SURFING THE URGE: EXPERIENTIAL ACCEPTANCE MODERATES THE RELATION BETWEEN AUTOMATIC ALCOHOL MOTIVATION AND HAZARDOUS DRINKING

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There is growing evidence for the role of automatic mental processes in substance use. Recent research suggests that mindfulness training may be a useful treatment for substance use disorders and theoretical analyses suggest mindfulness works by decoupling the relation between automatic appetitive responses and actual behavior. The current study was designed to examine whether mindfulness moderates the relation between automatic processes and alcohol behavior. A sample of undergraduate drinkers ($N = 50$) completed measures of hazardous drinking, mindfulness and automatic alcohol motivation (using the Implicit Association Test; Greenwald, McGhee, & Schwartz, 1998). Regression analyses indicate that greater mindful acceptance of current experience weakens the positive relation between automatic alcohol–approach associations and hazardous drinking found in other research (Palfai & Ostafin, 2003). The results contribute to basic science by indicating that the relation between automatic mental processes and behavior may be moderated by mindfulness and to clinical science by suggesting how mindfulness might work in changing substance use behavior.

A defining element of addiction is the difficulty in refraining from substance use even when one has conscious intentions to do so

(Widiger & Smith, 1994). This accounts for the high relapse rates found after treatment (see McKay, Franklin, Patapis, & Lynch, 2006) and substance users' self–reported difficulty in controlling their urges (Gudgeon, Connor, Young, & Saunders, 2005). Why is it so hard to refrain from using? Addiction researchers have increasingly used the cognitive psychology construct of *automatic mental processes* (Posner & Snyder, 1975; Shiffrin & Schneider, 1977) to model the nonvolitional nature of addiction (see Tiffany, 1990; Wiers & Stacy, 2006).

Automatic processes are differentiated from controlled processes in that automatic processes are usually defined as being: (a) unintentional, (b) efficient (i.e., effortless), (c) difficult to control, or (d) not involving awareness whereas controlled processes are defined as being: (a) intentional, (b) relying upon limited attentional resources, (c) controllable, and (d) occurring within awareness (Bargh, 1994). Substance use, like other behaviors, may start out as a function of controlled processes (e.g., consciously deciding whether to go out for a drink). However, with repeated use and reinforcing consequences, substance use decisions may shift from a deliberative "mental algebra" (Goldman, Brown, Christiansen, & Smith, 1991) to automatic appetitive processes that promote use (see Tiffany, 1990). These automatic processes have begun to be studied with a variety of implicit tasks borrowed from cognitive and social cognition researchers (see Wiers & Stacy, 2006).

Of the variety of measures used to assess automatic stimulus–affect associations (see Fazio & Olson, 2003), the one that has become most widely used is the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). The IAT provides an indirect measure of the strength of associations among concepts by having participants categorize stimuli from four categories using one of two response keys. The IAT is based on the idea that stronger associations between concepts will result in faster response times when they share the same response key than when they do not share the same response key. Several studies have used the IAT to assess automatic alcohol–affect associations. This research has found that automatic alcohol–approach associations predict heavy drinking episodes and urge responses to alcohol cues, even when covarying an explicit measure of alcohol–affect associations (Ostafin & Palfai, 2006; Palfai & Ostafin, 2003). Other research with the IAT has found that automatic alcohol–valence and alcohol–arousal associations similarly

predict alcohol behavior (Jajodia & Earleywine, 2003; Wiers, van Woerden, Smulders, & de Jong, 2002).

Automatic and controlled processes can come into conflict, such as when a hazardous drinker attempting to abstain experiences a strong automatic (i.e., unintentional and difficult to control) appetitive response when offered a beer. In such situations, the drinker may attempt to self–regulate by effortfully controlling the automatic appetitive response. However, because controlled process resources are limited (Muraven, Tice, & Baumeister, 1998) and because inhibiting automatic responses may lead to a rebound effect in which the responses become more accessible and likely to influence mood and behavior (Palfai, Colby, Monti, & Rohsenow, 1997; Wegner, 1994), attempts to inhibit automatic responses may be ineffective. That is, the drinker may end up acting on a behavioral impulse to use despite conscious intentions to do otherwise. Recent research with the alcohol–approach IAT using cross–sectional (Palfai & Ostafin, 2003) and experimental (Ostafin, Marlatt, & Greenwald, 2007) designs suggests that automatic processes do play a role in dyscontrolled alcohol use.

