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Individual Differences in Approach and Avoidance Inclinations Moderate the Effect of Self-Control Depletion on Ad-Lib Drinking

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Abstract

Background—The current study sought to examine how exerting self-control to inhibit stereotype use affects alcohol consumption. In addition, we sought to expand previous findings via examination of how individual differences in motivations to approach or avoid alcohol consumption interact with self-control depletion to determine the regulation of ad-lib drinking behavior.

Methods—Sixty-one social drinkers (31 female) were recruited to participate in a socially relevant self-control depletion task in which they were randomly assigned to one of two creative writing conditions: 1) the self-control depletion condition with explicit instructions to refrain from using stereotypes, or 2) the non-depletion condition in which no instructions were given regarding the use of stereotypes. Participants then completed an ad-lib drinking task and self-report questionnaires pertaining to their motivation to consume alcohol.

Results—As predicted, results indicated a significant three-way interaction between depletion condition, approach inclinations, and avoidance inclinations. Specifically, self-control depletion predicted greater drinking disinhibition (i.e., mean sip size, total alcohol consumption) only among participants high in both approach and avoidance.

Conclusions—Taken together, results from the current study highlight the importance of both approach and avoidance inclinations in the failure to regulate alcohol consumption following a routine, socially relevant form of self-control depletion. Our results also suggest that the high

approach / high avoidance motivational profile may predict the greatest risk among those actively trying to regulate their drinking.

Keywords

self-control; self-regulation; alcohol; approach; avoidance

INTRODUCTION

Even the casual observer will note that there is great variation in the extent to which individuals regulate alcohol consumption. Certainly, for those with alcohol use disorders, so-called “loss of control” drinking (Jellinek, 1960) appears to occur with some frequency, though not invariably (Marlatt et al., 1973). There is good reason to believe that motivational factors and the cognitive reactions people have to them play important roles in differential drinking outcomes (cf. Marlatt & Donovan, 2005). Similarly, among social drinkers, evidence indicates that stress and the cognitive context surrounding it are influential determinants of alcohol use (Marlatt & Donovan, 2005; Maltzman & Marinkovic, 1996; Sayette, 1999; Helzer & Searles, 2002). Theories highlighting self-control as a limited resource (e.g., Muraven & Baumeister, 2000; Baumeister, 1998) may provide insight into individual differences related to drinking in situations that demand self-control. Indeed, research has shown that simple thought suppression is capable of depleting cognitive resources, resulting in greater alcohol consumption (Muraven et al., 2002). Utilizing a socially relevant self-control task, namely inhibiting stereotype expression, the current study examined how exerting self-control to inhibit stereotype use affects alcohol consumption. Additionally, we sought to expand these findings by examining how individual differences in motivations to approach or avoid alcohol consumption interact with self-control depletion to determine the regulation of ad-lib drinking behavior.

Self-Control Depletion

Self-control requires both the motivation and the cognitive resources to successfully restrain behavior (Baumeister et al., 2007; Baumeister & Vohs, 2007; Muraven & Baumeister, 2000). For example, motivational conflict, suppression of prepotent responses and resultant self-control failure has been studied using the self-control strength model (e.g., Muraven & Baumeister, 2000; Baumeister, 1998). This model conceptualizes self-control as a limited and renewable resource. Acts of volition, which are often construed to be cognitive in nature, deplete the resource. When resources are depleted through repeated or extreme acts of volition, the probability of successful future self-control is reduced, until the resource is renewed (e.g., with rest or by experience of positive emotional states). Research examining the effect of self-regulation on task performance using a variety of paradigms (e.g., emotion suppression, thought suppression, initiation of consummatory action) have generally provided support for this theory (e.g., Hagger et al., 2010; Monteith et al., 1998; Muraven et al., 1998; Muraven & Baumeister, 2000; Richeson & Shelton, 2003; Muraven et al., 1999; Baumeister et al., 2000), suggesting that simple acts of self-control can significantly attenuate the capacity for future self-regulatory processes across domains.

Regarding alcohol consumption more specifically, depletion of self-control has been associated with future alcohol consumption in several studies (Muraven, et al., 2002; Christiansen et al., 2012; Muraven & Shmueli, 2006; Muraven et al., 2005). For example, Muraven and colleagues (2002) found that those who suppressed their thoughts prior to drinking consumed more alcohol than those who did simple arithmetic problems, suggesting that diminished self-control yielded less regulation of drinking despite experimental conditions favoring such regulation. Such findings are significant for several reasons: (a) a non-clinical sample was used, (b) the result was *not* limited to those who were high in temptation to drink at the outset, and (c) the thought suppression effort exerted by the experimental group had no obvious connection to alcohol use. They also found a significant interaction between temptation to use and self-control depletion, such that those higher on temptation to drink consumed more alcohol when depleted than those lower on temptation to drink. Taken together, this indicates that perhaps alcohol consumption is not entirely dependent on historical or even physical or social contextual factors, but partly on a potential common denominator, namely the available cognitive capacity to exert effortful self-control, which may vary based on individual differences in motivations to control such behaviors.

