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Drink refusal self-efficacy and implicit drinking identity: An evaluation of moderators of the relationship between self-awareness and drinking behavior

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Abstract

This study evaluated the roles of drink refusal self-efficacy (DRSE), implicit drinking identity, and self-awareness in drinking. Self-awareness (assessed by public and private self-consciousness), DRSE, and implicit drinking identity (measured via an implicit association test; IAT) were expected to interact in predicting self-reported drinking. This research was designed to consider mixed findings related to self-awareness and drinking. Hypotheses were: 1) alcohol-related outcomes would be negatively associated with self-awareness; 2) implicit drinking identity would moderate the association between self-awareness and alcohol consumption; and 3) this association would depend on whether participants were higher or lower in drink refusal self-efficacy. Participants included 218 undergraduate students. Results revealed that drinking behavior was not associated with self-awareness but was positively associated with implicit drinking identity. Of the four drinking variables (peak drinking, drinking frequency, drinks per week, and alcohol-related problems), only alcohol-related problems were positively associated with self-awareness. Furthermore, a significant two-way interaction emerged between private (but not public) self-consciousness and drinking identity to predict drinking. Consistent with expectations, three-way interactions emerged between self-awareness, implicit drinking identity, and DRSE in predicting drinking. For participants low in DRSE: 1) high implicit drinking identity was associated with greater drinking frequency when private self-consciousness was low; and 2) high implicit drinking identity was associated with greater drinks per week and peak drinks when public self-consciousness was low. This suggests that alcohol-related IATs may be useful tools in predicting drinking, particularly among those low in self-awareness and DRSE.

Keywords

implicit association test; IAT; private self-consciousness; public self-consciousness alcohol

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Contributors

Dawn Foster designed the study, wrote the protocol, conducted literature searches, provided summaries of previous research studies, conducted the statistical analysis, and wrote the first draft of the manuscript. Clayton Neighbors and Chelsie Young contributed through revisions of subsequent drafts of the manuscript. All authors contributed to and have approved the final manuscript.

Conflict of Interest

All authors declare that they have no conflicts of interest.

1. Introduction

Despite current intervention and prevention efforts, heavy drinking among undergraduate students continues to be problematic. Research shows that young adults engage in heavy drinking and experience a range of alcohol-related problems, including poor class attendance, hangovers, trouble with authorities, injuries, and even fatalities (Hingson et al., 2005; Hingson, 2010; Wechsler et al., 2000; Wechsler et al., 1994). Research has demonstrated links between sexual assault, risky sexual behavior, and college drinking (Abbey et al., 2003; Kaysen et al., 2006; Koss & Gaines, 1993; Larimer et al., 1999), depression (Geisner, Larimer, & Neighbors, 2004), and eating disorders (Dunn et al., 2002). Estimates of prevalence demonstrate that four out of five undergraduate students drink at least occasionally, two-thirds of college students drink at least monthly, and two out of five students frequently consume several drinks on a given occasion (Johnston, O'Malley, Bachman, & Schulenberg, 2006). Moreover, 43.6% of undergraduate students, compared to 38.4% of non-college peers, report heavy episodic drinking (five or more drinks in a row during the past two weeks; SAMHSA, 2008). Reports published by the NIAAA (2007) examining trends in the magnitude of the morbidity and mortality related to college drinking show that almost 20% of college students meet DSM-IV criteria for alcohol abuse or dependence, however less than 5% of undergraduates seek counseling or treatment for alcohol abuse (NIAAA, 2007). Additional research is needed to understand how to further translate empirical findings into effective interventions to reduce drinking and related problems (Hingson, 2010).

1.1. Self-awareness

College drinking can be examined using the theory of objective self-awareness, which posits that self-awareness is a reflective process that involves attention being inwardly focused towards the self rather than outwardly focused towards the environment (Duval & Wicklund, 1972). Alcohol-related studies have evaluated self-awareness as an individual difference trait. One study found that for adolescents low in self-awareness, a family history of alcoholism was associated with higher drinking levels and related consequences, but this relationship did not emerge among adolescents high in self-awareness (Chassin et al., 1988). This suggests that the association between self-awareness and drinking may vary as a function of other correlates of drinking. More recently, self-consciousness has been used as an individual trait measure of self-awareness (e.g., LaBrie, Pedersen, Neighbors, & Hummer, 2008). Self-consciousness is defined as the selective encoding process of information that is self-relevant (Niaura, Wilson, & Westrick, 1988) and consists of both private self-consciousness, which is cognitive and related to attendance to inner reflections, and public self-consciousness, which is related to the self as a social object that is influenced by others (Fenigstein et al., 1975; Fenigstein, 2009). Private self-consciousness refers to introspection on one's own thoughts and feelings, whereas public self-consciousness refers to a focus on how one interacts with others (Fenigstein, Scheier, & Buss, 1975).

Niaura, Wilson, and Westrick (1988) conducted a study in which 72 healthy males were divided into Type A and B groups, and further subdivided into low and high private self-consciousness. Half of participants were randomly assigned to consume alcohol, and half

placebo, and they were then exposed to a stressor (e.g., self-disclosing speech). Findings showed that alcohol dampened autonomic responsiveness (increased systolic blood pressure reactivity and sensitivity to alcohol effects) during the speech stressor among Type A individuals low in private self-consciousness (Niaura et al., 1988). This suggests that a task forcing participants to focus on discrepancies between the actual and ideal self (e.g., a speech stressor related to drinking behavior) might be aversive for those low in private self-consciousness based on the natural tendency to avoid the uncomfortable self-aware state, and this discomfort may be reflected in increased autonomic arousal (Niaura et al., 1988). Alcohol may interfere with the salience of these discrepancies, thereby dampening autonomic responsiveness (Niaura et al., 1988). Additional research has found that private self-consciousness was protective for both fraternity and sorority Greek members, however, only public self-consciousness buffered against drunkenness for fraternity members (Park, Sher, & Krull, 2006). Consistent with these findings, LaBrie, Pedersen, Neighbors, and Hummer (2008) found that private self-consciousness predicted less drinking among college students. This study further showed that public self-consciousness predicted alcohol-related consequences beyond self-reported drinking for both genders.

In sum, research examining the association between self-awareness (measured via self-consciousness) and drinking has been mixed, with some findings suggesting a positive association (Niaura et al., 1988) and others suggesting a negative association (LaBrie et al., 2008; Park et al., 2006). This suggests the possibility of moderators yet to be identified. Thus, further research is needed to better elucidate individual difference factors influencing the effect of self-awareness on drinking.

1.2. Implicit drinking identity

Implicit attitudes may help us understand the mixed findings related to self-awareness and drinking. Many processes that affect drinking behavior are cognitive and unconscious (Greenwald, Poehlman, Uhlmann, & Banaji, 2009). The manifestation of implicit alcohol-related attitudes as behaviors can occur without conscious awareness of causation, which presents difficulties in measuring attitudes using self-report methods. Additionally, in studies examining alcohol consumption, implicit measures are particularly beneficial as they are less subject to the influence of self-presentation biases which can pose a stronger threat to explicit measures (Hofmann et al., 2005; Sayette et al., 2000). One widely known implicit attitude measure is the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998), an experimental method that evaluates automatic processes through the measurement of timed reactions between word and/or picture pairings (Greenwald, McGhee, & Schwartz, 1998; Nosek, Greenwald, & Banaji, 2007). The IAT has been applied to alcohol use research in efforts to predict drinking from implicit associations (e.g. Houben & Wiers, 2008; Jajodia & Earleywine, 2003; Lindgren, Neighbors, Ostafin, Mullins, & George, 2009; Ostafin, Marlatt, & Greenwald, 2008; Wiers, Van Woerden, Smulders, & De Jong, 2002). Furthermore, a recent study comparing several alcohol-related IATs found the implicit drinking identity IAT to be the best at predicting drinking, alcohol-related problems, and craving (Lindgren et al., in press).