New approaches to psychological treatment hold promise in modulating the influence of automatic appetitive responses on behavior. One category of such treatments emphasizes the utility of changing the relationship to one's internal experience rather than changing the content of the experience (Hayes, 2004). *Mindfulness* falls into this category of treatments and can be defined as consisting of the following: (a) awareness of immediate experience, and (b) a nonjudgmental and accepting attitude toward that experience which involves "a conscious decision to abandon one's agenda to have a different experience" (Bishop et al., 2004, p. 233). Behavioral impulses to approach reinforcing stimuli and avoid aversive stimuli (i.e., impulses to change the nature of one's current experience) are to be allowed and experienced for their duration (i.e., accepted) rather than acted upon. That is, with an accepting attitude, impulses (and thoughts and emotions) are simply to be observed as mental content that comes and goes.

These components of mindfulness may be illustrated in the everyday experience of having an itch. An itch may enter awareness as a mildly aversive experience that elicits an automatic response of scratching behavior. Because an accepting attitude involves abandoning an agenda to have a different experience (i.e., more pleasant

or less aversive), motivational dispositions should be less likely to be acted upon. Thus, one may be less likely to scratch an itch, or, in a more clinically relevant situation, a hazardous drinker may be less likely to order a drink when experiencing automatic motivational dispositions to drink. Instead, the drinker may accept the disposition to drink, allowing it to grow and recede without taking action to actually drink (to reduce negative affect or increase positive affect). Marlatt has described this type of accepting attitude toward automatic appetitive responses in addiction as "urge surfing" (Marlatt, 1994). Recent work suggests that mindfulness may indeed be a useful treatment for substance use behaviors including alcohol, cocaine, marijuana and cigarette use (Bowen et al., 2006; Davis, Fleming, Bonus, & Baker, 2007).

The above analysis suggests that mindfulness may influence substance use by modulating the effect of automatic appetitive processes on behavior. The current study was designed to examine this question. We expected that an accepting attitude toward one's experience would moderate the relation between automatic alcohol motivation and hazardous drinking. Specifically, we predicted that the positive relation between automatic alcohol–approach associations and hazardous drinking found in other research (Palfai & Ostafin, 2003) would be reduced in individuals who are more accepting of their present experience. We did not have a hypothesis for the awareness component of mindfulness to similarly reduce the relation between automatic alcohol motivation and hazardous drinking. In fact, awareness of internal state might actually increase the association between affective associations and alcohol behavior, as alcohol expectancies have been shown to more strongly predict alcohol use in participants who are more aware of their internal experience (Bartholow, Sher, & Strathman, 2000). To examine our hypothesis, participants completed a measure of automatic alcohol motivation and self–report measures of drinking behavior and mindfulness.

METHOD

PARTICIPANTS

Fifty college students (28 females) who reported consuming alcohol at least once in the previous month participated as partial fulfillment of a class requirement. Mean participant age was 19.97 years old (*SD*

= 2.47). Self–reported ethnicity was White (n = 31), Asian/Pacific Islander (n = 11), Multi–racial (n = 3), American Indian/Alaskan native (n = 2), Hispanic (n = 2), and Black (n = 1). Participants reported an average of 4.37 (SD = 4.70) heavy drinking episodes and 5.24 (SD = 7.0) alcohol–related problems over the past month.

MEASURES

Hazardous Drinking. Heavy drinking episodes over the past month were measured as the number of times that participants consumed four or more (for females) or five or more (for males) drinks on one occasion (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). Alcohol–related problems over the past month were assessed with a 12–item Likert measure (e.g., "Got hurt or injured") with options ranging from 0 (*No, not in the past 30 days*) to 17 (*21–30 times in the past 30 days*; Wechsler et al., 1994). The problems measure demonstrated adequate internal consistency (*Coefficient alpha = .67*). Standardized values of the heavy drinking and alcohol problem variables were aggregated into a single hazardous drinking variable (*Coefficient alpha = .71*).

Automatic Alcohol Motivation. Each participant completed an IAT that assessed alcohol–motivation associations and was presented on a personal computer with Inquisit software (Draine, 2004). The IAT is assessed by having participants categorize stimuli from four categories—two target categories (e.g., pictures of beer and water) and two attribute categories (e.g., approach and avoidance–related words)—by pressing one of two response keys. During the combination blocks, each response key is paired with one target and one attribute category. For example, the left key would be pressed whenever beer or approach stimuli are presented and the right key would be pressed whenever water or avoid stimuli are presented. The IAT is based on the idea that stronger stimulus–affect associations will lead to faster response times for both the target (e.g., beer pictures) and attribute (e.g., approach words) stimuli when they are paired on the same key. Over two combination blocks, each target category is matched with both attribute categories (e.g., with both approach and avoidance words). The IAT score is calculated as a difference score between congruent (for those with appetitive motivation towards alcohol, the beer–approach/water–avoid block) and incongruent (e.g., water–approach/beer–avoid

block) response times, with larger scores indicating stronger automatic approach motivation towards alcohol.