In a similar study, Christiansen and colleagues (2012) examined potential mediators and moderators for the relationship between self-control depletion and ad-lib alcohol consumption. Among the variables tested were automatic approach tendencies and craving (defined as a desire to use alcohol). Results from this study suggested that craving responses were not impacted by the self-control depletion manipulation, nor did they test the interaction between craving and experimental condition predicting alcohol consumption. Further, although automatic approach tendencies were significantly related to alcohol consumption (main effect only), there was no significant interaction with experimental condition (self-control depletion vs. control). One possible explanation for the limited findings may be that craving and approach tendencies were measured without the joint consideration of a concurrent, competing motivation of desire to avoid using (i.e., avoidance inclinations). For example, it has been posited that motivational conflict lies at the center of all self-control demands, with greater cognitive resources required for stronger conflicts (e.g., Baumeister & Vohs, 2007). Models of craving and drug motivation that account for the full spectrum of motivational dispositions, including ambivalence (i.e., motivational conflicts), have the potential to improve our understanding of when drinking is most likely to occur.

Ambivalence Model of Craving (AMC): Approach and Avoidance Inclinations

Ambivalence about use, defined as the simultaneous desire to use and to not use psychoactive substances, has been identified as a hallmark feature of addiction, and is central to many clinical formulations of substance use and substance use disorders (e.g., Orford, 2001; Heather, 1998). However, despite the importance of competing desires (Kavanagh et al., 2013; Anton, 1999; Tiffany, 1990), ambivalence is often overlooked in the study of craving. To address this concern, Breiner, Stritzke, and Lang (1999) introduced an ambivalence conceptualization of craving that called for independent assessment of both approach and avoidance inclinations to use alcohol.

The Ambivalence Model of Craving (AMC) views craving as a complex experience requiring consideration of contextual and other factors, and highlights the importance of two motivational constructs: the desire to use (approach) and desire to not use (avoidance; Breiner et al., 1999; McEvoy et al., 2004; Stritzke et al., 2004). Both are presumed to develop as a function of the positive and negative consequences of use (Breiner et al., 1999), and are proposed to be orthogonal to one another resulting in four hypothetical quadrants; approach (high approach, low avoidance), avoidance (low approach, high avoidance), ambivalence (high approach, high avoidance), and indifference (low approach, low avoidance). Measurement of both approach and avoidance inclinations, as separate dimensions, has several clinical and methodological advantages (see Stritzke et al., 2007). Further, it has been argued that measuring “craving” exclusively in terms of approach without consideration of a separate, yet concurrent, avoidance inclination may misrepresent a motivational disposition that is a combination of both, thereby significantly diminishing the utility of the information obtained (Breiner et al., 1999).

Studies examining avoidance inclinations using both cue reactivity paradigms and self-report measures have provided support for its incremental validity in predicting substance-related variables in both non-clinical and clinical samples. For example, approach and avoidance can be independently measured as separate dimensions of cue reactivity (e.g. Schlauch et al., 2013a; Curtin et al., 2005; Stritzke et al., 2004). Further, avoidance moderates the effect of approach inclinations on drinking (Schlauch et al., 2013c), is incrementally related to taking steps to make a change (Klein et al., 2007; Schlauch et al., 2013a; Schlauch et al., 2012; Schlauch et al., 2013c), and may be more predictive of relapse among alcoholics, rather than increases in approach inclinations (Stritzke et al., 2007). This is important as it suggests that once internal or external cues trigger urges to use, resisting such urges takes effort (Tiffany, 1990). The AMC provides a framework for which alcohol use is not inevitable when approach inclinations are activated, but rather dependent on competing desires and effortful control. Therefore, the impact of approach is likely moderated by the balance of other salient rewards/incentives (including avoidance inclinations and the benefits of not using), the availability of the substance, and available cognitive resources for inhibiting use.