Despite conceptual overlap between self-awareness and implicit attitudes, no one has yet considered implicit attitudes as a potential moderator of the relationship between self-awareness and drinking. According to the theory of planned behavior (Ajzen, 1991), explicit attitudes are a key contributor in the prediction of behavior. Research also indicates that considering self-identification within this theoretical framework can contribute to better prediction of behavioral outcomes (e.g., Pierro, Mannetti, & Livi, 2003; Smith et al., 2007). As individuals seek to maintain consistency in views of the self (Lalwani & Shavitt, 2009), self-identity may be a powerful predictor of behavior. Drinking identity is typically defined as how closely individuals believe that consuming alcohol is a crucial aspect of their identities (Conner, Warren, Close, & Sparks, 1999). An implicit analogue of drinking identity, which does not require explicit self-reporting, has also been found to be positively associated with drinking and related consequences (e.g., Casey & Dollinger, 2007; Lindgren et al., in press). As implicit aspects of the self such as the self-concept have traditionally been measured using the IAT (e.g., Gray, LaPlante, Bannon, Ambady, & Shaffer, 2011; Greenwald & Farnham, 2000), a drinking identity IAT was used for this study.

Individual differences in implicit drinking identity may account for variations in alcohol associations. The connection between increased drinking and self-awareness is that drinking is presumed to provide psychological relief from unpleasant states of self-awareness (Hartman, 1986; Hull, 1981); however, not everyone is likely to be equally affected by internal discomfort. Recent research involving implicit measures suggests that drinking identity associations are powerful and reliable predictors of drinking (Lindgren et al., 2012; Lindgren, Foster, Westgate, & Neighbors, 2013). Drinking identity has been shown to positively correlate with and significantly predict alcohol consumption and problems (Lindgren, Neighbors, et al., 2012; Lindgren, Foster, et al., 2013). Thus, we considered how implicit drinking identity might influence the relationship between self-awareness and alcohol use. Individuals with *stronger* implicit drinking identity may be more likely to drink to reduce self-awareness, whereas those with weaker associations with implicit drinking identity may reduce unpleasant self-aware states by modifying behaviors to be more consistent with inner values (e.g., drinking less). Those with *less strong* implicit drinking identity may be more likely to drink based on intrapersonal and interpersonal cues (e.g., social influence). Thus, higher implicit identity might be more strongly associated with drinking to reduce uncomfortable self-awareness compared to lower implicit drinking identity. This may, in turn, suggest the need to consider additional factors, such as how much control or confidence individuals have in their ability to regulate their own drinking.

1.3. Drink refusal self-efficacy

We propose that the interaction between self-awareness and drinking identity in predicting alcohol consumption may differ as a function of self-efficacy, specifically drink refusal self-efficacy. Self-efficacy beliefs are identified as the foundation of human agency (Bandura, 1982; 2000). Self-efficacy concerns self-perceived competence, such as the belief that one can cope with situations (Bandura, 2000). Drink refusal self-efficacy (DRSE) in particular refers to the belief that one is able to refuse or resist drinking alcohol and is a useful predictor of alcohol consumption (e.g., Baldwin, Oei, & Young, 1993; Morawska & Oei, 2005; Oei & Morawska, 2004; Skutle, 1999; Solomon & Annis, 1990). Additionally,

research has demonstrated that DRSE is a mediator of the relationship between alcohol-related expectancies and drinking (e.g., Gullo, Dawe, Kambouropoulos, Staiger, & Jackson, 2010; Morawska & Oei, 2005) and is associated with drinking in non-clinical samples (e.g., Young, Hasking, Oei, & Loveday, 2007), and with abstinence following treatment (Maisto, Connors, & Zywiak, 2000).

Literature suggests that DRSE has been consistently negatively associated with drinking (e.g., Connor, George, Gullo, Kelly, & Young, 2011; Oei & Jardim, 2007). Additionally, DRSE has been shown to moderate the relationship between protective behavioral strategies (PBS), drinking, and problems such that individuals low in PBS and low in DRSE are at increased risk for alcohol use and problems (Ehret, Ghaidarov, & Labrie, 2013). Further, DRSE has been shown to mediate the relationship between alcohol expectancies and problems (Connor et al., 2011) and moderate the association between alcohol expectancies and drinking (Oei & Jardim, 2007). Literature on the intersection of DRSE with self-awareness or identity in predicting alcohol use or problems is limited. Social psychological studies have evaluated self-consciousness with respect to concepts including global measures for self-competence, self-confidence (Miller, 1995), or self-presentation in social media (e.g., Sun & Wu, 2012), and although these constructs overlap conceptually with self-efficacy, they are not specific to alcohol use. Thus, there is a gap in the literature related to evaluations of DRSE's influence on self-awareness and implicit drinking identity in the prediction of alcohol use. As such we formulated an exploratory hypothesis with respect to how DRSE would interact with self-awareness and implicit drinking identity.

This interaction may be most important among individuals who do not feel confident in their ability to resist drinking. Even as self-awareness might be less strongly associated with drinking among those who do not have strong implicit drinking identities, this association may be further limited to those who do not feel some degree of certainty in their ability to regulate their drinking. That is, individuals with strong associations with implicit drinking identity who have low DRSE may turn to alcohol in efforts to reduce the uncomfortable self-aware state. In other words, highly self-aware individuals with strong alcohol-related implicit attitudes who are seeking to decrease self-awareness and who do not feel confident that they can resist alcohol might have significantly higher drinking levels relative to individuals who are confident in their ability to resist alcohol. Conversely, those who are more confident in their ability to resist drinking might not turn to alcohol for psychological relief and may have lower drinking levels compared to individuals low in DRSE. Thus, we expect that the interaction between self-awareness and implicit drinking identity will depend on whether one is high versus low in DRSE.

1.4. Current study

The present study was designed to evaluate the relationship between self-awareness and drinking by considering two potential moderators, implicit drinking identity and DRSE. Our first hypothesis was that based on previous research (LaBrie et al., 2008; Park et al., 2006), a negative association between self-awareness and drinking would emerge. Additionally, consistent with previous research, we expected that DRSE would be negatively associated with drinking. Our second hypothesis was that implicit drinking identity would moderate the

association between self-awareness and alcohol consumption because those with stronger implicit drinking identity would be especially likely to drink as a result of high levels of self-awareness such that individuals with higher IAT scores on the implicit drinking identity IAT may be more likely to drink to reduce self-awareness compared to individuals with lower IAT scores. An alternate second hypothesis was that those who do not implicitly identify with alcohol might be more likely to be affected by intrapersonal and interpersonal cues whereas those with a stronger alcohol-related implicit identity may consume higher levels of alcohol regardless of their level of self-awareness. Our third hypothesis was that the interaction between self-awareness and implicit drinking identity would depend on whether one is higher or lower in DRSE, being more evident among those with less confidence in their ability to regulate their alcohol consumption. Self-awareness and implicit identity were not expected to have as much influence among those with greater confidence in their ability to regulate their drinking. Thus, we evaluated a three-way interaction between self-awareness, implicit attitudes, and DRSE.

2. Method

2.1. Participants

Participants included 218 undergraduate students (82% female) from a large southwestern university who were recruited via in-class recruitment and flyers and received extra credit as compensation for participation. Participants' mean age was 22.93 years ($SD = 6.29$). Participants self-reported the following races: 34% Caucasian, 19% Black/African American, 20.6% Asian/Pacific Islander, 6% Multi-Ethnic, 0.4% Native American/American Indian, and 20% Other. Additionally, 30% of participants reported as Hispanic/Latino.

