



Effects of evaluative context in implicit cognitions associated with alcohol and violent behaviors[☆]



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ABSTRACT

Introduction: A large body of literature has substantiated the relationship between alcohol use and violent behaviors, but little consideration has been given to implicit interactions between the two. This study examines the implicit attitudes associated with alcoholic drinks and violent behaviors, and their relationship to explicit reports of problematic behaviors associated with alcohol use.

Methods: The Go/No-Go Association Task (GNAT; Nosek & Banaji, 2001) was used to test the effect of distracters (noise) on implicit cognitions associated with alcoholic drinks and violent behaviors. Data was collected from 148 students enrolled in a Midwestern university.

Results: Irrespective of contextual distractions, participants consistently exhibited negative implicit cognitions associated with violent behaviors. However, context impacted the valence of cognitions associated with alcoholic beverages. Implicit cognitions associated with alcoholic beverages were negative when nonalcoholic beverages were used as distracters, but were positive when licit and illicit drugs were used as distracters. Implicit cognitions associated with alcoholic drinks were correlated with implicit cognitions associated with violent behaviors and explicit measures of problem drinking, problem drug-related behaviors, and measures of craving, to name a few.

Conclusion: Evaluative context can have an effect on the expressed appraisal of implicit attitudes. Implications, limitations, and future directions for using the GNAT in addictions research are discussed.

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1. Introduction

Alcohol consumption among young adults has become increasingly problematic in the United States. According to the National Epidemiologic Survey on Alcohol Related Conditions (NESARC), nearly 70% of young adults in the U.S. consumed alcohol in the last year (Grant et al., 2004). Additionally, the literature consistently illustrates that young adults tend to drink their heaviest in their late teens and early-to mid-twenties (Monti, Tevyaw, & Borsari, 2004), thus making them prone to heavy and/or binge drinking during this stage of life (National Survey on Drug Use and Health, 2008).

The level of binge and heavy drinking among young adults is concerning due to the known association between alcohol use and violent behaviors. Alcohol is linked to more than 696,000 physical assaults

and 97,000 sexual assaults each year in the U.S. (Giles, Champion, Sutfin, McCoy, & Wagoner, 2009; Hingson, Heeren, Winter, & Wechsler, 2005) and implicated in approximately 16% of violent crimes in the U.S. (U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, 2010 [USDJ]). It has also been reported that between 30 to 40% of men and 27 to 34% of women who perpetuated violence against their partners were drinking at the time of the assault (Caetano, Schafer, & Cunradi, 2001). This finding is consistent with Hines and Straus (2007), who found binge drinking to be associated with the perpetration of interpersonal violence (IPV), and with other previous research demonstrating an association between alcohol use and personal violence in college samples (e.g., Caetano et al., 2001; O'Farrell, Fals-Stewart, Murphy, & Murphy, 2003; Øverup, Dibello, Brunson, Acitelli, & Neighbors, 2015; Shorey, Stuart, McNulty, & Moore, 2014).

Researchers have attempted to explain the relationship between the cognitive processes of violent behavior and the consumption of alcohol. Much of this literature aims to understand underlying causes of alcohol-related aggression and its relation to behavioral expectancies and attentional capacity (Quigley & Leonard, 2006; Rohsenow & Bachorowski, 1984; Giancola, Duke, & Ritz, 2011). In the present study, we attempt to expand this literature by investigating the nature of alcohol-related

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implicit cognitions, implicit cognitions associated with interpersonal violence, and the potential interaction between the two.

1.1. Utility of implicit cognition measures

Paper–pencil measures are regularly used in clinical research for mental health issues, including perceptions on alcohol and violence. While many assessment tools produce scores with adequate reliability and validity, limitations exist in using such measures when assessing complex belief systems of sensitive topics. Namely, the face validity of paper–pencil measures limits the ability of researchers to measure constructs that have the potential to be significantly damaging to one's character (i.e., addictions and interpersonal violence).

Greenwald and Banaji (1995) defined implicit cognitions as “the introspectively unidentified (or inaccurately identified) trace of past experience that mediates a response” (p. 5). Implicit cognitions are representative of documented memory association processes rather than rational decisions or intentional behavior. Implicit cognition measures provide a causally produced index of a certain attitude or cognition that occurs automatically and subconsciously (De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009). Participants completing implicit measures are generally not consciously aware of the attitude or cognition being measured, and are thus unable to access it explicitly and/or exert control over the measurement outcome (de Houwer, 2005). One key benefit of such measures lies in their ability to alleviate factors of social desirability by nullifying learned inhibitions (rational decisions).

For the purpose of this study, the Go/No-Go Association Task (GNAT) was used to measure implicit cognitions associated with alcoholic drinks and interpersonal violence. There are two features of the GNAT that distinguish it from other implicit measures. First, the GNAT is designed to use signal detection statistics (d -prime or d') in its calculation of automatic associations between a target (e.g., alcohol) and an attribute (e.g., good or bad). The primary value of d -prime is not criterion dependent, but instead is a true measure of internal response or signal detection. This approach is different from other implicit measures (e.g., IAT, EAST, etc.) which operate as a function of response latency to determine the strength of implicit associations. By requiring both accurate and time-constrained responding, the GNAT actively restricts cognitive resources and thereby eliminates the potential to override implicit processing with conscious control.

