant and the lower bound of the 90% confidence interval for the effect size was zero. In order to address this problem, we conducted a high-powered and preregistered replication of Experiment 1.

Experiment 2

Experiment 2 was a preregistered direct replication of Experiment 1 (for more information, see "Preregistration Information" below).

Below we report how we determined our sample size, all data exclusions, all manipulations, and all measures used in Experiment 2.

Method

Participants

The planned replication was based on Experiment 1 in which 118 nonabstainers (from alcohol) were included in the analyses. Using a mixed factorial design with one between-subjects factor, a predicted 3-way interaction was marginally significant using this sample, $F(1, 116) = 3.21$, $p = .076$, $\eta^2_p = .027$. According to G*power, adequate power to detect an effect comparable to this one using the same design in the replication requires a sample of 148 participants. To ensure that this many nonabstainers would be available for analyses, we planned to recruit a total sample of $N = 160$ participants (see the OSF preregistration).

Data collection started initially at one site (University of Missouri), but after several months of data collection, it became apparent that we would not be able to collect all the required data at one site and we expanded recruitment and data collection to three additional sites (The University of Southern Mississippi, Hattiesburg and Gulf Coast campuses, and the Family YMCA of Southeast Mississippi). Participants recruited at university campuses were undergraduate students, and those recruited at the YMCA were adults from the community. Due to collecting data at multiple sites, we slightly over-recruited beyond our original goal of 160 (i.e., 185 participants). We attempted to limit recruitment to only nonabstainers (from alcohol). However,

Table 2. Drinking measures in Experiment 2

Variable	Alcohol-cue condition *M*, *SD*	Neutral-cue condition *M*, *SD*
Drinking occasions per week, last 3 months	1.15, 1.14	1.05, 1.21
Number of drinks on any one occasion, last 3 months	4.22, 2.87	3.52, 2.12
Drinking occasions per week, last 12 months	0.96, 0.95	0.98, 1.14
Number of drinks on any one occasion, last 12 months	3.77, 2.51	3.46, 1.97

Note. N = 152.

19 individuals who completed the study indicated on self-report alcohol use measures that they were abstainers. Additionally, several participants withdrew from the study after beginning, resulting in 14 incomplete cases. Excluding all nondrinkers and incomplete cases resulted in a final sample of 152 participants (M_{age} = 22.54, SD = 7.77; 34.2% male), consistent with the number (N = 148) deemed necessary by G*power to detect the effect. Participants included in the final sample reported their ethnicity as follows: 69.7% European American or White, 17.1% African American or Black, 5.9% multiracial, 4.6% Asian American or Asian, 1.3% Hispanic or Latino/Latina, and 1.3% Other.

Procedure and Materials

Procedure and materials were identical to Experiment 1. Participants received either research participation credit or US $10 as remuneration.

Results and Discussion

There were no significant differences between the two cue priming conditions in drinking habits among participants, ts < 1.71, ps > .09 (see Table 2). Again, due to several extreme values for answers on a number of drinks consumed in one sitting in the past 30 days and in the lifetime, we did not compare values on those answers.

Analogous to Experiment 1, we calculated means for each of the Prime Race (Black, White) × Target Stereotypicality (stereotypical Black, stereotypical White) × Target Valence (positive, negative) combinations, aggregating across the 12 items for each of the stereotypicality and valence cells of the design. We did not analyze responses on (a) neutral or filler primes and (b) nonword and filler targets; only responses on correct trials were included. The RT distributions were trimmed, first, by deleting trials with RTs < 100 ms and with RTs > 1,500 ms. Next, RT values > 2 *SD* from each participant's mean were replaced with values = 2 *SD* from their mean.

The winsorized RT scores were submitted to a 2 (Cue Condition: alcohol, nonalcohol) × 2 (Prime Race: Black, White) × 2 (Target Stereotypicality: Black, White) × 2 (Target Valence: positive, negative) mixed ANOVA. The Cue Condition × Prime Race × Target Valence interaction in question was not significant, $F(1, 150) = .76$, $p = .38$, $\eta^2_p = .005$, 90% CI = [0.00, 0.04]. No other interactions were significant, including the Cue Condition × Prime race × Target Stereotypicality interaction, $F(1, 150) = .41$, $p = .53$, $\eta^2_p = .003$, 90% CI = [0.00, 0.03], or the higher-order interaction[3] involving all predictors, $F(1, 150) = .59$, $p = .44$, $\eta^2_p = .004$, 90% CI = [0.00, 0.04][4]. Inclusion of the 19 abstinent participants in the analyses did not change these patterns. Therefore, we concluded that exposure to alcohol cues did not enhance either racial stereotyping or prejudice in Experiment 2.