2.2. Measures

2.2.1. Demographics—Participants provided demographic information such as age, gender, racial background, and student status.

2.2.2. Alcohol use and related problems—*The Quantity/Frequency Scale* (Baer, 1993; Marlatt, Baer, & Larimer, 1995) is a 5-item scale assessing the number of drinks and the number of hours spent drinking on a peak drinking event within the last month, as well as the number of days out of the month that the individual consumed alcohol (0 = I do not drink at all, 1 = about once per month, 2 = two to three times a month, 3 = once or twice per week, 4 = three to four times per week, 5 = almost every day, 6 = I drink once daily or more). *The Daily Drinking Questionnaire* (Collins et al., 1985; Kivlahan, Marlatt, Fromme, Coppel, & Williams, 1990) measures the number of standard drinks consumed on every day of a normal week (Monday-Sunday) within the last 3 months. Scores represent the average number of drinks that are consumed over the course of each week during the previous month. Relative to other drinking indices, weekly drinking has been shown to be a reliable index of problems related to alcohol among college students (Borsari, Neal, Collins, & Carey, 2001). Both the Quantity/Frequency Scale and the Daily Drinking Questionnaire include standard drink definitions. *The Rutgers Alcohol Problem Index* (RAPI; White & Labouvie, 1989) is a 25-item measure that assesses alcohol-related negative consequences in

the last month and the responses range from never (0) to 10 times or more (4). The measure was modified to add two driving items. Items were rated based on how many times each problem occurred while consuming alcohol, such as “went to work or school high or drunk” and total summed scores for the RAPI ranged from 0 to 100 (White & Labouvie, 1989).

2.2.3. Self-awareness—Participants completed the 23-item Self-Consciousness Scale (Fenigstein et al., 1975) which is comprised of items that measure private self-consciousness (e.g., “I’m always trying to figure myself out,”; $\alpha = .69$), public self-consciousness (e.g., “I’m concerned about what other people think of me,”; $\alpha = .81$), and social anxiety (e.g., “It takes me time to overcome my shyness in new situations,”; $\alpha = .80$). Participant responses were based on a 5-point Likert scale ranging from extremely uncharacteristic (0) to extremely characteristic (4).

2.2.4. Implicit drinking identity—The IAT was used to examine automatic associations with alcohol using pictures and words as stimuli (Lindgren et al., 2009; Ostafin & Palfai, 2006) and was presented using Inquisit software (Draine, 2004). The seven phases of the IAT include practice tasks to orient subjects with the sorting rules and stimulus materials (Nosek, Greenwald, & Banaji, 2007). A drinking identity IAT was used to assess alcohol-related implicit associations with respect to identification as a drinker (Lindgren et al., in press). A schematic of the IAT involves the assessment of the strength of association between categories of “self-identification as a drinker” and categories of “no self-identification as a drinker.” For example, stimuli from the “drinker” or “me” categories were sorted by pressing a key on the left, whereas stimuli from the “non-drinker” or “not me” categories were sorted by pressing a key on the right. Following two blocks wherein multiple trials were presented, the pairings were switched such that stimuli belonging to the “non-drinker” or “me” categories were sorted using a key on the right. The order of pairings was counterbalanced.

A scoring algorithm (D) is recommended by the creators of the IAT (Greenwald, Nosek, & Banaji, 2003) and is arrived at by dividing the difference between test block means by the standard deviation of all of the latencies in the two test blocks. This is similar to the effect-size measure, Cohen’s d (Cohen, 1977). Evaluations with respect to IATs have often focused on two main aspects; valence and association with constructs. The D -score of an IAT indicates attitude, and this can be positive or negative valence (represented by a positive or negative D -score). If the D -score is significantly different from zero, this indicates a preference for one category over the other. Further details regarding the IAT form and block trials can be found above and in Greenwald et al. (1998).

Using procedures detailed in Nosek and colleagues (2007), all IAT data were screened for exclusion such that responses to 10% or more of the trials in less than 300 milliseconds were discarded. Eleven scores were excluded from the IAT. Additionally, data were screened for overly slow responders such that responses to more than 10% of trials in greater than 10,000 milliseconds were discarded. No participants met that criterion. Therefore, less than 5% percent of the scores for each IAT were discarded. The correlation between D scores using data from test blocks (4 and 7) and practice blocks (3 and 7) were used to examine internal

consistencies. Typically, these correlations range from .5 to .7 for most IATs (see Greenwald et al., 2003).

2.2.5. Drink refusal self-efficacy—The Drink Refusal Self-Efficacy Questionnaire, a 19-item scale, was used to assess self-efficacy related to drinking (DRSEQ; Young & Oei, 1996). Participants were given a list of situations in which people may find themselves drinking alcohol and were asked to rate their ability to resist drinking on a 6-point Likert scale ranging from 1 = I am very sure I could NOT resist drinking to 6 = I am very sure I could resist drinking ($\alpha = .83$).

2.3. Procedure

Students who met eligibility criteria (e.g., at least 18 years of age and a registered student) completed a computer-based survey including measures of alcohol use DRSE, self-awareness, and three separate alcohol-related IATs. All self-report and IAT measures were counterbalanced such that half of the participants completed the IAT first and the other half completed the self-report measures first to minimize potential priming effects and demand artifacts. Recruitment for screening was open until we reached our target of approximately 200 students. Participants received course extra credit for their participation.

3. Results

3.1. Descriptives

Means, standard deviations, and correlations for all of the variables are presented in Table 1. Low and high values on variables were determined by subtracting or adding one standard deviation from the mean of each variable. The drinking variables (peak drinks, drinking frequency, drinks per week, and alcohol-related problems) were significantly and positively correlated with each other and with IAT scores, suggesting that heavier drinkers tend to more closely associate themselves with a drinking identity. Alcohol-related problems were positively associated with both private and public self-consciousness suggesting that those experiencing greater frequencies of alcohol-related consequences are also high in self-awareness. Peak drinks and drinking frequency were negatively associated with social anxiety such that those high in social anxiety drank less and less frequently than those low in social anxiety. Private self-consciousness, public self-consciousness, and social anxiety were positively associated with one another, suggesting that those high in private self-consciousness are also high in public self-consciousness as well as social anxiety. DRSE was negatively associated with the drinking variables such that those high in DRSE reported less drinking behavior, which supports the first hypothesis. For illustrative purposes we have provided a table of means at low and high levels of DRSE based on a median split (Table 2).

3.2. Frequencies and internal consistencies

Seventy-eight (32.1%) participants reported zero drinks in the past month. Forty-two (17.3%) participants reported their peak consumption on one occasion as one to two drinks in the past month. Forty-five (18.5%) participants reported their peak consumption in the past month to be three to four drinks on one occasion. Seventy-eight (32.1%) participants reported their peak consumption as five or more drinks on one occasion in the past month.

Internal consistencies were calculated as correlations of D scores from IAT blocks 3 and 6 and from IAT blocks 4 and 7 according to procedures specified by Greenwald et al. (2003) and Lindgren, Foster, Westgate, and Neighbors (2013). Correlations typically range from .5 to .7 (see Greenwald et al., 2003). The drinking identity IAT from the current study was .54.

3.3. Primary analyses

There was essentially no missing data. All participants came into the lab and completed measures. One participant did not complete all measures. To test our hypothesis that self-awareness (measured via self-consciousness) would be negatively linked with drinking, we ran a series of correlations. The alcohol variables were positively associated with one another but inconsistently associated with self-awareness. All four alcohol outcome variables were positively skewed and leptokurtic, however none of the skewness values were higher than 3 and none of the kurtosis values were higher than 10, which have been identified as problematic levels for univariate normality (Kline 2011). Neither private nor public self-consciousness were associated with measures of consumption, but both were positively associated with alcohol-related problems. Additionally, results showed that DRSE was negatively correlated with drinking (see Table 1).