Mindfulness. The Kentucky Inventory of Mindfulness Skills (Baer, Smith, & Allen, 2004) consists of 39 items that use a Likert–scale ranging from 1 (*Never or very rarely true*) to 5 (*Almost always or always true*) to assess four scales. The measure includes two scales that reflect the acceptance and awareness components of mindfulness (internal consistencies are in parentheses): the Accepting without judgment scale (*Coefficient alpha* = .84) assesses an attitude that consists of letting go of an agenda to maintain or change one's experience (e.g., "I tell myself that I shouldn't be feeling the way I'm feeling") and the Observing scale (*Coefficient alpha* = .83) assesses awareness of internal and external phenomena (e.g., "I pay attention to sensations, such as the wind in my hair or sun on my face"). The measure also includes two other mindfulness–related scales: the Describing scale (*Coefficient alpha* = .86) assesses the tendency to apply words to experience and the Acting with awareness scale (*Coefficient alpha* = .79) assesses the ability to engage undivided attention on a current task.

PROCEDURE

Participants were run individually and began by completing the alcohol motivation IAT. Participants then completed the hazardous drinking and mindfulness measures.

The stimuli for the IAT consisted of five alcohol–related pictures, five water–related pictures, five approach–related words, and five avoidance–related words (see Appendix A). The IAT was presented in seven blocks: (a) a 14–trial target discrimination block (for the congruent block first IAT order, left = *beer* and right = *water*); (b) a 14–trial attribute discrimination block (left = *approach* and right = *avoid*); (c) a 20-trial combination block (left = *beer* + *approach* and right = *water* + *avoid*); (d) a 40-trial combination block of the same combination in (c); (e) a 14-trial target discrimination block in which the target categories were reversed (left = *water* and right = *beer*); (f) a 20-trial combination block (left = *water* + *approach* and right = *beer* + *avoid*); and (g) a 40-trial combination block of the same combination in (f). Each block had one additional lead–in trial. The stimuli for the target and attribute discrimination blocks were presented randomly. The stimuli for the combination blocks were presented randomly with the restric-

tion that the trials alternated between target and attribute stimuli. A 250 ms interval separated each trial after a response was made. Participants were instructed to respond as quickly and accurately as possible. If participants made an error, they saw an error message and were required to make the correct response before the next trial was presented. Two IAT orders were utilized: one with the *beer* and *approach* (and *water* and *avoid*) combination (the congruent block) first and one with the *water* and *approach* (and *beer* and *avoid*) combination (the incongruent block) first. The two IAT orders were counterbalanced across participants.

RESULTS

The IAT score was calculated with the revised IAT scoring algorithm (Greenwald, Nosek, & Banaji, 2003). In order to examine whether the alcohol motivation IAT was related to drinking behavior, a regression analysis on hazardous drinking was performed with IAT order and gender entered as Step 1 and IAT score entered as Step 2. The results indicated a relation between the IAT and hazardous drinking (β = .26, p = .08) comparable in magnitude to that found in previous research (Ostafin & Palfai, 2006; Palfai & Ostafin, 2003).

The main hypothesis was that the acceptance component of mindfulness would moderate the relation between automatic alcohol motivation and hazardous drinking. The moderator–interaction effect was examined with a regression analysis on hazardous drinking with IAT order and gender entered as Step 1, IAT score and Acceptance entered as Step 2 and a product of the standardized values of the IAT score and Acceptance variables entered as Step 3. The results indicated that Acceptance acted as a moderator of the relation between automatic alcohol motivation and hazardous drinking (β = −.37, p = .02; see Table 1). Regression analyses indicated that the other scales did not moderate the relation between the IAT and hazardous drinking at alpha = .05, including the Observe (β = .26, p = .08), Describe (β = .10, p = .47), and Act with awareness (β = −.21, p = .22) scales.