Even though the predicted interactions were not observed, we performed exploratory analyses concerning potential moderation of the predicted effects by alcohol expectancies, alcohol use, and explicit race bias. While we did not detect moderating effects, there was one significant interaction involving drinking frequency, namely, a Prime Race × Target Valance × Target Stereotypicality × Drinking Frequency interaction, $F(1, 149) = 6.20$, $p = .014$, $\eta^2_p = .04$, 90% CI = [0.004, 0.10]. The simple effect of Prime race was significant within high drinking frequency, positive Target valence, and White target stereotypicality combination, $F(1, 148) = 7.67$, $p = .006$, $\eta^2_p = .05$, 90% CI = [0.008, 0.12]. The simple effect of Prime race was not significant within all other combinations of factors. Individuals who indicated more frequent alcohol use responded more

[3] Performing the same analysis on non-winsorised RT values (i.e., before RT values > 2 *SD* from each participant's mean were replaced with values = 2 *SD* from their mean) produced analogous findings, with none of the interactions described reaching significance. We are reporting this analysis here due to our commitment in the OSF pre-registration; however, we believe that our analyses on the winsorised RTs are more accurate, given the data.

[4] When all participants who reported seeing the prime words were also excluded (resulting in a sample size of N = 137), none of the interactions in question reached significance.

When Gender of Participants was entered as a factor, no interactions with Gender emerged. We recoded Race of Participants, creating White and non-White groups, analogous to Experiment 1, and ran parallel analyses with it as a fixed factor. No interactions with Race emerged.

quickly on trials with White primes and White stereotypical positive targets (M = 593.67, SE = 15.20) than on trials with Black primes and White stereotypical positive targets (M = 614.92, SE = 15.23). Given the highly complicated and unpredicted nature of this interaction, as well as the fact that it was limited to only one of the alcohol use items we measured (i.e., Think of all the times in the past twelve months when you had something to drink. How often have you had some kind of beverage containing alcohol?), we believe it would be inappropriate to interpret its significance within the context of this study.

General Discussion

In Experiment 1, when participants were primed with the alcohol-related images, their reactions to Black primes became less positive in the LDT than when they were primed with the neutral images. However, we failed to replicate this effect in a high-powered preregistered replication (Experiment 2).

It is important to note that alcohol priming effects are short-lived. Recent research on the temporal effects of alcohol priming suggests that such short temporal delays as 15 min (after exposure to alcohol-related cues) effectively erase effects of alcohol priming (Pedersen et al., 2014). In our work participants completed the race bias task, which was administered immediately after the alcohol priming task within a similar time frame of 15 min or less. Perhaps our weak findings in Experiment 1 and lack thereof in Experiment 2 can be attributed to waning effects of alcohol priming. Given that the task we employed to measure racial prejudice and stereotyping relied on a priming technique itself (the race-priming LDT) with BLACK and WHITE as prime words, it is possible that racial primes effectively erased any influence that alcohol primes might have exerted. In other words, the race-priming LDT might not be an especially good measure of racial bias for detection of alcohol priming effects, especially given a long nature of the task. For comparison, participants completed 232 trials in each of two blocks (464 trials total) versus 192 trials total in the WIT (Stepanova et al., 2012) that also relied on a priming technique (primes of Black and White faces) but was shorter and detected the effects of alcohol priming.

Previous research suggests that exposure to alcohol cues increases expressions of racial bias through social disinhibition. Alcohol often is linked to more extreme social behaviors by removing inhibiting cues (Steele & Josephs, 1990) and reduced social anxiety (Wilson, Abrams, & Lipscomb, 1980). In addition to biasing perception of others' intentions (Pedersen et al., 2014), work by Freeman et al. (2010) indicates that priming with alcohol cues facilitates expression of usually inhibited social behaviors. Such social disinhibition effects were observed only when participants were informed that their responses would be allegedly monitored by the experimenter, supporting the idea that alcohol-cue exposure specifically alleviated social pressure. In the current study, such a "social disinhibition" effect could have manifested in alcohol-primed participants being more willing to express their true (and less positive attitudes) toward Blacks if they believed that their performance *will be observed and evaluated*. Perhaps absence of evaluation apprehension contributed to absence of alcohol priming effects in our work.