To test our second hypothesis that self-awareness and implicit drinking identity would interact to predict drinking, we conducted multiple hierarchical regressions (Tables 3 and 4). Given the exploratory nature of the work and that outcomes were significantly correlated (average $r = .69$) we did not correct alpha level. Effect sizes (d) were calculated using the formula $2t/\sqrt{df}$ (Rosenthal & Rosnow, 1991). Effect sizes of .20, .50, and .80 are considered small, medium, and large, respectively (Cohen, 1992). Regression models included self-consciousness, DRSE, and the IAT as predictors and drinking variables as outcomes. Results indicate that there was no significant interaction between the IAT and private self-consciousness when predicting drinking or related problems (Table 3). However, findings revealed significant associations between public self-consciousness and the IAT when predicting peak drinks, drinking frequency, and drinks per week (Table 4). Gender, included as a covariate, was dummy coded (female = 1), therefore negative coefficients indicated that females drank less or had fewer alcohol-related problems. Exploratory analyses also evaluated whether or not predicted interactions were moderated by gender. Consistent with previous research, for all models, gender was associated with all drinking variables such that females reported drinking less than males with respect to peak drinks and drinks per week. Additionally, females also reported fewer alcohol-related problems. Gender was not found to moderate the predicted interactions. In conclusion, there was some evidence to suggest that self-awareness interacted with implicit drinking identity to predict drinking, specifically in the case of public self-consciousness. Therefore, our second hypothesis was partially supported such that a significant interaction emerged between self-awareness (measured via self-consciousness) and implicit drinking identity when predicting drinking.

We conducted multiple hierarchical regressions to test our third hypothesis. Results revealed significant three-way interactions. The model consisted of the IAT, self-consciousness, and DRSE as independent variables, and drinking variables as outcomes (Tables 3 and 4). As

expected, multiple three-way interactions emerged between self-awareness, implicit drinking identity, and DRSE in predicting drinking outcomes. More specifically, a significant three-way interaction emerged between DRSE, IAT, and private self-consciousness when predicting drinking frequency such that high implicit drinking identity was associated with greater drinking frequency when private self-consciousness was low for participants low in DRSE (Figure 1). Additionally significant three-way interactions were found between DRSE, IAT, and public self-consciousness when predicting peak drinks and drinks per week such that high implicit drinking identity was associated with greater drinks per week (Figure 2) and peak drinks (Figure 3) when public self-consciousness was low for participants low in DRSE. Thus, there was evidence to support our third hypothesis.

4. Discussion

This study evaluated the relationship between self-awareness, measured via the self-consciousness scale, and drinking by considering two individual difference factors: implicit drinking identity and DRSE. Our expectation that drinking would be negatively linked with self-awareness was not supported. Both private and public self-consciousness were positively associated with alcohol problems but not with consumption. Although not consistent with our expectations, this finding is somewhat in line with previous research suggesting that alcohol may dampen awareness-induced discomfort (Niaura et al., 1988). As expected, DRSE was negatively associated with alcohol consumption and problems.

Our second hypothesis was that implicit drinking identity would moderate the association between self-awareness and alcohol consumption. That is, we expected that self-awareness would be negatively associated with drinking and that this relationship would be stronger among those with more positive (less negative) alcohol identity-related implicit associations. Evidence partially supported this hypothesis in that self-awareness did indeed significantly interact with drinking identity to predict alcohol consumption, but only for public self-consciousness. It is possible that with respect to private self-consciousness, those who do not implicitly identify with drinking are more likely to be influenced by intrapersonal and interpersonal cues, whereas those who strongly identify implicitly with drinking may drink more, regardless of their level of private self-consciousness.

Our third hypothesis was that the association between self-awareness and implicit drinking identity would depend on whether one was higher versus lower in DRSE because individuals who are confident that they can resist drinking may not use alcohol to manage self-awareness induced discomfort. Consistent with expectations, three-way interactions emerged between self-awareness, implicit drinking identity, and DRSE in predicting drinking (see Tables 2 and 3, and Figures 1, 2, and 3). High private self-consciousness was associated with increased drinking frequency when implicit drinking identity was low, especially among those low in DRSE (Table 3 and Figure 1); however, this relationship was not found among individuals high in DRSE. This same significant relationship was found for public self-consciousness when predicting drinks per week (Table 4 and Figure 2) and peak drinks (Table 4 and Figure 3) among those low in DRSE, and similar to the above, this relationship was not significant among participants high in DRSE. Thus, our third hypothesis was supported.

A potential explanation for these findings is that perhaps high DRSE is protective against heavy drinking (e.g., Hasking & Oei, 2002; Lee & Oei, 1993). Findings demonstrate that participants reporting high DRSE consumed alcohol less frequently compared to participants reporting low DRSE. Low DRSE was associated with greater variability in alcohol consumption for both private and public self-consciousness. More specifically, high implicit self-identification as a drinker was associated with greater volume and frequency of alcohol consumption amongst those reporting low DRSE. In other words, participants who had stronger associations with a drinking self-identity and less confidence about being able to turn down alcohol drank the most and most often. It seems that low self-efficacy with respect to refusing alcohol may be an important factor to consider in evaluating drinking behavior. It is likely that people who find it difficult to say no to alcohol experience more ambivalence with respect to drinking, and therefore may find it more difficult to choose to refuse alcohol. This may contribute to greater discrepancies between implicit attitudes and behavior. These findings have identified an important sub-population that may benefit from strategies aiming to increase DRSE and decrease implicit self-identity as a drinker. This is an important contribution to the alcohol literature and future interventions might increase their efficacy by focusing on key factors such as DRSE and implicit self-identity as a drinker.

Another potential explanation for these findings is related to how automatic processes form, which is through experience and the environment (e.g., Lindgren, Neighbors, Ostafin, Mullins, & George, 2009). We proposed that individuals with experience with or exposure to alcohol may develop automatic alcohol-related associations such that they may be more likely to turn to alcohol during times of self-awareness induced discomfort. Conversely, we proposed that it is possible that individuals with little or no alcohol exposure who lack these automatic alcohol cognitions may not be likely to turn to alcohol to alleviate the uncomfortable self-aware state. However, results did not reveal significant interactions between implicit drinking identity and self-awareness in predicting drinking. It is possible that drinking to mitigate self-awareness is not significantly different in terms of quantity or frequency, compared to drinking for social reasons (e.g., to have fun or fit in). For example, a student drinking to regulate affect might drink the same amount as another student drinking to fit in. In other words, it is possible that the interaction between implicit drinking identity and self-awareness did not emerge because drinking motives were not controlled. Thus, further research is needed to better understand the role that drinking motives play in the relationship between self-awareness and alcohol consumption.

4.1. Limitations and future directions

The strengths of the study must be considered in light of the limitations. First, it is important to note that the IAT is a relative measure that assesses the strength of one association relative to the strength of another (e.g., strength of *alcohol + cope* and *water + ignore* versus *alcohol + ignore* and *water + cope*). Thus, if a participant's *D*-score changed after taking the same IAT, it would not be possible to determine which association had changed relative to the other (other measures must be used for this, such as the Brief IAT; Sriram & Greenwald, 2009). Related to this limitation is the interpretation of the *D*-score. Our findings with respect to the alcohol-related IAT are consistent with previous research in that *D*-scores

were slightly negative, which theoretically reflects that attitudes toward alcohol relative to water were slightly negative. Because the IAT is a relative measure, this finding may be due to the awareness of negative societal stigma associated with alcohol use. For most people, excessive alcohol consumption and alcoholism is viewed negatively, and awareness of this may have contributed to longer response latencies when viewing alcohol-related stimuli due to an ambivalence between personal attitudes and societal stigma. Concurrently, water is generally associated with positive phenomena such as life, health, hygiene, and nature. Thus, it is possible that the negative *D*-scores resulting from the alcohol-related IAT may be a reflection of societal and cultural stigma associated with alcohol consumption relative to water consumption.