Present Study

In this study, we examined self-control depletion effects on subsequent alcohol consumption in an *ad libitum* drinking task, incorporating analysis across dimensions of motivation to approach or avoid alcohol consumption. We hypothesized that the joint consideration of approach and avoidance inclinations would result in distinct motivational profiles that would differentially predict the ability to exert self-control during the drinking task. In order to test our hypothesis, a stereotype suppression task was followed by an alcohol taste-rating task (TRT; Marlatt, 1978) that, in turn, preceded an anticipated test of driving skill on which an expectation of impairment by alcohol was implicit. Based upon the existing literature suggesting that those demonstrating ambivalence towards alcohol use require effortful control to inhibit drinking behaviors, we posited that those high on both approach and avoidance inclinations would be affected most by the self-control depletion manipulation. Specifically, we predicted that those high on both approach and avoidance (i.e., ambivalent)

would demonstrate greater alcohol disinhibition as measured by total alcohol consumed and mean sip size in the self-control depletion condition than in the non-depletion condition. No differences were predicted between the non-depletion and self-control depletion conditions for the other motivational dispositions. In addition, within the self-control depletion condition, we predicted that those high on both approach and avoidance inclinations would exhibit greater alcohol disinhibition when compared to those high on avoidance and low on approach inclinations (i.e., those requiring the least effort to control drinking).

MATERIALS AND METHODS

Participants

Sixty-one ($n = 31$ female) undergraduate social drinkers were recruited from both an undergraduate psychology research pool and through flyers posted on campus at a major southeast University. Participants were predominantly European American (70.5%; 8.2% African American, 13.1% Hispanic, 3.3% Asian, 4.9% other) with a mean age of 22.4 ($SD = 1.8$) years. Exclusion criteria were a) average daily alcohol consumption exceeding 35 standard drinks for men or 28 for women per week, and b) medical conditions that contraindicated alcohol consumption. Participants reported drinking on average 6.35 ($SD = 7.29$) drinks per week, with 50.8% indicating beer as the alcoholic beverage most consumed (14.8% wine, 27.9% mixed drinks, 3.3% straight drinks, 3.3% other).

Measures

Approach and Avoidance of Alcohol Questionnaire—(AAAQ, McEvoy et al., 2004; Schlauch et al., 2013c). The AAAQ is a 19-item self-report measure assessing two primary dimensions of alcohol craving: approach and avoidance inclinations. Participants report on their attitudes toward alcohol during the past week by indicating how strongly they agree with each statement on a 9-point Likert Scale (1 = *not at all* to 9 = *very strongly*). Although originally developed as a three-factor measure representing two approach subscales that differed on intensity of desire to consume alcohol (i.e., inclined/indulgent and obsessed/compelled), recent evidence in clinical samples suggests that the items for these two factors simply represent an approach dimension (Schlauch et al., 2013c; Klein et al., 2007). Thus, a single approach dimension (10 items) was used to test the most parsimonious model in all analyses.

Drinking Behavior Questionnaire—The DBQ is a 10-item self-report measure based upon the work of Cahalan and colleagues (1969). It assesses the extent to which behavioral and physiological tolerance from regular alcohol use has developed, including items that address frequency and quantity of drinking.

Internal and External Motivation to Respond Without Prejudice Scale—(IMS/EMS, Plant & Devine 1998). The IMS/EMS is a 10-item self-report measure that assesses motivations to inhibit stereotypical and prejudicial responses due to internal beliefs and external pressures. Participants rate their agreement to reasons for responding in non-prejudiced ways on a 9 point Likert scale (“1 = *strongly disagree*” to “9 = *strongly agree*”). Internal motivation to respond without prejudice (IMS) arises primarily from personally

important non-prejudice and non-stereotypical beliefs (e.g., “I attempt to act in non-prejudiced ways toward Black people because it is personally important to me”), whereas external motivation is derived from a desire to avoid the negative reactions by others (e.g., “Because of today’s ‘politically correct’ standards, I try to appear non-prejudiced toward Black people). IMS/EMS scales have demonstrated test-retest reliability, convergent, discriminant and predictive validity (Plant & Devine, 1998).

Medical Screening Questionnaire—The MSQ is a self-report instrument developed for this study to assess lifetime experience of medical conditions, medication use, tobacco use, illicit drug use and use of psychological services and related diagnoses, as well as changes in drinking patterns and the reason for the change.

Young Adult Alcohol Problems Screening Test—(YAAPST; Hurlbut & Sher, 1992). The YAAPST is a 27-item, single factor self-report measure that assesses alcohol-related negative consequences, dependence symptoms, and their potential consequences in college students.