We conducted several analyses to assist the interpretation of the interaction effect with the Acceptance scale. In one set of analyses, we created a median split on the Acceptance scale and conducted a regression analysis on hazardous drinking for both the Low Acceptance (n = 23) and High Acceptance (n = 27) groups. IAT order and

TABLE 1. Experiential Acceptance as a Moderator of the Relation Between Automatic Alcohol Motivation and Hazardous Drinking

	Variable	**R–squared change**	**F–change**
Hazardous drink-ing			
Step 1			
IAT order	.01	$F (2, 47) = .25$	
Gender			.06
Step 2			
IAT score	.08	$F (2, 45) = 2.05$	.25
Acceptance			−.14
Step 3			
IAT × Acceptance	.10	$F (1, 44) = 5.55$	−.37*

Note. Hazardous drinking = aggregate of heavy drinking frequency + alcohol problems; IAT order (1 = congruent block first, 2 = incongruent block first); Gender (1 = male, 2 = female); IAT score (larger scores = stronger approach associations); Acceptance = nonjudgmental acceptance of experience; IAT × Acceptance = product of the IAT and Acceptance variables. *$p < .05$.

gender were entered as Step 1 and IAT score was entered as Step 2. The results indicated a strong positive relation between the IAT score and hazardous drinking in the Low Acceptance group ($\beta = .43$, $p = .06$) and a null relation in the High Acceptance group ($\beta = −.10$, $p = .62$), suggesting that greater acceptance of current experience weakens the relation between automatic alcohol motivation and hazardous drinking. In a second set of analyses, we examined whether the Acceptance variable was related to either hazardous drinking or the IAT, as a moderator–interaction effect can be most clearly interpreted when the moderator is not related to either the predictor or criterion variable (Baron & Kenny, 1986). A partial correlation analysis in which gender was covaried indicated that Acceptance was not significantly related to hazardous drinking ($pr = −.15$, $p = .30$). A regression analysis on the IAT score with IAT order and gender entered as Step 1 and Acceptance entered as Step 2 indicated that Acceptance was not related to the IAT score ($\beta = −.02$, $p = .92$). These latter results contribute to the confidence of interpreting the Acceptance variable as a moderator of the relation between automatic alcohol motivation and hazardous drinking.

DISCUSSION

The present study examined whether the relation between automatic alcohol motivation and hazardous drinking would be lower in indi-

viduals with high levels of acceptance of their present experience and, conversely, that it would be higher in individuals with lower levels of acceptance. The results indicate that an accepting attitude toward one's experience is indeed associated with a reduced positive relation between automatic alcohol–approach associations and hazardous drinking. Recent research has indicated that heavy alcohol use (as well as other substance use behavior) may be reduced after a mindfulness intervention (Bowen et al., 2006; Davis et al., 2007). The current study suggests that one way in which mindfulness training may influence alcohol use is by decoupling the relation between automatic appetitive responses and actual alcohol behavior. That is, acceptance may "increase the gap between impulse and action" (Paul Ekman, cited in Boyce, 2005, p. 40), allowing for more adaptive responding.

Mindfulness is often defined as including both greater acceptance and awareness of internal experience (Bishop et al., 2004; Kabat–Zinn, 2003). We did not have a hypothesis regarding the potential role of awareness as a moderator in this study. The results indicated that awareness marginally served as a moderator in the direction of increasing the relation between the IAT and hazardous drinking. This is not surprising, given past research in which greater awareness of internal experience increased the relation between alcohol expectancies and alcohol use (Bartholow et al., 2000). Similarly, a recent study has found that the awareness subscale of a mindfulness questionnaire (different from the one in this study) was correlated with more heavy drinking episodes and smoking behavior (Leigh, Bowen, & Marlatt, 2005). The current study and past research indicate that simply being aware of one's motivational responses may make one more likely to act on them. It may be that in addition to awareness, developing acceptance of one's internal state is necessary for the beneficial effects of mindfulness training on substance use behavior. The idea that acceptance is central to modulating the impact of behavioral dispositions on actual behavior is supported by a recent study with a sample of obsessive compulsive disorder participants (Twohig, Hayes, & Masuda, 2006). The results indicated that an acceptance-based intervention led to a reduction in symptoms as well as a greater acceptance of and, importantly, a decreased need to act on compulsive behavioral dispositions.

The results of the study have implications for both basic and clinical science. Basic research has established a role for automatic mental processes in cognition, affect, and behavioral dispositions (Chen & Bargh, 1999; Fazio, Jackson, Dunton, & Williams, 1995). As evidence accumulates for the existence of automatic mental processes, work has turned toward examining the conditions in which their influence is more or less likely to occur (e.g., Perugini, 2005). One model proposes that behavior may be more likely to be influenced by controlled processes when there is motivation and opportunity to self–regulate and by automatic processes when either motivation or opportunity are lacking (Fazio & Towles–Schwen, 1999). The current study makes a novel contribution by indicating that the influence of automatic processes on behavior may also be moderated by dispositional acceptance of current internal experience. Future research should examine whether the current findings extend to other domains, such as whether acceptance moderates the influence of automatic motivational responses on self–regulation (Fishbach & Shah, 2006) or intergroup bias (Fazio et el., 1995).