A further limitation relates to the cross-sectional nature of the study. Relationships between variables of interest were not measured longitudinally and therefore causality of these relationships cannot be determined. Furthermore, changes among the variables over time cannot be assessed. Future research can consider examining longitudinal relationships between drinking identity, DRSE, and self-awareness. Additionally, the study sample did not exclude participants based on drinking criteria. Thus, the sample in the present study included abstainers, light drinkers, moderate drinkers, and heavy drinkers. Expected effects may have been washed out based on the drinking heterogeneity of the sample. Specifically, it is possible that the central hypothesis is supported only when considering heavy drinkers. That is, it is possible that self-awareness interacts with implicit drinking identity in predicting drinking but is only true for heavy drinkers. Partialing out these data from the current sample for analyses was not helpful due to low sample size (not enough heavy drinkers were included in the sample) and ensuing low power to detect effects. Additionally, this sample was comprised of college students, which may limit generalizability of findings. Moreover, the sample was relatively homogenous with respect to age (young adults), sex (mostly women), race/ethnicity (mostly Caucasian), and occupation (full-time university students). While this is a group for whom alcohol and associated problems are of concern, it is not clear whether these findings would generalize to other groups. These findings should be replicated in more diverse samples.

Another limitation concerns the method of measurement of variables of interest in the study. The alcohol consumption measures were limited to self-report. Observational and biometric data, while more costly than self-report measures to collect and analyze, may provide additional and important information. Additionally, we did not measure anxiety and depressive symptoms and we did not explore differences in state versus trait self-consciousness. Thereby, future research may wish to explore the potential links between state self-consciousness and drinking to cope with anxiety and depressive symptoms. Future directions for research include the use of experimentally designed studies to identify individual differences in drinking patterns and trajectory, including multiple time points of assessment to evaluate changes in alcohol-related implicit attitudes and drinking. Additionally, to address positive societal associations with water relative to alcohol, researchers might consider creating IATs that include other beverages such as soda, coffee, energy drinks, or fruit juice. Researchers might also consider using the Affect Misattribution Procedure to discern implicit affective responses towards alcohol stimuli (Payne, Cheng, Govorun, & Stewart, 2005). Moreover, further research is needed to understand the implicit

associations, specifically of heavy drinkers, and how these associations are similar to or different from those of abstainers or light drinkers. This may help to inform interventions and treatment programs targeting strategies that may increase cognitive factors that serve to protect against heavy drinking. The present research would suggest that an important factor to consider is DRSE. It is important to note that based on the findings of this study, increasing DRSE may attenuate positive associations between high implicit drinking identity and high self-consciousness on various drinking outcomes. Furthermore, future research might increase external validity through the inclusion of community-based or clinical samples and by including a more representative distribution of age and sex. Finally, future research may include measures that are not self-reported, such as observational or biometric methods.

4.2. Conclusion

The present study examined implicit drinking identity and drink refusal self-efficacy (DRSE) as moderators of the relationship between self-awareness and drinking. Findings were consistent with previous research in that females reported drinking less than males and alcohol-related attitudes, specifically drinking identity (Lindgren et al., in press), towards alcohol relative to water were negative. Results did not support our expectation that drinking would be negatively associated with self-awareness, however, results did support our expectation that individuals who feel confident that they can refrain from drinking will likely drink less compared to individuals who do not feel confident that they can refrain from drinking, as DRSE was negatively correlated with drinking. Results did not support our hypothesis that implicit drinking identity would moderate the association between self-awareness and alcohol consumption. However, there was support for an alternative perspective that individuals who do not implicitly identify with drinking may be more likely to be affected by intrapersonal and interpersonal cues, whereas those with strong implicit drinking identity may drink more regardless of their self-awareness level. Results supported our third hypothesis that the interaction between self-awareness and implicit drinking identity may depend on whether one is higher or lower in DRSE because individuals high in DRSE may not necessarily turn to alcohol to reduce discomfort that results from self-awareness. Findings revealed that self-awareness consistently interacted with implicit drinking identity for those low in DRSE. This suggests that implicit attitudes, specifically implicit drinking identity and DRSE, are key factors in the relationship between self-awareness and drinking. Furthermore, these findings suggest that if DRSE is low, then implicit processes are a strong predictor of drinking. Alcohol-related IATs such as the drinking identity IAT may be a useful tool in predicting drinking frequency, drinks per week, and peak drinks, particularly among those low in self-awareness and DRSE. This study contributes to the growing social cognitive literature that seeks to understand and identify individual differences in alcohol consumption and to determine if automatic processes represent a target for treatment and prevention efforts for maladaptive behaviors.

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References

- Abbey A, Buck PO, Zawacki T, Saenz C. Alcohol's effects on perceptions of a potential date rape. *Journal of Studies on Alcohol*. 2003; 64:669–677. [PubMed: 14572189]
- Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. 1991; 50:179–211.
- Baer, JS. Etiology and secondary prevention of alcohol problems with young adults. In: Baer, J.; Marlatt, G.; McMahon, R., editors. *Addictive behaviors across the lifespan: Prevention, treatment, and policy issues*. Sage; Thousand Oaks, CA: 1993. p. 111-137.
- Baldwin AR, Oei TP, Young R. To drink or not to drink: The differential role of alcohol expectancies and drinking refusal self-efficacy in quantity and frequency of alcohol consumption. *Cognitive Therapy and Research*. 1993; 17:511–530.
- Bandura A. Self-efficacy mechanisms in human agency. *American Psychologist*. 1982; 37:122–147.
- Bandura, A. Health promotion from the perspective of social cognitive theory. In: Norman, P.; Abraham, C.; Conner, M., editors. *Understanding and changing health behaviour: From health beliefs to self-regulation*. Harwood Academic Publishers; Amsterdam Netherlands: 2000. p. 299-339.
- Borsari B, Neal DJ, Collins SE, Carey KB. Differential utility of three indexes of risky drinking for predicting alcohol problems in college students. *Psychology of Addictive Behaviors*. 2001; 15:321–324. [PubMed: 11767264]
- Casey PF, Dollinger SJ. College students' alcohol-related problems: An autophotographic approach. *Journal of Alcohol and Drug Education*. 2007; 51:8–25.
- Chassin L, Mann LM, Sher KJ. Self-awareness theory, family history of alcoholism, and adolescent alcohol involvement. *Journal of Abnormal Psychology*. 1988; 97:206–217. [PubMed: 3385074]
- Cohen, J. *Statistical power analysis for the behavioral sciences*. Academic Press; New York: 1977. Rev. ed.
- Cohen J. A power primer. *Psychological Bulletin*. 1992; 112:155–159. [PubMed: 19565683]
- Collins RL, Parks GA, Marlatt GA. Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology*. 1985; 53:189–200. [PubMed: 3998247]
- Conner M, Warren R, Close S, Sparks P. Alcohol consumption and the theory of planned behavior: An examination of the cognitive mediation of past behavior. *Journal of Applied Social Psychology*. 1999; 29:1676–1704.
- Draine, SC. Inquisit 2.0.50401 [Computer software]. Millisecond Software; Seattle, WA: 2004.
- Dunn EC, Larimer ME, Neighbors C. Alcohol and drug-related negative consequences in college students with bulimia nervosa and binge eating disorder. *International Journal of Eating Disorders*. 2002; 32:171–178. [PubMed: 12210659]
- Duval, S.; Wicklund, RA. *A theory of objective self awareness*. Academic Press; Oxford England: 1972.
- Fenigstein, A. Private and public self-consciousness. In: Leary, MR.; Hoyle, RH., editors. *Handbook of individual differences in social behavior*. Guilford; New York: 2009. p. 495-511.
- Fenigstein A, Scheier MF, Buss AH. Public and private self-consciousness: Assessment and theory. *Journal of Consulting & Clinical Psychology*. 1975; 43:522–527.
- Geisner I, Larimer ME, Neighbors C. The relationship among alcohol use, related problems, and symptoms of psychological distress: Gender as a moderator in a college sample. *Addictive Behaviors*. 2004; 29:843–848. [PubMed: 15219328]
- Gray HM, LaPlante DA, Bannon BL, Ambady N, Shaffer HJ. Development and validation of the alcohol identity implicit associations test (AI-IAT). *Addictive Behaviors*. 2011; 36:919–926. [PubMed: 21621924]
- Greenwald AG, McGhee DE, Schwartz JLK. Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*. 1998; 74:1464–1480. [PubMed: 9654756]