Procedure

Participants responding to the study advertisements (e.g., flyers on campus or through the undergraduate psychology research pool) were screened on the telephone for initial eligibility requirements. Eligible participants were scheduled individually between 4-6:30 pm and were instructed to abstain from alcohol for 24 hours, from any other drugs (except nicotine) for 72 hours, and from all food and beverages (except water), for 4 hours prior to participation. They were further advised that drug testing might be conducted to ensure compliance. Upon arrival, each participant’s age was verified, consent forms were completed, and breathalyzer tests were conducted to verify breath alcohol concentrations (BrAC) of zero (Alco-Sensor III Breathalyzer; Intoximeters, Inc., St. Louis, MO). Further, pregnancy testing was conducted for female participants (QuickVue One-Step hCG; Quidel Corp., San Diego, CA). Participants were randomly assigned to either a self-control depletion (stereotype suppression) or a control (no suppression instruction) condition.

Participants were told that they were taking part in a three-phase study that examined the relationship between creativity, sensory sensitivity, and discernment of motor impairment following alcohol consumption. The first phase was said to “assess creative writing skills in typical college-age students,” and served as the vehicle for manipulating cognitive stereotype suppression. The second phase of participation was described as “assessment of the relationship between the ability to make fine taste discriminations while minimizing the impact of alcohol consumption on a third and final phase, performance of a driving task.” The taste-rating task was the vehicle for assessing the failure to regulate drinking behavior, using the driving task as an incentive to control alcohol consumption. No driving task was actually performed.

Each participant “randomly” selected a picture of an individual from one of six through a rigged lottery system, so that they received a picture of a black male. Participants in the self-control depletion condition were given the following instructions:

“In this phase, we ask that you spend five minutes writing a passage about a typical day in the life of the pictured individual using a word processing program on this computer. As this is a creative writing task, we would like you to test the limits of your imagination. Although psychological research has established that our impressions and evaluations of others are consistently biased by stereotypes, we would like you to refrain from using such information in your essays. You should actively avoid thinking about or writing about the person in the picture in stereotypic ways.”

The same initial instructions were given to the control participants, but they were not made aware of or asked to avoid using stereotypes.

Following the completion of the creative writing task, participants were told that they would take part in a taste-rating task (TRT; Marlatt, 1978), which would be followed by a computerized driving task. They were informed that they would receive monetary bonuses for accurate driving performance as indicated by scores obtained on the driving simulation. These incentives were included to provide motivation for regulating drinking behavior that might compromise performance. Each participant was then presented with three tumblers of beer labeled A, B, and C, each containing 24 ounces (~709.77 ml) of Miller, Budweiser and Coors beers, respectively. The participants, blind to beer brand, were asked to taste each beer and rate its characteristics. Eighty different descriptors (e.g., bitter, sweet; Webb, 1994) were presented individually on a computer screen to reduce awareness of the number of ratings required or the task length. Participants were allowed to work at their own pace, sipping as much or as little of each of the three brands of beer as needed in order to rate the degree to which each beer possessed each characteristic using a 7-point Likert scale. Following the 20-minute drinking session, the remaining beer was measured and subtracted from the set amount provided to calculate the amount of beer consumed. Both pre-drinking and post-drinking beverage measurement was done by weight in ounces using a food scale. The experimenter also observed the drinking session and recorded the number of sips of beer taken.

After the TRT, participants were told that a 20-minute alcohol absorption period was required before the driving task. Participants completed a battery of post-TRT self-report forms. At the end of this period, participants were debriefed and the true purpose of the study was explained. Participants were allowed to leave the laboratory once their BrAC had reached a safe level (.02). All participants were compensated with research credits toward experimental participation requirements or payment of \$5.00 per hour (or combination of both). All study procedures were approved by the university's institutional review board.

Data Analytic Strategy

Total alcohol consumed and mean sip size (total alcohol consumed/total number of sips) served as indices of drinking disinhibition. All variables were examined for outliers and non-normality (i.e., skewness and kurtosis). Upon reining in outliers (median + or - 2 interquartile ranges), some distributions continue to demonstrate minor skewness. Therefore all models were estimated using robust standard errors (MLR estimator using MPLUS 7.0; Muthen & Muthen, 2012). To examine our main hypotheses (Condition $\times$ Approach $\times$

Avoidance interaction), separate linear regression analyses were conducted for total alcohol consumed and mean sip size with condition (Control vs. Self-Control Depletion), approach inclinations, avoidance inclinations, all two-way interactions, and the three-way interaction entered as predictors, controlling for alcohol preference (i.e., beer 0=no, 1=yes) and average number of drinks per occasion. Approach and avoidance inclinations were mean centered prior to creating interaction terms, as were all control variables.