In fact, the primed LDT did not detect any racial bias whatsoever. Participants had somewhat positive attitudes toward Blacks in Experiment 1 and no racial preferences in Experiment 2, as indicated by responses on White primes and positive targets in the neutral priming conditions in Experiment 1 and no significant differences in responding to combinations of racial primes, stereotypical targets, and valenced targets in Experiment 2. It is possible that our samples were composed of younger individuals who either had a positivity bias toward Blacks or no implicit preferences. Note that we recruited different participants across two experiments, and participants were recruited from a variety of locations. It is also possible that the priming methodology developed by Wittenbrink et al. (1997) is simply not as reliably associated with stereotype (or prejudice) activation as previously believed.

Lastly, we did not observe moderation of the obtained (in Experiment 1) or expected (in Experiment 2) effects by alcohol-related expectancies. In general, the effects of alcohol-related cues are explained by activation of (a) explicit alcohol outcome expectancies or (b) alcohol-related implicit memory associations. While explicit alcohol outcome expectancies are beliefs about the effects of alcohol, implicit memory associations are associations formed by direct and indirect experiences with alcohol (Reich, Below, & Goldman, 2010; Stacy, 1995, 1997; Wiers & Stacy, 2006). We did not measure alcohol-related implicit memory associations, and therefore, cannot comment on potential moderation of such in our data. One of the explanations of the (lack of) the expectancy effects in this work is perhaps, the absence of explicit expectancies related to alcohol consumption and expressions of racial bias.[5]

[5] Note that previous research investigating effects of alcohol-cue exposure on hostility (Bartholow & Heinz, 2006; Friedman et al., 2007) or social disinhibition (Freeman et al., 2010) found no moderation of the alcohol priming effects by either drinking frequency of quantity. We included other measures (e.g., assessing explicit racial biases) to test exploratory hypotheses concerning potential moderation of predicted effects. No such moderation was observed in any analyses, and therefore these measures are not discussed.

In considering how the current findings fit with the larger body of research on alcohol-cue priming effects, given the very small effects observed in the current studies, it would appear prudent to be skeptical of the specific hypothesis that exposure to alcohol cues decreases positive attitudes toward racial outgroup members. Previous research has shown that, among White undergraduates, exposure to alcohol cues can enhance expression of racial bias against Blacks (Stepanova et al., 2012) and produce harsher judgments of Black experimenters (Stepanova et al., in press). The current research represented a conceptual replication and extension of those previous studies, and the current results suggest that those previous findings might be more sensitive to methodological differences across studies than was expected. Here, not only was no effect of alcohol-cue priming observed on general evaluative prejudice, but indeed no evidence of stereotype activation was seen, either. Thus, it could be that the priming method used in Stepanova et al. (2012), in which participants completed the Weapons Identification Task (Payne, 2001), is both more likely to demonstrate a general bias and more sensitive to moderation of that bias by situational factors, including the presence of alcohol cues.

The primary goal of research examining effects of alcohol-cue priming is to understand whether simple exposure to alcohol-related cues is sufficient to produce changes in behavior that often are associated with alcohol consumption. In that regard, the current study could be instructive concerning boundary conditions for alcohol-cue priming effects as well as the psychological processes by which alcohol effects on social behavior might operate. One conclusion from the current work is that alcohol-cue priming is unlikely to affect stereotype activation as measured with the specific procedures used here (i.e., associations between racial categories and valenced stereotypic concepts). In general, this finding is consistent with previous work showing that alcohol consumption similarly does not affect the strength of association between racial categories and stereotypic words (Bartholow et al., 2006). Considered in this context, the current studies contribute to a larger body of evidence suggesting that alcohol, whether consumed or merely experienced as a visual percept, does not increase stereotype activation in a general way. Continued research will help to further clarify the conditions under which exposure to alcohol-related cues affects social behavior. Attempts at conceptual replication, such as the one reported here, are an important component of that overall effort.

Preregistration Information

Experiment 2 was a preregistered direct replication of Experiment 1 (see preregistration at https://osf.io/swmre/); the complete copy of the project is available at https://osf.io/vgyrt/.