- Greenwald AG, Farnham SD. Using the implicit association test to measure self-esteem and self-concept. *Journal of Personality and Social Psychology*. 2000; 79:1022–1038. [PubMed: 11138752]
- Greenwald AG, Nosek BA, Banaji MR. Understanding and using the implicit association test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology*. 2003; 85:197–216.
- Greenwald AG, Poehlman TA, Uhlmann EL, Banaji MR. Understanding and using the implicit association test: III. Meta-analysis of predictive validity. *Journal of Personality and Social Psychology*. 2009; 97:17–41.
- Gullo MJ, Dawe S, Kambouropoulos N, Staiger PK, Jackson CJ. Alcohol expectancies and drinking refusal self-efficacy mediate the association of impulsivity with alcohol misuse. *Alcoholism: Clinical and Experimental Research*. 2010; 34:1386–1399.
- Hartman, LM. Social anxiety, problem drinking, and self-awareness. In: Hartman, LM.; Blankstein, KR., editors. *Perception of self in emotional disorder and psychotherapy*. Plenum Press; New York, NY US: 1986. p. 265-282.
- Hasking PA, Oei TS. The differential role of alcohol expectancies, drinking refusal self-efficacy and coping resources in predicting alcohol consumption in community and clinical samples. *Addiction Research & Theory*. 2002; 10(5):465–494.
- Hofmann W, Gawronski B, Gschwendner T, Le H, Schmitt M. A meta-analysis on the correlation between the Implicit Association Test and explicit self-report measures. *Personality and Social Psychology Bulletin*. 2005; 31:1369–1385. [PubMed: 16143669]
- Hingson R, Heeren T, Winter M, Wechsler H. Magnitude of alcohol-related mortality and morbidity among U.S. college students ages 18-24: Changes from 1998 to 2001. *Annual Review of Public Health*. 2005; 26:259–279.
- Hingson RW. Magnitude and prevention of college drinking and related problems. *Alcohol Research & Health*. 2010; 33:45–54. [PubMed: 23579935]
- Houben K, Wiers RW. Measuring implicit alcohol associations via the internet: Validation of web-based implicit association tests. *Behavior Research Methods*. 2008; 40:1134–1143. [PubMed: 19001405]
- Hull JG. A self-awareness model of the causes and effects of alcohol consumption. *Journal of Abnormal Psychology*. 1981; 90:586–600. [PubMed: 7320328]
- Hull JG, Levenson RW, Young RD, Sher KJ. Self-awareness-reducing effects of alcohol consumption. *Journal of Personality and Social Psychology*. 1983; 44:461–473.
- Hull JG, Young RD, Jouriles E. Applications of the self-awareness model of alcohol consumption: Predicting patterns of use and abuse. *Journal of Personality and Social Psychology*. 1986; 51:790–796. [PubMed: 3783425]
- Jajodia A, Earleywine M. Measuring alcohol expectancies with the implicit association test. *Psychology of Addictive Behaviors*. 2003; 17:126–133. [PubMed: 12814276]
- Johnston, LD.; O'Malley, PM.; Bachman, JG.; Schulenberg, JE. Volume II: College students and adults ages 19-45. National Institute on Drug Abuse; Bethesda, MD: 2006. Monitoring the Future national survey results on drug use, 1975-2005; p. 302NIH Publication No. 06-5884
- Kaysen D, Neighbors C, Martell J, Fossos N, Larimer ME. Incapacitated rape and alcohol use: A prospective analysis. *Addictive Behaviors*. 2006; 31:1820–1832. [PubMed: 16446044]
- Kivlahan DR, Marlatt GA, Fromme K, Coppel DB, Williams E. Secondary prevention with college drinkers: Evaluation of an alcohol skills training program. *Journal of Consulting and Clinical Psychology*. 1990; 58:805–810. [PubMed: 2292630]
- Kline, RB. *Principles and practice of structural equation modeling*. Guilford press; 2011.
- Koss MP, Gaines JA. The prediction of sexual aggression by alcohol use, athletic participation, and fraternity affiliation. *Journal of Interpersonal Violence*. 1993; 8:94–108.
- LaBrie J, Pedersen ER, Neighbors C, Hummer JF. The role of self-consciousness in the experience of alcohol-related consequences among college students. *Addictive Behaviors*. 2008; 33:812–820. [PubMed: 18258376]
- Lalwani AK, Shavitt S. The "me" I claim to be: Cultural self-construal elicits self-presentational goal pursuit. *Journal of Personality and Social Psychology*. 2009; 97:88–102. [PubMed: 19586242]