Significant interactions were probed by substituting values relatively low (15th percentile) and high (85th percentile) on approach and avoidance inclinations, and by recoding the dummy values for experimental condition (Aiken & West, 1991). Specifically, to examine the hypothesis that those high on both approach and avoidance would be most affected by the self-control depletion manipulation, we examined the simple effect of condition after re-centering approach and avoidance at the 85th percentile values. In addition, to examine the hypothesis that within the self-control depletion condition there would be a simple slopes effect for approach inclinations among those high on avoidance, we examined the simple effect of approach after re-coding the condition variable (0 = self-control depletion, 1 = control condition) and re-centering avoidance at the 85th percentile value.

RESULTS

Preliminary Data Analyses

Demographics and means and standard deviations are presented in Table 1. Preliminary analyses revealed no significant differences between the non-depletion and self-control depletion conditions on age, gender, education, income, average number of drinks consumed per occasion, problems associated with alcohol (YAAPST), drink preference (beer versus other), approach inclinations, avoidance inclinations, or internal (IMS) and external motivations to respond without prejudice (EMS), suggesting that random assignment was successful.

Manipulation Check

To examine if the stereotype inhibition manipulation was successful, two independent raters scored each essay on “Overall, how stereotypic is the essay?” using a 5-point Likert scale (1 = “Not at All”, 2 = “only a little”, 3 = “somewhat”, 4 = “moderately”, and 5 = “Extremely”). Raters were instructed to consider both positive (e.g., athletic) and negative stereotypes (e.g., violent). Inter-rater reliability was assessed using a two-way mixed, consistency, average-measures intra-class correlation (ICC), which indicates the degree that coders provided consistency in their ratings. The ICC was in the acceptable range (ICC = .725), suggesting a good to excellent rate of agreement (Cicchetti, 1994). Ratings were then averaged, and after controlling for the ability to type (i.e., words per minute) and motivations to respond without prejudice (IMS and EMS), results indicated a marginally significant difference between the control and experimental conditions [$F(1, 55) = 3.40$; $p = .071$; $\text{partial } \eta^2 = .06$]. The control condition essays were rated as being more stereotypic (*observed mean* = 1.65; *SD* = .80; *adjusted mean* = 1.68) than the experimental condition essays (*observed mean* = 1.40; *SD* = .48; *adjusted mean* = 1.37), suggesting that the stereotype inhibition manipulation was successful.

Alcohol Consumption: Indices of Drinking Disinhibition

To examine the effect of self-control depletion, approach inclinations, and avoidance inclinations on subsequent alcohol consumption, two separate regression analyses were conducted (see Table 2 for summary of results).

Total Alcohol Consumed—Consistent with our hypothesis, results indicated a significant Condition $\times$ Approach $\times$ Avoidance interaction ($B = 54.568$, $SE = 25.322$, $p = .031$, $\beta = .257$; see Figure 1). As expected, inspection of this interaction revealed a significant difference between conditions for those high on approach and high on avoidance inclinations (i.e., ambivalent; $B = 160.355$, $SE = 58.967$, $p = .007$, $\beta = .336$). Those in the self-control depletion condition drank more alcohol than those in the non-depletion condition. There were no significant differences between the non-depletion and self-control depletion conditions for those high on approach/low on avoidance ($B = -4.757$, $SE = 79.839$, $p = .952$, $\beta = -.010$), low on approach/high on avoidance ($B = -35.459$, $SE = 121.729$, $p = .771$, $\beta = -.074$), or low approach/low avoidance ($B = 176.562$, $SE = 100.670$, $p = .079$, $\beta = .370$). In contrast to our hypothesis, within the self-control depletion condition a significant simple slope for approach inclinations was not observed among those high (but not low) on avoidance inclinations ($B = 41.831$, $SE = 25.391$, $p = .099$, $\beta = .239$). This difference was also not significant in the non-depletion condition ($B = -29.616$, $SE = 38.521$, $p = .442$, $\beta = -.169$). Although no predictions were made, we also explored the simple slopes for approach inclinations among those low on avoidance inclinations. Results indicated that within the non-depletion condition a significant simple slope for approach inclinations was observed among those low (but not high) on avoidance inclinations ($B = 59.490$, $SE = 27.639$, $p = .031$, $\beta = .339$), such that those who were high on approach and low on avoidance drank significantly more than those low on approach and low on avoidance (i.e., indifferent). This effect was not significant in the self-control depletion condition ($B = -6.688$, $SE = 26.831$, $p = .803$, $\beta = -.038$).