Second, the GNAT provides flexibility in the measurement of contextual characteristics for a given evaluative situation. It is assumed that the closer the relationship between target and evaluative variables, the shorter the response time would be and the greater the accuracy of signal detection. While theories of aggression have sought to explain the relationship between alcohol and violence through traditional correlation methods, implicit cognitive measures allow researchers to hone in on subconscious belief systems, while potentially avoiding confounds stemming from individual's propensities toward the self-preservation of social capital.

1.2. Alcohol- and violence-related implicit attitudes

Prior literature regarding implicit alcohol-related attitudes has yielded mixed findings. Negative implicit attitudes toward alcohol have been evidenced in nonclinical samples of heavy and light drinkers (Wiers, Stacy, et al., 2002; Campos-Melady & Smith, 2012), and clinical samples of heavy drinkers (De Houwer, Crombez, Koster, & De Beul, 2004). However, unipolar implicit measures have suggested that positive alcohol-related implicit attitudes are more predictive of drinking behavior (Houben & Wiers, 2008; Jajodia & Earleywine, 2003). Considering these conflicting findings, Houben and Wiers (2006) suggest that the strength of measured implicit negative associations with alcohol is related to the contrast category (context) utilized. Scherer and Lambert (2012) further highlight the importance of context to indicate

the strength of implicit attitudes, whereby evaluative consistency across contexts indicates stronger implicit attitudes than inconsistent evaluations. The state-like nature of implicit attitudes has also been acknowledged in the literature, challenging previous assumptions that implicit cognitions are highly stable and robust traits (Gawronski, LeBel, & Peters, 2007; Dasgupta & Greenwald, 2001). Indeed, implicit cognitions related to alcohol may be more malleable and susceptible to change than previously thought (Coronges, Stacy, & Valente, 2011). Despite these notions, context effects in implicit alcohol-related cognitions have not been assessed. However, explicitly-based assessments of alcohol use attitudes evidence variability across situational contexts (e.g., Ham, Zamboanga, Bridges, Casner, & Bacon, 2013; Monk & Heim, 2013), in accordance with situational-specificity hypotheses (Wall, McKee, & Hinson, 2000).

Implicit cognitions associated with interpersonal violence have also been investigated. Among children, implicit aggressive attitudes (vs. peaceful) have been positively associated with aggressive behavior (Grumm, Hein & Fingerie, 2011; Richetin, Richardson & Mason, 2010; Gollwitzer, Banse, Eisenbach, & Naumann, 2007). Compared to nonviolent counterparts, violent offenders tend to hold more positive implicit attitudes toward violence, which are often at odds with their explicit reports (Eckhardt, Samper, Suhr, & Holtzworth-Munroe, 2012; Eckhardt & Crane, 2014; Gray, MacCulloch, Smith, Morris, & Snowden, 2003). These findings suggest that implicit measures of violence may not only be useful in predicting violent behavior, but may also help discriminate violent offenders from nonoffenders above and beyond explicit measures. Despite such potential utility, this research base relies heavily on the IAT to determine violence-related implicit attitudes. Using a computationally different measurement tools, such as the GNAT, may therefore be useful in supplementing existing findings.

To our knowledge, there is no published research that has investigated the potential relationship between implicit cognitions associated with alcoholic beverages and interpersonal violence. However, implicit effects of alcohol primes on violence have received some limited attention. Semantic activation of alcohol can increase the accessibility of aggressive thoughts and social disinhibition (Bartholow & Heinz, 2006; Freeman, Friedman, Bartholow & Wulfert, 2010). Moreover, implicit exposure to alcohol-related primes can enhance aggressive behavior, particularly among those who hold strong alcohol outcome expectancies of violent behavior (Brown, Coyne, Barlow & Qualter, 2010; Friedman et al., 2007; Pedersen et al., 2014). These findings collectively suggest that the semantic memory networks associated with alcohol and violence may be closely linked. Because it is not uncommon for violence and alcohol use to co-occur, it is possible that these behaviors may be preceded by overlapping implicit networks that uniquely impact behavioral output. Therefore, further investigation of the implicit association between the two may be helpful in identifying such overlap and thereby delineating behavioral mechanisms between alcohol consumption and aggressive behavior.

1.3. Present study

The purpose of this study was threefold. First, we wanted to further the findings of Houben and Wiers (2006) and investigate the impact salient stimuli (context) has on the activation of alcohol-related implicit cognitions. We hypothesized that the valence of implicit alcohol-related cognitions would depend on the context in which it is evaluated (e.g., nonalcoholic drinks vs. licit and illicit drugs). That is, implicit cognitions associated with alcoholic drinks would be perceived as being “bad” when alcohol is presented in the context of “nonalcoholic drinks”. Conversely, implicit alcohol-related cognitions would be “good” when alcohol is presented in the context of “licit and illicit drugs” (Cavanagh & Obasi, in press).