- Larimer ME, Lydum AR, Anderson BK, Turner AP. Male and female recipients of unwanted sexual contact in a college student sample: Prevalence rates, alcohol use, and depression symptoms. *Sex Roles*. 1999; 40:295–308.
- Lee NK, Oei TS. The importance of alcohol expectancies and drinking refusal self-efficacy in the quantity and frequency of alcohol consumption. *Journal of Substance Abuse*. 1993; 5:379–390. [PubMed: 8186672]
- Lindgren, KP.; Foster, DW.; Westgate, E.; Neighbors, C. 2013.
- Lindgren KP, Neighbors C, Ostafin BD, Mullins PM, George WH. Automatic alcohol associations: Gender differences and the malleability of alcohol associations following exposure to a dating scenario. *Journal of Studies on Alcohol and Drugs*. 2009; 70:583–592. [PubMed: 19515299]
- Lindgren KP, Neighbors C, Teachman BA, Wiers RW, Westgate E, Greenwald AG. I drink therefore I am: Validating alcohol-related implicit association tests. *Psychology of Addictive Behaviors*. in press.
- Maisto SA, Connors GJ, Zywiak WH. Alcohol treatment changes in coping skills, self-efficacy, and levels of alcohol use and related problems 1 year following treatment initiation. *Psychology of Addictive Behaviors*. 2000; 14:257–66. [PubMed: 10998951]
- Marlatt, GA.; Baer, JS.; Larimer, ME. Preventing alcohol abuse in college students: A harm-reduction approach. In: Boyd, G.; Howard, J.; Zucker, R., editors. *Alcohol Problems among Adolescents: Current Directions in Prevention Research*. Lawrence Erlbaum; Mahwah, NJ: 1995. p. 147-172.
- Miller R. On the nature of embarrassability: shyness, social evaluation, and social skill. *Journal of Personality*. 1995; 63:315–339. [PubMed: 7782995]
- Morawska AA, Oei TS. Binge drinking in university students: A test of the cognitive model. *Addictive Behaviors*. 2005; 30:203–218. [PubMed: 15621393]
- NIAAA. What Colleges Need to Know Now: An Update on College Drinking Research. National Institutes of Health, DHHS; Bethesda, MD: 2007. NIH publication no. 07-5010
- Niaura R, Wilson GT, Westrick E. Self-awareness, alcohol consumption, and reduced cardiovascular reactivity. *Psychosomatic Medicine*. 1988; 50:360–380. [PubMed: 3413270]
- Nosek, BA.; Greenwald, AG.; Banaji, MR. The implicit association test at age 7: A methodological and conceptual review. In: Bargh, JA., editor. *Social psychology and the unconscious: The automaticity of higher mental processes*. Psychology Press; New York, NY: 2007. p. 265-292.
- Oei TS, Morawska AA. A cognitive model of binge drinking: The influence of alcohol expectancies and drinking refusal self-efficacy. *Addictive Behaviors*. 2004; 29:159–179. [PubMed: 14667427]
- Ostafin BD, Marlatt GA, Greenwald AG. Drinking without thinking: An implicit measure of alcohol motivation predicts failure to control alcohol use. *Behaviour Research and Therapy*. 2008; 46:1210–1219. [PubMed: 18823876]
- Palfai TP, Ostafin BD. Alcohol-related motivational tendencies in hazardous drinkers: Assessing implicit response tendencies using the modified-IAT. *Behaviour Research and Therapy*. 2003; 41:1149–1162. [PubMed: 12971937]
- Park A, Sher KJ, Krull JL. Individual differences in the 'Greek effect' on risky drinking: The role of self-consciousness. *Psychology of Addictive Behaviors*. 2006; 20:85–90. [PubMed: 16536670]
- Payne BK, Cheng CM, Govorun O, Stewart BD. An inkblot for attitudes: Affect misattribution as implicit measurement. *Journal of Personality and Social Psychology*. 2005; 89:277–293. [PubMed: 16248714]
- Pierro A, Mannetti L, Livi S. Self-identity and the theory of planned behavior in the prediction of health behavior and leisure activity. *Self and Identity*. 2003; 2:47–60.
- Rosenthal, R.; Rosnow, RL. *Essentials of behavioral research: Methods and data analysis*. 2. McGraw-Hill; New York: 1991.
- SAMHSA. Screening on campus: Effective and available. 2008. U.S. Department of Health and Human Services, Substance Abuse & Mental Health Services Administration. Retrieved from website: http://www.samhsa.gov/samhsa_news/volumexvi_2/article7.htm
- Sayette MA, Shiffman S, Tiffany ST, Niaura RS, Martin CS, Shadel WG. The measurement of drug craving. *Addiction*. 2000; 95:189–210.
- Skutle A. The relationship among self-efficacy expectancies, severity of alcohol abuse, and psychological benefits from drinking. *Addictive Behaviors*. 1999; 24:87–98. [PubMed: 10189975]

- Smith JR, Terry DJ, Manstead ASR, Louis WR, Kotterman D, Wolfs J. Interaction effects in the theory of planned behavior: The interplay of self-identity and past behavior. *Journal of Applied Social Psychology*. 2007; 37:2726–2750.
- Solomon KE, Annis HM. Outcome and efficacy expectancy in the prediction of post-treatment drinking behavior. *British Journal of Addiction*. 1990; 85:659–665. [PubMed: 2354283]
- Sriram N, Greenwald AG. The brief implicit association test. *Experimental Psychology*. 2009; 56:283–294. [PubMed: 19439401]
- Thush C, Wiers RW, Ames SL, Grenard JL, Sussman S, Stacy AW. Apples and oranges? Comparing indirect measures of alcohol-related cognition predicting alcohol use in at-risk adolescents. *Psychology of Addictive Behaviors*. 2007; 21:587–591. [PubMed: 18072843]
- Wechsler H, Lee J, Kuo M, Lee H. College binge drinking in the 1990s: A continuing problem: Results of the Harvard School of Public Health 1999 College Alcohol Study. *Journal of American College Health*. 2000; 48:199–210. [PubMed: 10778020]
- Wechsler H, Davenport A, Dowdall G, Moeykens B. Health and behavioral consequences of binge drinking in college: A national survey of students at 140 campuses. *JAMA: Journal of the American Medical Association*. 1994; 272:1672–1677.
- White HR, Labouvie EW. Towards the assessment of adolescent problem drinking. *Journal of Studies on Alcohol*. 1989; 50:30–37. [PubMed: 2927120]
- Wiers RW, Van Woerden N, Smulders FTY, De Jong PJ. Implicit and explicit alcohol-related cognitions in heavy and light drinkers. *Journal of Abnormal Psychology*. 2002; 111:648–658. [PubMed: 12428778]
- Young, RM.; Oei, TPS. *Drinking Expectancy Profile: Test Manual*. Behaviour Research and Therapy Centre, University of Queensland; Australia: 1996.
- Young RD, Hasking PA, Oei TS, Loveday W. Validation of the drinking refusal self-efficacy questionnaire--revised in an adolescent sample (DRSEQ-RA). *Addictive Behaviors*. 2007; 32:862–868. [PubMed: 16919885]

Highlights

- We evaluated self-efficacy and implicit identity as moderators of drinking
- Private self-consciousness and implicit identity interacted to predict drinking
- Self-efficacy moderated the link between self-consciousness, implicit identity, and drinking
- Low self-efficacy and public self-consciousness is linked with increased risk

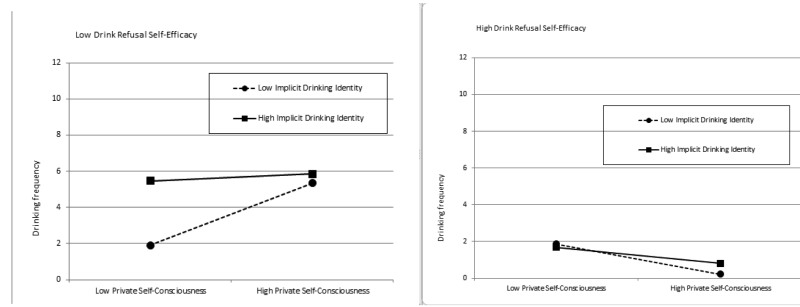


Figure 1. High implicit drinking identity is associated with increased drinking frequency when private self-consciousness is low among those low in drink refusal self-efficacy.

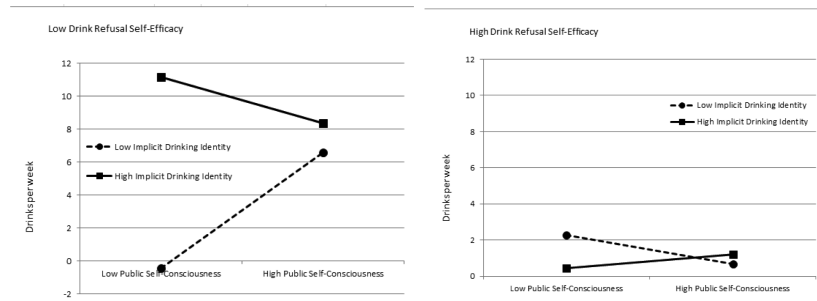


Figure 2. High implicit drinking identity is associated with increased drinks per week when public self-consciousness is low among those low in drink refusal self-efficacy. Among those high in drink refusal self-efficacy, low (not high) implicit drinking identity is associated with increased drinks per week.