Mean sip size—Consistent with our hypothesis, results indicated a significant Condition $\times$ Approach $\times$ Avoidance interaction ($B = 1.894$, $SE = .553$, $p = .001$, $\beta = .371$; see Figure 2). As predicted, a significant condition effect was observed among those high on approach and high on avoidance inclinations ($B = 9.011$, $SE = 2.452$, $p < .001$, $\beta = .783$), such that those in the self-control depletion condition had higher mean sip sizes when compared to those in the non-depletion condition. There were no significant differences between the non-depletion and self-control depletion conditions for those high on approach/low on avoidance ($B = -3.248$, $SE = 1.897$, $p = .087$, $\beta = -.282$), low on approach/high on avoidance ($B = .425$, $SE = 2.217$, $p = .848$, $\beta = .037$), or low on approach/low on avoidance ($B = 1.256$, $SE = 2.359$, $p = .594$, $\beta = .109$). Within the self-control depletion condition, a significant simple slope for approach inclinations was observed for those high (but not low) on avoidance inclinations ($B = 2.331$, $SE = .825$, $p = .005$, $\beta = .552$), such that those high on approach and high on avoidance (i.e., ambivalent) had higher mean sip sizes when compared to those low on approach and high on avoidance. This difference was not significant in the non-depletion condition ($B = -.802$, $SE = .738$, $p = .277$, $\beta = -.190$). Similar to the total alcohol consumed analyses, we also explored the simple slopes for approach among those low on avoidance. The simple slopes for approach inclinations among those low on avoidance inclinations was

non-significant in both the non-depletion ($B = 1.196$, $SE = .665$, $p = .072$, $\beta = .283$) and self-control depletion conditions ($B = -.448$, $SE = .580$, $p = .440$, $\beta = -.106$).

DISCUSSION

The present study examined the effect of self-control depletion on subsequent alcohol consumption, and expanded previous findings via incorporating analysis across individual differences in dimensions of motivation to approach and avoid alcohol consumption. Consistent with our hypothesis, self-control depletion interacted with both approach and avoidance inclinations to predict indices of alcohol disinhibition during an alcohol taste rating task. Specifically, among participants who reported high approach and high avoidance inclinations (i.e., ambivalent), self-control depletion resulted in greater mean sip size during the ad lib drinking task and showed a trend toward greater total alcohol consumption. Further, within the self-control depletion condition, those who were high on both approach and avoidance inclinations drank greater amounts of alcohol in terms of both total consumption and mean sip size than those highly avoidant (high on avoidance, low on approach). Such differences were not found in the non-depletion condition. These findings suggest that those high on both approach and avoidance inclinations may require greater resources to regulate drinking behavior and that simple acts of self-control may temporarily compromise such efforts.

These results are consistent with previous findings on self-control and alcohol use, and continue to highlight the importance of concurrently assessing desires to avoid consuming alcohol during the study of craving and motivations to use. Specifically, assessment of concurrent desires to avoid using alcohol may help clarify inconsistencies in the previous literature on motivations to use and self-control. For example, Muraven et al., (2002) found a significant interaction between temptation to use and self-control depletion, such that those higher on temptation to drink consumed more alcohol compared to those low on temptation to drink. Interestingly, and somewhat surprisingly, the simple slopes for temptation to drink were non-significant for both the control and thought suppression condition. In the current study, the simple slope of approach inclinations was significant within the self-control depletion condition for those concurrently high on avoidance, but not low on avoidance. Such an effect was not observed in the non-depletion condition, suggesting that internal desires to consume alcohol interact with self-control processes only when there are competing internal motivations to regulate use, rather than external incentives.

Although there was a significant interaction between motivations and self-control depletion predicting ad lib alcohol consumption, it was somewhat surprising that a main effect of self-control depletion was not observed. In two previous studies (Christiansen et al., 2010; Muraven et al., 2002), significant main effects of self-control depletion were observed on drinking outcomes. It is possible that the type of self-control depletion task utilized in the current study may account for such differences. For example, the two previous studies demonstrating main effects utilized a task designed to inhibit thoughts of a “white bear” and a task in which participants were instructed to inhibit emotional reactions to a video clip, both of which are not common situations requiring self-control. The novelty of these situations may have resulted in greater cognitive effort needed to control such thoughts or

responses and thereby yielded a greater depletion effect. Although a strength of the current study was the utilization of a more socially-relevant task, it is possible that participants are more practiced at inhibiting stereotype expression, thereby reducing the cognitive effort required for self-control. Indeed, stereotypes were infrequently used in the essays regardless of condition. Future research examining individual differences in the frequency of self-control exhibited on depletion tasks in everyday life, including the strength of the motivational conflict, will be important for understanding when self-control depletion is likely to occur.