Second, we wanted to begin to build a literature examining implicit cognitions associated with interpersonal violence and their potential interaction with implicit alcohol-related cognitions. While this research

aim is exploratory in nature, we hypothesized that implicit cognitions associated with interpersonal violence would be more static than those associated with alcohol. Therefore, the valence of interpersonal violence would be unaffected by the context in which the stimuli are presented. More specifically, implicit cognitions associated with interpersonal violence would be perceived as being “bad” irrespective of contextual factors. Given the extant literature, we also expected implicit cognitions associated with interpersonal violence to be positively related to implicit alcohol-related cognitions.

Finally, we wanted to examine the relationship between implicit alcohol-related cognitions and explicit measures of craving, problem drinking, and problem alcohol-related behaviors. We hypothesized that implicit-alcohol related cognitions would be positively associated with craving, problem drinking, and problem alcohol-related behaviors.

In order to test the research hypotheses, 148 participants were randomly assigned to one of two conditions: Condition 1 (GNAT-AN and GNAT-VR) and Condition 2 (GNAT-AD and GNAT-VI). Both conditions were identical with the exception of manipulating the distracters (noise) that were used in the implicit cognition task. More specifically, non-alcoholic drinks were used as distracters for alcoholic drinks (GNAT-AN) in Condition 1, while licit and illicit drugs were used as distracters (GNAT-AD) in Condition 2. Furthermore, recreational activities were used as distracters for violent behaviors (GNAT-VR) in Condition 1, while physical intimacy was used as a distracter (GNAT-VI) in Condition 2.

2. Method

2.1. Participants

Condition 1 participants ($N = 75$) consisted of English-speaking college students (men: $n = 38$, 50.7%; women: $n = 36$, 48.0%; failed to report (FTR): $n = 1$, 1.3%) enrolled at a large public Midwestern university. The ages of the participants ranged from 18 to 41, with an average age of 19.9 ($SD = 3.2$). Self-reported ethnicity/race was European American/White ($n = 38$, 50.7%), African American/Black ($n = 24$, 32.0%), Asian American/Asian ($n = 7$, 9.3%), Latino/a ($n = 3$; 4.0%), Native American ($n = 1$, 1.3%), Biracial ($n = 1$, 1.3%), and FTR ($n = 1$, 1.5%). Each participant was asked: “Have you ever used professional services that were provided by a psychologist?” Seventy-two percent ($n = 54$) reported no, 24.0% ($n = 18$) reported yes, and 4.0% ($n = 3$) failed to report. Participants were recruited for this study as an option for partial fulfillment of a course research requirement. The reported demographics do not include participants that were removed from analyses due to excessive error rates ($n = 8$), defined by Nosek and Banaji (2001) as $d\text{-prime} < 0$. A complete definition of $d\text{-prime}$ is provided later in this article.

Condition 2 participants ($N = 73$) consisted of English-speaking college students (women: $n = 48$, 65.8%; men: $n = 20$, 27.4%; FTR: $n = 5$, 6.8%) enrolled at a large public Midwestern university. The ages of the participants ranged from 18 to 31, with an average age of 19.39 ($SD = 2.0$). Self-reported ethnicity/race was European American/White ($n = 47$, 64.4%), African American/Black ($n = 14$, 19.2%), Latino/a ($n = 4$; 5.5%), Asian American/Asian ($n = 1$, 1.4%), Biracial ($n = 1$, 1.4%), and FTR ($n = 6$, 8.2%). Each participant was asked: “Have you ever used professional services that were provided by a psychologist?” Approximately 73% ($n = 53$) reported no, 19.2% ($n = 14$) reported yes, and 8.2% ($n = 6$) failed to report. The reported demographics do not include participants that were removed from analyses due to excessive error rates ($d' < 0$; Nosek & Banaji, 2001) in this study ($n = 3$).

2.2. Implicit measure

2.2.1. Alcoholic drinks GNATs (GNAT-AN and GNAT-AD)

The GNAT (Nosek & Banaji, 2001) was modified to test implicit cognitions associated with alcohol by associating alcoholic drinks with two

attributes: “good” and “bad”. The task consisted of multiple blocks, allowing “alcoholic drinks” (the target) to be combined with both attributes; consequently, “alcoholic drinks” (i.e., BUDWEISER, CHAMPAGNE, GIN, MARTINI, VODKA, etc.) was paired with “good” in one block and with “bad” in another block. In Condition 1, implicit cognitions (GNAT-AN) associated with alcohol were measured using “nonalcoholic drinks” (i.e., CAPPUCINO, GATORADE, LEMONADE, MILK, PEPSI, TEA, etc.) as the distracter for “alcoholic drinks”. Further, “good” attribute terms served as the distracter for “bad” attribute terms, and vice versa. The GNAT-AD in Condition 2 was identical to the GNAT-AN presented in Condition 1 with one major difference: implicit cognitions associated with alcoholic drinks were measured using “licit and illicit drugs” (e.g., COCAINE, HEROIN, MARIJUANA, PCP, TOBACCO, etc.) as a distracter for “alcoholic drinks” (see Table 2).