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Appendix

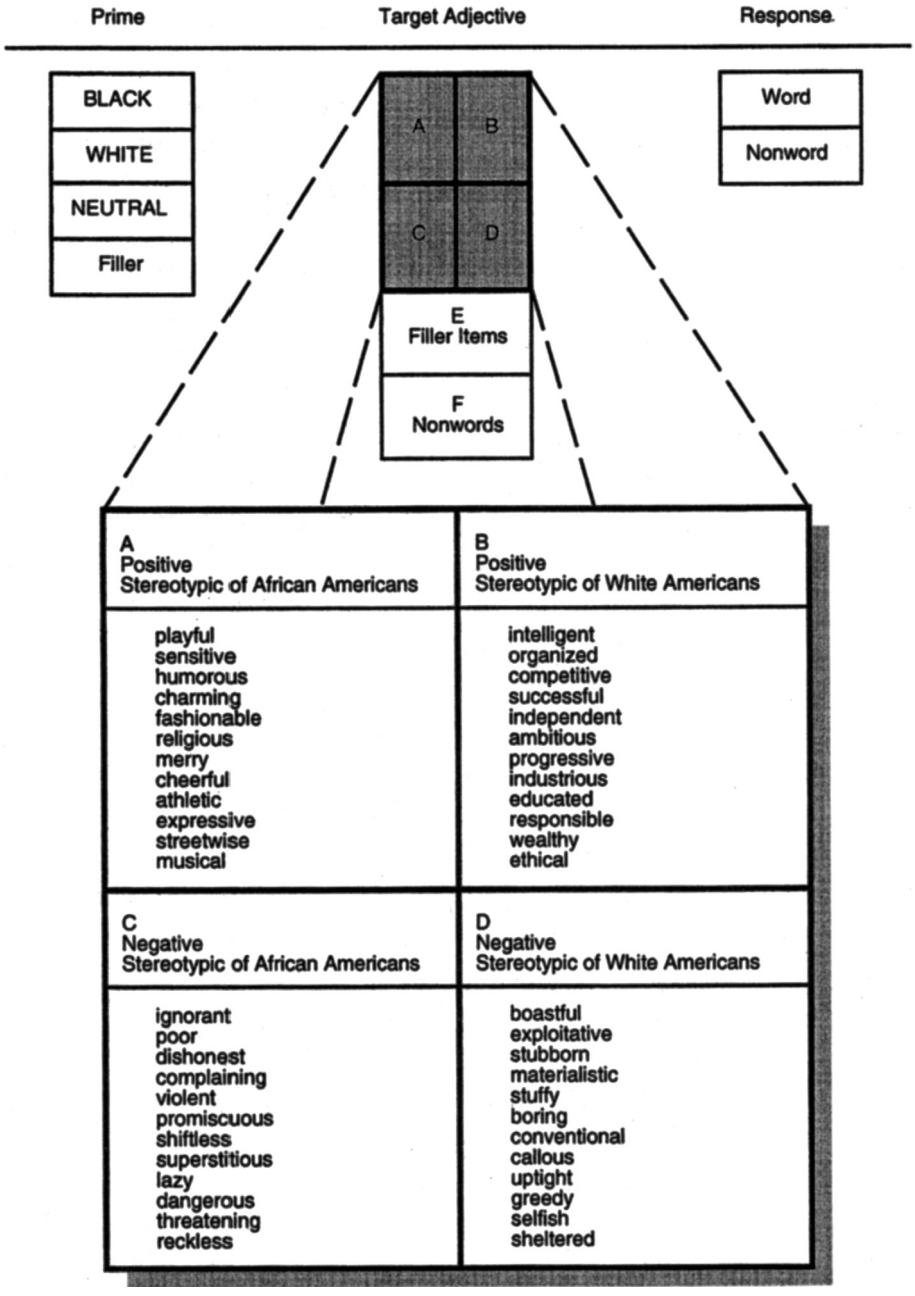

Figure A1. The lexical decision task consisted of word-nonword judgments to a target item. Besides fillers (E) and nonwords (F), the stimulus pool for this target item included trait adjectives that were either stereotypic of African Americans (and counterstereotypic of Whites; A and C) or stereotypic of Whites (and counterstereotypic of African Americans; B and D). Within each set of stereotypic items, half of the items were positively valenced (A and B), and half were negative in valence (C and D). The target item was preceded by a subliminally presented prime that referred to one of the two social groups (African Americans and Whites), was neutral, or was a filler. Figure and figure caption reprinted with permission: Wittenbrink et al. (1997). Evidence for racial prejudice at the implicit level and its relationship with questionnaire measures. Journal of Personality and Social Psychology, 72, 262–274. © American Psychological Association.