The results also have clinical implications. Although a growing number of studies indicate that the mindfulness training may have beneficial effects on psychological well–being (Baer, 2003), little is known about the paths by which mindfulness leads to clinical improvements. One suggestion is that mindfulness shifts the relationship with mental content from one of identification (e.g., believing negative self–thoughts as reflecting reality) to a decentered perspective in which content is experienced more as "passing thoughts and feelings that may or may not have some truth in them" (Teasdale et al., 2002, p. 276). The current study supports this idea in that the strength of automatic alcohol–approach associations did not differ as a function of level of acceptance. That is, participants high in dispositional acceptance were as likely to experience strong automatic appetitive responses to alcohol as were those low in acceptance. What did differ is the link between automatic alcohol motivation and behavior. It may be that greater levels of acceptance allow one to decenter from automatic motivational responses—to have the response but not act on it. Given the increasing evidence for a role of automatic mental processes in psychopathology such as substance abuse (Palfai & Ostafin, 2003), depression (Gemar, Segal, Sagrati, & Kennedy, 2001) and anxiety (Teachman & Woody, 2003), altering the

influence of these automatic processes would have important clinical potential. However, such interpretations of the current results are limited by the use of a non–clinical sample and a cross sectional study design. Future research should examine whether acceptance decreases the harmful influence of automatic processes in clinical samples.
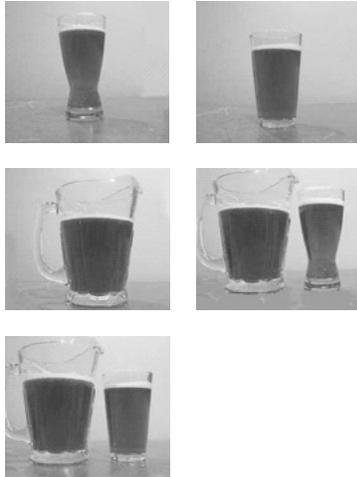
Future research should also use an experimental design to examine whether mindfulness training leads to a decoupling of automatic processes and alcohol behavior. At this early stage, it is difficult to tell whether mindfulness training may be best utilized in substance use disorders as a primary intervention (Bowen et al., 2006; Davis et al., 2007) or for relapse prevention (Witkiewitz, Marlatt, & Walker, 2005), as is done in Mindfulness–Based Cognitive Therapy for depression (Teasdale et al., 2000). However, the current findings suggest that any mindfulness intervention for problematic alcohol use may benefit from having participants deliberately practice relating differently toward their automatic appetitive responses toward alcohol—to cultivate an attitude toward the automatic processes that might be described as 'accepting,' 'allowing,' or 'letting be' (Segal, Williams, & Teasdale, 2002).

In sum, the current study suggests that an accepting attitude towards one's experience may interrupt the relation between automatic mental processes and overt alcohol behavior. The results support models of treatment in which the target of change is the relation toward one's internal experience. The nature of this relation toward one's experience can be illustrated with two contrasting pictures of emotion regulation, both of which depict emotion as animal like. In the first perspective, a wild horse representing emotion is to be controlled by the charioteer's whip and spur of reason (Plato, 2002). Given the limitations involved in effortful self–control, this strategy may be of modest use. Alternatively, the approach proposed in the second perspective is to create a spacious meadow for the animal. That is, the best strategy for regulating the animals of the mind is to ". . . watch them, just to watch them, without trying to control them" (Suzuki, 1974, p. 32). Perhaps best way to tame "wild" emotions and their harmful influence is not by force, but with a nonjudgmental attitude that creates space between impulse and action.
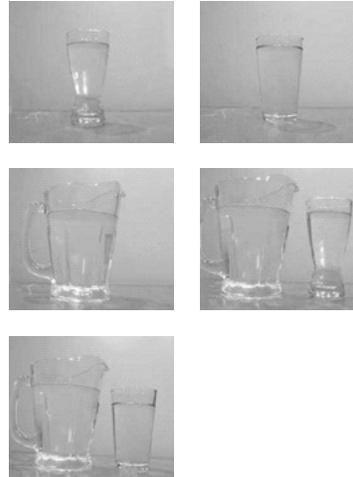
APPENDIX A

IAT stimuli	
Beer stimuli	**Water stimuli**

Approach stimuli	Avoid stimuli
Advance	Avoid
Approach	Away
Closer	Escape
Forward	Leave
Toward	Withdraw

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