Stimuli for all concepts and attributes consisted of written English words. The 24 words used to represent alcoholic drinks, nonalcoholic drinks, and licit and illicit drugs were developed by the first author for the purposes of this study. The 24 words used to represent good and bad attributes were selected from previous research (Bellezza, Greenwald, & Banaji, 1986; Nosek & Banaji, 2001). A sample of the GNAT-AN and GNAT-AD paradigms can be found in Table 2. Labels for the signal (target) category and attribute for each block were continuously presented on the upper left and right quadrants of the computer screen (i.e. “alcoholic drink” and “good”) as a reminder to participants. Stimuli were randomly presented in the middle of the computer screen and participants were instructed to (1) press the “space bar” (a “go” response) as quickly as possible for stimuli belonging to either the defined signal (target) or attribute for the block, or (2) refrain from pressing the “space bar” (a “no go” response) for stimuli that do not belong to either of the pre-defined categories for the block (see Table 2). Performance accuracy was reinforced by presenting (100 ms) a green “O” below the stimulus for correct responses and a red “X” below the stimulus for incorrect responses.

In addition to task instructions, each participant familiarized themselves with the task by participating in four practice blocks that involved detecting signal (target = “alcoholic drinks”) from noise (distracter = “nonalcoholic drinks”) for each target and attribute (e.g., alcoholic drinks, good, and bad) independently. Each practice block consisted of 20 trials with a 1000 ms response deadline. Finally, each participant completed two experimental blocks that combined the target with an attribute (i.e., “alcoholic drink” and “good”; “alcoholic drink” and “bad”). Each block consisted of 76 trials, where the first 16 trials were considered practice trials. Each GNAT was run twice using a different response deadline (700 ms, 550 ms). These response deadlines were found to be fast enough to minimize ceiling effects in error rates, but slow enough to support accuracy sustainability (Nosek & Banaji, 2001). The signal to noise (S/N) ratio was 1:1. While dramatic increases in S/N ratio may magnify automatic activations, this ratio has been found to minimize extraneous variability in GNAT effects (Nosek & Banaji, 2001). Signal detection ($d\text{-prime}$) was used as the dependent variable and the task was administered using Inquisit 2.0. Alcoholic drinks GNAT blocks yielded acceptable reliabilities using the Random Sample of Split Halves (RaSSH) method ($r = 0.66\text{--}0.75$) for the current sample (Williams & Kaufmann, 2012).

2.2.2. Violent Behaviors GNATs (GNAT-VR and GNAT-VI)

The GNAT (Nosek & Banaji, 2001) was again modified to test implicit cognitions associated with violent behaviors by associating violent behaviors (i.e., ASSAULT, FIGHT, MURDER, RAPE, TORTURE, etc.) with two attributes (“good” and “bad”). The GNAT-VR in Condition 1 was identical to the GNAT-AN with two major differences: (1) the target was changed to “violent behaviors”, and (2) implicit cognitions associated with violent behaviors were measured using “recreational behaviors” (i.e., DANCING, JOGGING, PAINTING, TENNIS, YOGA, etc.) as a distracter for “violent behaviors” (see Table 2). A sample of the GNAT-VR paradigm can be found in Table 2. The GNAT-VI in Condition 2 is

identical to the GNAT-VR presented in Condition 1 with one major difference: implicit cognitions associated with violent behaviors were measured using “interpersonal intimacy” (e.g., CUDDLE, FOREPLAY, KISS, SEX, ORGASM, etc.) as a distracter for “violent behaviors” (see Table 2). A sample of GNAT-VI paradigm can be found in Table 2. The 24 words that were used to represent violent behaviors, recreational behaviors, and interpersonal intimacy were developed by the first author for the purposes of this study. Violent behaviors GNAT blocks yielded acceptable RaSSH reliabilities ($r = 0.63\text{--}0.77$) for the current sample (Williams & Kaufmann, 2012).

2.3. Explicit measures

2.3.1. Problem drinking

The Alcohol Use Disorders Identification Test (AUDIT) is a 10-item screening questionnaire developed by the World Health Organization (WHO) designed to measure the amount and frequency of drinking, alcohol dependence, and problems caused by alcohol in adults (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). Higher scores on the AUDIT are associated with problem drinking. More specifically, high-risk alcohol use is associated with an AUDIT score ≥ 8 (Kokotailo et al., 2004). The AUDIT has been shown to have high sensitivity (.94) and moderate specificity (.66) in the detection of high-risk drinkers in college samples when compared to DSM-IV diagnostic criteria for alcohol abuse and dependence (Fleming, Barry, & MacDonald, 1991). The AUDIT produced scores with adequate reliability in this study (Cronbach's $\alpha = .87$). The mean AUDIT score for the Condition 1 sample was 8.40 ($SD = 7.28$). For Condition 2, the AUDIT produced scores with similar reliability to Condition 1 (Cronbach's $\alpha = .88$), with a mean AUDIT score for this sample of 8.82 ($SD = 7.53$).