Findings from the current study have several clinical implications. Research suggests that avoidance inclinations are significantly related to treatment initiation, treatment retention, and improved treatment outcomes among clinical samples (Schlauch et al., 2012; Schlauch et al., 2013b; Schlauch et al., 2013c). However, results from the current study would suggest that efforts to control use may come at a cost. For example, attempts to change one's drinking behavior requires effortful control, particularly among those high on both approach and avoidance inclinations. It is possible that successful acts of regulating drinking may acutely deplete resources needed to enact effortful self-control in future drinking situations. Therefore, while higher avoidance inclinations should be a central goal of treatment protocols, early on in treatment it may have paradoxical effects and put individuals at greater risk for future lapse due to depleted self-control resources, particularly when faced with triggers for use. However, it is likely that this risk will be attenuated over the course of treatment as routinely stressing self-control resources has been shown to bolster one's overall capacity to exert self-control. Treatment gains may be boosted through guided self-control training exercises, which operate similarly to cue exposure treatments, in developing the client's ability to exert self-control across high-risk situations following exposure training techniques encompassing a broad array of behavioral domains (e.g., Muraven, 2010; Denson et al., 2011). We suspect that similar gains may be observable among non-treatment seeking abstainers and controlled users who successfully avoid using for a substantial length of time. Future research examining the interplay of approach, avoidance, and self-control depletion on alcohol lapses and relapse will be important for understanding those at greatest risk.

Although this study offered some insights that could advance understanding of the relationship between motivations to both approach and avoid alcohol use and self-control depletion, it is not without limitations. First, the sample size was relatively small, limiting conclusions that can be drawn from null findings (i.e., larger sample sizes may detect smaller effects that are significant). Second, the current study utilized undergraduate social drinkers and results may or may not generalize to clinical samples. This may be particularly important given the relatively low scores on avoidance inclinations. This is not surprising because avoidance inclinations are believed to develop as a result of problems associated with use (e.g., Breiner et al., 1999; Schlauch et al., 2013), and standard screening procedures for alcohol administration studies require one to rule out problematic alcohol use. Nevertheless, avoidance inclinations did significantly moderate the relationship between approach inclinations, self-control depletion, and alcohol consumption. It is possible that among those with concurrently strong approach and avoidance inclinations such effects

might be stronger. Future research replicating the current findings in larger samples and samples evincing problematic alcohol use will be important moving forward.

While the use of the stereotype suppression task represents a strength of the current study in that it utilized a more socially relevant domain requiring self-control, the use of a single black male prime within a diverse sample that included participants of all race and ethnicities may have impacted the current findings. For example, stereotype endorsement may vary depending on one's internal values and/or ethnic background, thereby creating variability in the effects of the self-control depletion condition. However, this concern is attenuated by research suggesting that all people have knowledge of stereotypes and that stereotypes are automatically activated in the presence of relevant stimuli (e.g., Devine, 1989), regardless of endorsement. Consistent with this notion are findings suggesting that stereotypes represent cognitive heuristics, particularly in situations where people may be less able or motivated to engage in more systematic and careful judgment strategies (Bodenhausen & Lichtenstein, 1987). Examination of how race and ethnicity of participants, as well as internal and external motivations to respond without prejudice, may have interacted with the self-control depletion task was beyond the scope of the current study. However, it is important to note that preliminary analyses demonstrated no differences between the depletion and non-depletion conditions on measures of internal and external motivations to respond without prejudice. Future research examining the factors affecting self-control depletion will be important in understanding how depletion of self-control resources increase the risk for future alcohol consumption.

In summary, the results from the current study may provide some insight into the failure to self-regulate drinking behaviors. Specifically, depletion of self-control resources may affect those with the greatest motivational conflict toward using alcohol. Continued research to explore the interactions among approach inclinations, avoidance inclinations and self-control depletion may provide guidance for new approaches to the prevention and treatment of substance use disorders.

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Figure 1.

Scatterplot for Approach $\times$ Avoidance $\times$ Condition interaction for Total Beer Consumed (ml). Note: Data points grouped by low avoidance (15th percentile), mean avoidance (between the 15th and 85th percentiles), and high avoidance (85th percentile). Lines represent simple slopes for approach inclinations at the low (15th percentile), mean, and high (85th percentile) values of avoidance.