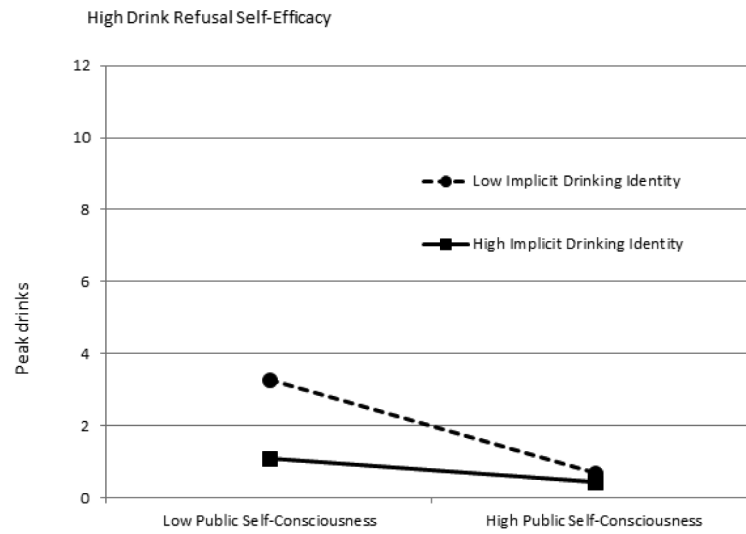


Figure 3. High implicit drinking identity is associated with increased peak drinks when public self-consciousness is low among those low in drink refusal self-efficacy. Among those high in drink refusal self-efficacy, low (not high) implicit drinking identity is associated with increased peak drinks.

Table 1

Means, Standard Deviations, and Correlations among Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Peak Drinks	--									
2. Drinking Frequency	0.71 ^{***}	--								
3. Drinks per Week	0.80 ^{***}	0.78 ^{***}	--							
4. Alcohol-Related Problems	0.55 ^{***}	0.63 ^{***}	0.63 ^{***}	--						
5. Drinking Identity IAT	0.28 ^{***}	0.29 ^{***}	0.29 ^{***}	0.24 ^{***}	--					
6. Private Self-Consciousness	0.05	0.08	0.11	0.17 [*]	0.06	--				
7. Public Self-Consciousness	-0.03	0.03	0.07	0.15 [*]	-0.008	0.60 ^{***}	--			
8. Social Anxiety	-0.12 [†]	-0.12 [†]	-0.08	0.03	-0.02	0.38 ^{***}	0.51 ^{***}	--		
9. Drink Refusal Self-Efficacy	-0.32 ^{***}	-0.34 ^{***}	-0.31 ^{***}	-0.39 ^{***}	-0.11 [†]	-0.04	-0.11	-0.08	--	
10. Gender	-0.30 ^{***}	-0.13 [†]	-0.18 ^{**}	-0.18 ^{**}	-0.15 ^{**}	-0.07	-0.03	0.02	-0.04	--
Mean	4.24	2.81	3.88	27.68	-0.10	2.35	2.18	1.70	5.36	0.82
Standard Deviation	5.35	2.56	5.59	4.30	0.44	0.64	0.91	0.97	0.85	0.38

Note. N=218

^{***} $p < .001$.^{**} $p < .01$.^{*} $p < .05$.[†] $p < .10$

Table 2

Means and Confidence Intervals of Drinking Outcomes at Low and High DRSE

	Low DRSE		High DRSE	
	Mean	95% CI	Mean	95% CI
Peak Drinks	6.65	5.53-7.77	1.90	1.32-2.49
Drinking Frequency	4.10	3.65-4.56	1.59	1.22-1.96
Drinks per Week	6.35	5.11-7.58	1.62	1.09-2.14
Alcohol-Related Problems	30.15	29.19-31.11	25.58	25.36-25.81

Table 3

Hierarchical regression analysis for variables predicting drinking variables from drink refusal self-efficacy (DRSE), the drinking identity IAT (IAT), and private self-consciousness (PC)

		Predictor	B	SE B	<i>d</i>	
Peak drinks	Step 1	DRSE	-0.93	0.19	-0.67***	
		IAT	1.40	0.37	0.51***	
		PC	0.21	0.25	0.11	
	Step 2	DRSE * IAT	-3.03	1.01	-0.41**	
		DRSE * PC	-2.43	0.59	-0.56***	
		IAT * PC	-0.72	1.22	-0.08	
	Step 3	DRSE * IAT * PC	3.31	1.88	0.24	
	Drinking frequency	Step 1	DRSE	-0.94	0.19	-0.67***
			IAT	1.47	0.37	0.54***
PC			0.23	0.25	0.13	
Step 2		DRSE * IAT	-1.28	0.49	-0.36**	
		DRSE * PC	-1.51	0.28	-0.73***	
		IAT * PC	-0.93	0.58	-0.22	
Step 3		DRSE * IAT * PC	1.81	0.90	0.27*	
Drinks per week		Step 1	DRSE	-1.83	0.41	-0.61***
			IAT	3.04	0.81	0.51***
	PC		0.67	0.55	0.17	
	Step 2	DRSE * IAT	-2.74	1.10	-0.34*	
		DRSE * PC	-2.54	0.64	-0.54***	
		IAT * PC	-2.04	1.32	-0.21	
	Step 3	DRSE * IAT * PC	3.18	2.05	0.21	
	Alcohol-related problems	Step 1	DRSE	-1.82	0.31	-0.80***
			IAT	1.72	0.61	0.38**
PC			0.94	0.41	0.31*	
Step 2		DRSE * IAT	-1.45	0.78	-0.25	
		DRSE * PC	-2.97	0.45	-0.90***	
		IAT * PC	-1.74	0.93	0.25	
Step 3		DRSE * IAT * PC	1.17	1.45	0.11	

Note. N=218

 $p < .001$

**
 $p < .01$

*
 $p < .05$.

Table 4

Hierarchical regression analysis for variables predicting drinking variables from drink refusal self-efficacy (DRSE), the drinking identity IAT (IAT), and public self-consciousness (PUC)

		Predictor	B	SE B	d	
Peak drinks	Step 1	DRSE	-1.84	0.38	-0.66***	
		IAT	2.56	0.75	0.46***	
		PUC	-0.36	0.36	-0.01	
	Step 2	DRSE * IAT	-4.39	0.95	-0.63***	
		DRSE * PUC	-1.16	0.42	-0.38**	
		IAT * PUC	-2.11	0.85	-0.34*	
	Step 3	DRSE * IAT * PUC	3.25	1.24	0.36**	
	Drinking frequency	Step 1	DRSE	-0.94	0.19	-0.67***
			IAT	1.41	0.37	0.52***
PUC			0.03	0.18	0.02	
Step 2		DRSE * IAT	-2.05	0.47	-0.59***	
		DRSE * PUC	-0.67	0.21	-0.43**	
		IAT * PUC	-0.98	0.42	-0.32*	
Step 3		DRSE * IAT * PUC	1.12	0.61	0.25	
Drinks per week		Step 1	DRSE	-1.82	0.41	-0.60***
			IAT	3.09	0.81	0.52***
	PUC		0.23	0.38	0.08	
	Step 2	DRSE * IAT	-4.08	1.04	-0.53***	
		DRSE * PUC	-1.10	0.46	-0.33*	
		IAT * PUC	-1.96	0.93	-0.29*	
	Step 3	DRSE * IAT * PUC	3.86	1.35	0.39**	
	Alcohol-related problems	Step 1	DRSE	-1.78	0.31	-0.78***
			IAT	1.80	0.61	0.40**
PUC			0.50	0.29	0.23	
Step 2		DRSE * IAT	-2.93	0.76	-0.52***	
		DRSE * PUC	-1.52	0.33	-0.63***	
		IAT * PUC	-1.02	0.68	-0.20	
Step 3		DRSE * IAT * PUC	0.52	1.00	0.07	

Note. N=218

p < .001

**
p < .01

*
p < .05.