2.3.2. Reasons for drinking

The Reasons for Drinking Questionnaire (RFDQ; Zywiak, Westerberg, Connors, & Maisto, 2003) is a 16-item self-report rating scale designed to assess reasons for drinking. Previous research supports a three-factor interpretation of the RFDQ: Negative Affect ($n = 8$), Social Pressure ($n = 3$), and Cued Craving ($n = 5$). Participants responded to these items using a Likert scale ranging from 0 (“Not at all important”) to 9 (“Very important”). Overall, the RFDQ produced scores with adequate reliability in this study (Condition 1: Cronbach's $\alpha = .90$; Condition 2: Cronbach's $\alpha = .86$). More specifically, the Negative Affect (Cronbach's $\alpha = .89$) and Social Pressure (Cronbach's $\alpha = .72$) subscales produced scores in the Condition 1 sample with adequate reliability, while the Cued Craving subscale did not (Cronbach's $\alpha = .65$). Similar to Condition 1, the RFDQ Negative Affect (Cronbach's $\alpha = .83$) and the RFDQ Social Pressure (Cronbach's $\alpha = .71$) subscales produced scores in the Condition 2 sample with adequate reliability, while the RFDQ Cued Craving subscale did not (Cronbach's $\alpha = .60$).

2.3.3. Problem drug-related behaviors

The Southern Illinois University (SIU) Core Alcohol and Drug Survey is a 39-item questionnaire developed in 1989 and revised in 1994 by the Core Institute at Southern Illinois University-Carbondale (Presley & Vineyard, 2004). The Core Alcohol and Drug Survey is used to assess the nature, scope, and consequences of alcohol and other drug use on college campuses and has been utilized by more than 1000 colleges throughout the United States. The Core Alcohol and Drug Survey has demonstrated content related validity, test–retest reliability, and item reliability (Presley & Vineyard, 2004). For the purpose of this study, we only included item 21 of this survey. This item included 19 problem behaviors associated with drug use (e.g., hangover, argument or fight, memory loss, DWI, inappropriate sexual behavior, etc.). Participants rated the frequency in which they experienced these behaviors during the past year on a Likert scale ranging from 0 (“Never”) to 5 (“10+ times”). This item set produced scores with adequate reliability in this

sample (Condition 1: Cronbach's $\alpha = .90$; Condition 2: Cronbach's $\alpha = .88$).

2.3.4. Explicit craving

Single-item explicit craving scales were created for this study. More specifically, participants were asked to rate four present urges which included: (1) desire to drink an alcoholic beverage, (2) desire to drink a nonalcoholic beverage, (3) desire to engage in a sexual behavior, and (4) desire to engage in a violent behavior. Explicit urges were measured using a Likert scale ranging from 1 (“Not At All Desire”) to 10 (“Extremely Desire”).

2.4. Demographic questionnaire

A brief demographic questionnaire was administered to quantify sample characteristics in this study. Demographic items included age, gender, and self-identified ethnicity/race.

2.4.1. Procedures

Participants were randomly assigned to Condition 1 or Condition 2, which are differentiated only by the distracter/noise provided in the completed GNATs. Preliminary analyses indicate that random assignment to conditions did not result in any group differences that might confound findings. Next, a research assistant read a script to each participant informing him or her that the present experiment involved the investigation of reaction times associated with various visual stimuli. After a written informed consent was completed, each participant completed either the GNAT-AN followed by the GNAT-VR (Condition 1), or the GNAT-AD followed by GNAT-VI (Condition 2). Then, participants completed the battery of self-report instruments described above. Finally, participants were debriefed of the general nature of the study in a way that simultaneously maintained the integrity of this experiment for future participants. The experiment took approximately 50 min to complete. The study was approved by the Institutional Review Board at the university where this data was collected.

3. Results

Implicit cognitions associated with alcoholic drinks and violent behaviors were measured using a sensitivity index (d -prime or d') in signal detection theory that assessed the participants' ability to discriminate targets (signal) from distracters (noise). According to Nosek and Banaji (2001), the use of d' assumes that participants will be more sensitive (i.e., discriminate signal from noise more easily) when the two components are positively associated relative to when they are not associated (or negatively associated). Greater sensitivity is indicative of a stronger association between the target category and attribute; thus an unobtrusive measure of implicit cognition toward the target category (Nosek & Banaji, 2001). d -prime was calculated using the conventional algorithm designed for the GNAT (see Nosek & Banaji, 2001 for details).

3.1. Condition 1

Participants showed greater sensitivity when ALCOHOLIC DRINKS and BAD ($d' = 1.88$) were signals than when ALCOHOLIC DRINKS and GOOD were signals ($d' = 1.41$; $t(66) = -6.371$, $p < .001$, Cohen's $d = -0.78$). This large effect suggests that bad implicit cognitions were associated with alcoholic drinks when nonalcoholic drinks were used as noise. Furthermore, participants showed greater sensitivity when VIOLENT BEHAVIORS and BAD ($d' = 1.65$) were signals than when VIOLENT BEHAVIORS and GOOD were signals ($d' = 0.98$; $t(66) = -11.159$, $p < .001$, Cohen's $d = -1.37$). This large effect suggests that bad implicit cognitions were associated with violent behaviors when recreational behavioral activities were used as noise (see Fig. 1).