Figure 2.

Scatterplot for Approach $\times$ Avoidance $\times$ Condition interaction for Mean Sip Size (ml). Note: Data points grouped by low avoidance (15th percentile), mean avoidance (between the 15th and 85th percentiles), and high avoidance (85th percentile). Lines represent simple slopes for approach inclinations at the low (15th percentile), mean, and high (85th percentile) values of avoidance.

Table 1Descriptive Statistics (means and SDs, percentages and *n*'s)

	Overall (<i>n</i> =61)	Non-Depletion (<i>n</i> =31)	Self-Control Depletion (<i>n</i> =30)	Statistical Test	<i>p</i> -value
Age	22.41 (1.84)	21.97 (1.49)	22.87 (2.06)	<i>F</i> (1,59) = 3.82	.055
Income	2.11 (1.77)	2.39 (1.67)	1.83 (1.86)	<i>F</i> (1,59) = 1.50	.225
Education	16.15 (1.42)	16.31 (1.07)	15.98 (1.70)	<i>F</i> (1,59) = 0.79	.377
Gender (% female)	50.8 (<i>n</i> = 31)	51.6 (<i>n</i> = 16)	50.0 (<i>n</i> = 15)	$\chi^2_{(1)} = .016$	.900
Drinks per Occasion	3.68 (1.88)	3.77 (1.92)	3.58 (1.88)	<i>F</i> (1,59) = 0.15	.697
YAAPST	12.15 (8.30)	13.06 (8.62)	11.20 (7.98)	<i>F</i> (1,59) = 0.77	.385
Drink Preference (% Beer)	49.2 (<i>n</i> = 30)	38.7 (<i>n</i> = 12)	60.0 (<i>n</i> = 18)	$\chi^2_{(1)} = 2.77$	.096
Approach	3.88 (1.37)	3.75 (1.33)	4.01 (1.42)	<i>F</i> (1,59) = 0.51	.479
Avoidance	2.17 (1.02)	2.05 (0.97)	2.30 (1.08)	<i>F</i> (1,59) = 0.91	.345
IMS	6.22 (1.90)	6.29 (1.20)	6.14 (1.23)	<i>F</i> (1,59) = 0.23	.632
EMS	3.62 (1.90)	3.73 (2.02)	3.50 (1.80)	<i>F</i> (1,59) = 0.22	.642
Beer Consumed (ml)	431.72 (240.75)	413.27 (260.33)	450.80 (221.52)	<i>F</i> (1,59) = 0.37	.547
Mean sip size (ml)	11.77 (5.80)	11.77 (5.23)	11.77 (6.43)	<i>F</i> (1,59) = 0.00	.998

Note: Approach = approach inclinations (AAAQ); Avoidance = avoidance inclinations (AAAQ); IMS = internal motivation to respond without prejudice scale; Drink Preference (0 = beer, 1 = other); YAAPST = Young Adult Alcohol Problems Screening Test; Income (0 = "0 to \$20,000", 1 = "\$20,001 to 40,000", 2 = "\$40,001 to 60,000", 3 = "\$60,001 to 80,000", 4 = "\$80,001 to 100,000", 5 = ">\$100,000").

Table 2

Regression results (full models) for total beer consumption and mean sip size

	Total Beer Consumed (ml)				Mean Sip Size (ml)			
	B	SE	p	β	B	SE	p	β
Intercept	399.867	38.078	<.001	--	11.276	.826	<.001	--
Alcohol Preference	-80.771	52.015	.120	-.169	-2.299	1.329	.084	-.200
Drinks/Occasion	54.321	13.793	<.001	.426	1.030	.314	.001	.335
Condition	75.933	48.498	.117	.159	1.170	1.260	.353	.102
Approach	25.903	21.537	.229	.148	.443	.507	.382	.105
Avoidance	-26.785	36.099	.458	-.114	-1.790	.752	.017	-.316
Condition $\times$ Approach	-14.306	28.379	.614	-.059	.157	.671	.815	.027
Condition $\times$ Avoidance	-5.016	42.902	.907	-.016	2.414	1.037	.020	.314
Approach $\times$ Avoidance	-35.325	19.557	.071	-.215	-.792	.387	.041	-.200
Condition $\times$ Approach $\times$ Avoidance	54.554	25.322	.031	.257	1.894	.553	.001	.371

Note: Condition: non-depletion = 0, self-control depletion = 1; Drink Preference (0 = beer, 1 = other); B = unstandardized estimates; SE = Standard Error; β = standardized estimate. All predictors (except condition) and control variables were centered on the mean.