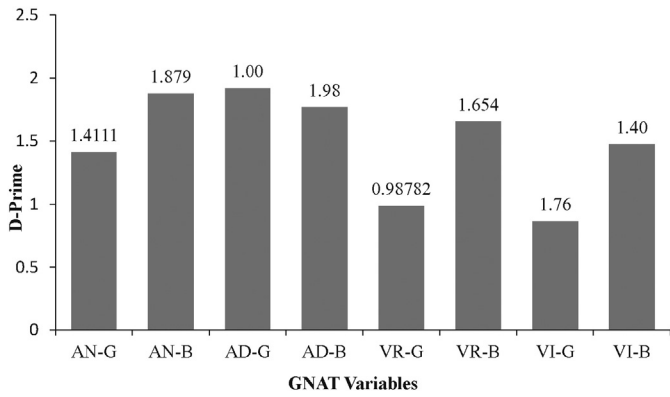


Fig. 1. Impact of contextual distracters (noise) on implicit cognitions associated with alcoholic drinks and violent behaviors. Note. AN-G = “Good” paradigm of Condition 1 GNAT-AN. AN-B = “Bad” paradigm of Condition 1 GNAT-AN. AD-G = “Good” paradigm of Condition 2 GNAT-AD. AD-B = “Bad” paradigm of Condition 2 GNAT-AD. VR-G = “Good” paradigm of Condition 1 GNAT-VR. “Bad” paradigm of Condition 1 GNAT-VR. VI-G = “Good” paradigm of Condition 2 GNAT-VI. VI-B = “Bad” paradigm of Condition 2 GNAT-VI.

Implicit cognitions associated with alcoholic drinks were significantly correlated with problem drinking ($r = .30, p = .019$), problem drug-related behaviors ($r = .27, p = .040$), social pressure to drink ($r = .38, p = .002$), explicit craving for an alcoholic beverage ($r = .32, p = .008$), and explicit craving to engage in sexual behaviors ($r = .30, p = .016$). Furthermore, implicit cognitions associated with alcoholic drinks were also correlated with implicit cognitions associated with violent behaviors ($r = .43, p < .001$). No other significant relationships were found between the implicit and explicit measures used in this study.

3.2. Condition 2

The purpose of Condition 2 was to examine if the context of distracters (noise) affects the valence of implicit cognitions associated with alcoholic drinks and violent behaviors. More specifically, licit and illicit drugs were used as distracters (noise) for alcoholic drinks as opposed to nonalcoholic drinks. Additionally, behaviors associated with interpersonal intimacy were used as distracters (noise) for violent behaviors as opposed to recreational behavioral activities as used in Condition 1 (see Table 1 and Table 2).

Participants showed greater sensitivity when ALCOHOLIC DRINKS and GOOD ($d' = 1.92$) were signals than when ALCOHOLIC DRINKS and BAD were signals ($d' = 1.77, t(69) = 2.801, p = .007, Cohen's d = 0.34$). This small effect suggests that good implicit cognitions were associated with alcoholic drinks when licit and illicit drugs were used as noise. Interestingly, the valence of the implicit alcohol related cognitions changed as a function of the context in which the target was presented. Of note, this change in valence has been replicated in our lab with other independent samples (Cavanagh & Obasi, in press). Participants also showed greater sensitivity when VIOLENT BEHAVIORS and BAD ($d' = 1.47$) were signals than when VIOLENT BEHAVIORS and GOOD were signals ($d' = 0.87, t(69) = -10.082, p < .001, Cohen's d = -1.21$). This large effect suggests that bad implicit cognitions

Table 1
Using the Go/No-Go Association Task (GNAT) to measure implicit cognitions associated with alcoholic drinks and violent behaviors.

Target	Distracter (noise)	Timeout (ms)
Alcoholic drinks GNAT (GNAT-AN)	Nonalcoholic drinks	700 ms, 550 ms
Alcoholic drinks GNAT (GNAT-AD)	Licit and illicit drugs	700 ms, 550 ms
Violent behaviors GNAT (GNAT-VR)	Recreational behaviors	700 ms, 550 ms
Violent behaviors GNAT (GNAT-VI)	Interpersonal intimacy	700 ms, 550 ms

Table 2
Summary of the Go/No-Go Association Task (GNAT) paradigm.

Alcoholic drinks Go/No-Go Association Task (GNAT-AN)				
Sequence	Key press	1	Key press	2
Task description		Target 1 + good attribute combined task		Target 1 + bad attribute combined task
Task instructions		Alcoholic drinks good		Alcoholic drinks bad
Sample stimuli	*	PINA COLADA	-	CAPPUCCINO
	-	COCA-COLA	*	BRANDY
	*	Joyful	-	Superb
	-	Angry	-	PEPSI
	*	LIQUOR	*	Tragic
	*	Pleasure	*	MARGARITA
	-	Bad	-	Likable
	-	FANTA	*	Evil

Alcoholic drinks GNAT Go/No-Go Association Task (GNAT-AD)				
Sequence	Key press	1	Key Press	2
Task description		Target 1 + good attribute combined task		Target 1 + bad attribute combined task
Task instructions		ALCOHOLIC DRINKS good		ALCOHOLIC DRINKS bad
Sample stimuli	*	BEER	-	ECSTASY
	-	COCAINE	*	VODKA
	*	Happy	-	Joyful
	-	Horrible	-	PCP
	*	SCOTCH	*	Unpleasant
	*	Friendly	*	GIN
	-	Noxious	-	Wonderful
	-	LSD	*	Destroy

Table 2
Summary of the Go/No-Go Association Task (GNAT) paradigm (continued).

Violent behaviors Go/No-Go Association Task (GNAT-VR)				
Sequence	Key press	1	Key press	2
Task description		Target 2 + good attribute combined task		Target 2 + bad attribute combined task
Task instructions		VIOLENT BEHAVIORS good		VIOLENT BEHAVIORS Bad
Sample stimuli	*	CHOKE	-	Excitement
	-	Good	*	ASSAULT
	*	JUMP	-	HIKING
	-	Dislike	-	Likable
	*	RAPE	-	PAINTING
	*	Awful	*	Terrible
	-	YOGA	*	STAB
	-	Splendid	*	Destroy

Violent behaviors Go/No-Go Association Task (GNAT-VI)				
Sequence	Key press	3	Key press	4
Task description		Target 2 + good attribute combined task		Target 2 + bad attribute combined task
Task instructions		VIOLENT BEHAVIORS good		VIOLENT BEHAVIORS bad
Sample stimuli	*	BURN	-	Fabulous
	*	Celebrating	*	RAPE
	-	CUDDLE	-	SEX
	-	Nasty	-	Marvelous
	*	SHOOT	-	KISS
	-	Awful	*	Revolting
	-	MASTURBATE	*	FIGHT
	*	Happy	*	Angry

Note. “*” delineates a “Go” response (i.e., spacebar pressed) for stimuli belonging to either the defined target or attribute for the block. “-” delineates a “No-Go” response (i.e., do nothing) for stimuli that do not belong to either of the pre-defined categories for the block.

were associated with violent behaviors when examples of interpersonal intimacy were used as noise (see Fig. 1). This was consistent with Condition 1.

Implicit cognitions associated with violent behaviors were correlated with drinking for the purpose of coping with Negative Affect ($r = .26$, $p = .037$). No other significant relationships were found between the implicit and explicit measures used in this study.

4. Discussion

While there is a breadth of research that supports increased risk of interpersonal violence when consuming alcohol, little is known about the nature of this relationship. The present study proposed three research aims that were conceptualized for the purpose of furthering our understanding of these two constructs independently, and of the potential relationship between them. All hypotheses were supported within the current sample. Alcohol valence (good vs. bad) was relative given the context in which it was presented. When alcoholic drinks were presented in the context of nonalcoholic drinks, participants tended to express an implicit attitude toward alcohol that was “bad”. However, when presented in the context of licit and illicit drugs, participants tended to express an implicit attitude toward alcohol that was “good”. Indeed, licit and illicit drugs provided a context that appeared to shift the valence of implicit alcohol-related cognitions from good to bad. These results support the need for addiction researchers to reconceptualize our understanding and assessment of alcohol-related cognitions. No longer can we assume that attitudes toward alcohol are categorically good or bad. Instead, the context in which alcohol is evaluated appears to be an important factor to consider.

Many of these findings had a medium to large effect size and have been consistently replicated with other independent samples (Cavanagh & Obasi, *in press*). To date, much of the implicit alcohol-related cognition research has either used soft drinks as the target category of interest in relation to the evaluative attribute (i.e., pleasant or unpleasant words), or has employed unipolar measures, which do not provide evaluative contrast categories. As a result, little evidence exists about the shifting valence of alcohol-related implicit attitudes when compared to varying target stimuli (e.g., nonalcoholic drinks, illicit drugs, etc.).

Implicit attitudes toward interpersonal violence have been largely understudied, though existing studies demonstrate their utility in predicting violent behavior, particularly among offending inmates (Eckhardt et al., 2012; Eckhardt & Crane, 2014; Gray et al., 2003). Here, we expanded the study of this topic to undergraduate populations, and found consistently negative attitudes toward violence. In the context of both recreational behaviors and interpersonal intimacy, interpersonal violence was viewed as “bad.” It should be noted that the variability in distracter valences (i.e., recreational behavior and interpersonal violence) within this domain is markedly less than in the alcohol GNATs. However, it is difficult to identify a noise category that is both qualitatively linked to interpersonal connection and normatively more negative than interpersonal violence. It was further found that implicit attitudes toward alcohol and interpersonal violence were positively correlated when alcohol was evaluated in contrast of nonalcoholic drinks, which is consistent with behavioral research linking alcohol consumption to interpersonal violence (Hines & Straus, 2007). While this highlights a novel and potentially relevant finding, replication and extension of the implicit interactions between alcohol and violence is required before definitive interpretations can be made regarding their relation to co-occurring behavioral output.

Collectively, these findings suggest that implicit attitudes about violence may be less susceptible to contextual influences than implicit attitudes about alcohol. Because interpersonal violence has a strongly and consistently negative social connotation, it may be the case that implicit attitudes about violence will usually be associated with negative experiences. Alcohol, on the other hand, may be associated with both positive

and negative experiences, as evidenced by unipolar IATs (Houben & Wiers, 2008; Jajodia & Earleywine, 2003). Therefore, evaluative context in alcohol-related appraisals may play a more influential role than in violence-related appraisals.

It has been further suggested within the attitude literature that the consistency of expression across situational contexts is an indicator of attitude strength (Conner & Sparks, 2002; Scherer & Lambert, 2012; Scherer & Lambert, 2009). From this perspective, stronger attitudes are relatively insensitive to situational contexts, whereas weak attitudes are more vulnerable to contextual influences. Therefore, these findings may be interpreted such that implicit attitudes about alcohol are fairly weak – and thereby more likely to be influenced by situational cues – whereas implicit attitudes to violence tend to be predominately negative.

Participants who held “good” implicit cognitions associated with alcoholic drinks (when evaluated in contrast to nonalcoholic drinks) were also more likely to endorse high levels of alcohol craving, problem drinking, and problem behaviors. These results are consistent with the literature that links alcohol to problem behaviors such as binge drinking, drunk driving (Yi, Williams, & Smothers, 2004), and unsafe sexual practices (Hingson et al., 2005). Our data also suggests that implicit cognitions associated with alcoholic drinks were more strongly related to craving, problem drinking, and problem drug-related behaviors when the distracter was nonalcoholic drinks as opposed to licit and illicit drugs. Additionally, alcohol-related implicit cognitions were found to be positive in heavy drinkers, a finding in contrast to previous IAT research (de Houwer et al., 2004; Wiers, van Woerden, et al., 2002). However, Houben and Wiers (2008) assert that positive implicit associations with alcohol may have more influence on drinking behavior than the strength of negative implicit associations.

Our findings also indicated that the GNAT-AN exhibited greater effect sizes and stronger correlations with several explicit measures, compared to the GNAT-AD. This presents an interesting trend that may be related to the strength of the measure itself. Alternatively, we suggest that this finding may be more related to the inherent ontology of implicit cognitions, in the sense that they represent long-standing memory associations between concepts (Greenwald et al., 1998). It is likely that participants have had a wide range of both personal and extrapersonal (i.e., within the larger societal framework) experience with nonalcoholic drinks throughout their lifetime, resulting in complex and well-developed memory networks. On the other hand, experience with licit and illicit drugs is likely much more limited both at the individual and societal level, resulting in more underdeveloped implicit networks. Because alcohol is at once a drink and a drug, both evaluative contexts are semantically linked to alcohol and can therefore exert differential influence on its appraisal. However, variable experience with these larger semantic categories may result in neural networks that respectively vary in complexity, salience, and interconnection to other constructs.

Ultimately, the findings of the current study support the notion that implicit alcohol-related cognitions can be different depending on its evaluative context. Such flexibility can guide how clinicians gather information for treatment purposes and the ways in which questions are asked. Given that alcohol-related cognitions may be responsive to contextual factors, this information may further our understanding of drinking behaviors and how they differ in various environments. While research has supported theories that link environmental cues (Treno, Gruenewald, Remer, Johnson, & LaScala, 1995), heavy drinking behaviors (Wiers, van Woerden, Smulders, & de Jong, 2002b; Wells, 2007), and alcohol expectancies (Quigley & Leonard, 2006; Rohsenow & Bachorowski, 1984; and Zhang, Welte, & Wieczorek, 2002) to alcohol-related aggressive behaviors, findings in the area of the Go/No-Go Association Task measures of alcohol-related aggressive behaviors may lead to more practical, population specific intervention strategies that improve explicit decision making in light of positive implicit alcohol associations.

This study demonstrates a novel relationship between the valence of implicit alcohol-related cognitions and the context in which the target is presented. Moreover, the GNAT has been limited in its application to addiction research. This GNAT is of additional interest given the fact that the Go/No-Go paradigm can be used as an assessment of impulsivity—an endophenotype of interest to addiction researchers (Hines, Ray, Hutchison, & Tabakoff, 2005; MacKillop, Obasi, Amlung, McGeary, & Knopik, 2010). Taken together, the current findings substantiate the need for future research in this area.

4.1. Limitations

While this study demonstrates a novel use of the GNAT for understanding implicit alcohol-related cognitions and violent behavior, it is not without limitations. Because the study was conducted with undergraduates at a Midwestern university where, on average, students have high levels of self-disclosure of alcohol consumption, we do not know if results will generalize to older populations or clinical samples. However, the replication of the contextual variability of implicit alcohol-related implicit cognitions found by our research laboratory serves to substantiate this paradigm within this sample. While the GNAT uses an experimental research design and can infer causal relationships, the correlational research design connecting implicit cognitions with explicit measures of drinking behaviors and individual reasons for drinking may be less effective in explaining the relationship between the implicit and explicit measures used in this study. Lastly, both contextual categories against which interpersonal violence was evaluated are arguably positive in valence (recreational and sexual activities). The valence of attitudes regarding interpersonal violence may be more susceptible to change in the context of other unimaginable events (i.e. natural disasters).

4.2. Future directions

Given the contextual variability of alcohol-related cognitions noted in the present study, together with previous results showing the influence of drinking behaviors on interpersonal violence, it seems of societal relevance to devote more research to investigating the variability of implicit alcohol-related cognitions in additional contexts (e.g., crime, weapons). In addition, future studies examining how sociocultural variables (e.g., race, gender, ethnicity, and social class) might mediate the relationship between implicit alcohol-related cognitions and interpersonal violence would be beneficial. Research aimed at extending our understanding of similar sociocultural variables could prove beneficial in informing intervention strategies. Lastly, a longitudinal research design would provide the ability to test the potential for alcohol-related implicit cognitions to predict alcohol consumption patterns and associated behaviors.

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Conflict of interest

All authors declare that they have no conflicts of interest.

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