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Mediators Of The Relationship Between Mindfulness And Alcohol Use

Melissa Lafferty
Eastern Illinois University

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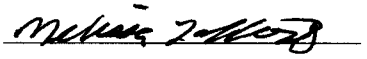

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Mediators of the Relationship Between Mindfulness and Alcohol Use

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Melissa Lafferty

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Mediators of the Relationship Between Mindfulness and Alcohol Use

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Abstract

Mindfulness is the act of "paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally" (Kabat-Zinn, 1994, p.4). Mindfulness training has been shown to produce beneficial effects for a wide range of physical and psychological symptoms, including substance abuse (Baer, 2003). The current study attempted to test a working model of how mindfulness can enhance psychological well-being developed by Hölzel et al. (2011) within the specific context of alcohol use. It was hypothesized that higher levels of mindfulness would be associated with less alcohol use and less alcohol-related problems experienced. In addition, this study investigated whether this predicted inverse relationship between mindfulness and alcohol use is mediated by attention regulation, emotion regulation, body awareness, and change in perspective on the self. One hundred fifty-seven Eastern Illinois University students participated in the study through an online survey. The results of the study demonstrated that mindfulness was, indeed, negatively correlated with alcohol use and alcohol-related problems. In addition, mindfulness was positively correlated with attention regulation, emotion regulation, body awareness, and change in perspective on the self. Subsequent analyses demonstrated that emotion regulation fully mediated the relationship between mindfulness and alcohol use, while attention regulation, body awareness, and change in perspective on the self did not act as mediators. Clinical implications of this research, limitations, and suggestions for future studies were discussed.

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Mediators of the Relationship Between Mindfulness and Alcohol Use

The purpose of this study was to test four possible mediators of the relationship between mindfulness and alcohol use, adopting a model of the relationship between mindfulness and well-being developed by Hölzel et al. (2011). In addition, this study investigated whether the relationship between mindfulness and alcohol use is mediated by attention regulation, emotion regulation, body awareness, and change in perspective on the self. The results of this study will help therapists and researchers identify which mechanisms of mindfulness may prevent an individual from developing alcohol problems. Additionally, viewing mindfulness through its mechanisms of action will aid in the development of interventions designed to treat alcohol problems.

Mindfulness has been described as "paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally" (Kabat-Zinn, 1994, p.4) and "bringing one's complete attention to the present experience on a moment-to-moment basis" (Marlatt & Kristeller, 1999, p. 68). For example, in practicing mindfulness while walking one would need to pay attention in the present moment in a nonjudgmental way. Walking mindfully would involve noticing the sense of touch between your feet and the ground, observing how your weight seamlessly transfers from one foot to the other, noticing the sights and sounds, and becoming aware of your emotions and feelings, without judging the self, one's observations, thoughts, and feelings (Hanh, Bobrow, & Aitken, 1985).

Mindfulness is a concept originating from ancient Buddhist philosophy that has recently gained popularity in the West. It is cultivated through a variety of meditation exercises to achieve clarity and balance of mind (Kabat-Zinn, 1990; Hanh, 1991). Given

that mindfulness training has been shown to produce beneficial effects for a wide range of physical and psychological symptoms (Baer, 2003), interventions that incorporate mindfulness training have been developed to treat a number of clinical disorders. The most common treatments include Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990), Mindfulness-Based Cognitive Therapy (MBCT; Teasdale, Segal, and Williams, 1995), Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999), and Dialectical Behavior Therapy (DBT; Linehan, 1993). More recent research has focused on developing mindfulness-based interventions for substance abuse disorders.

Operationalizing Mindfulness

It is necessary to define and measure mindfulness in order to investigate the nature of mindfulness and its relationship to other psychological constructs. Some researchers view mindfulness as a single construct. For instance, Brown and Ryan (2004) define mindfulness as attention to and awareness of what is occurring in the present. The authors developed The Mindful Attention Awareness Scale (MAAS) which has a single factor structure and yields a single score.

Several researchers have sought to define mindfulness in terms of its "facets" or components but suggest interpreting mindfulness as an overall construct. Buchheld and colleagues (2001) developed the Frieburg Mindfulness Inventory (FMI) to measure four facets of mindfulness: 'mindful presence,' 'non-judgemental acceptance,' 'openness to experience,' and 'insight.' However, due to high intercorrelations of the factors, high secondary loadings on the common factor, and substantial double loadings in the orthogonal solution, the authors suggest interpreting the FMI unidimensionally (Walach,

Buchheld, Buttenmuller, Kleinknecht, & Schmidt, 2006). The Mindfulness Questionnaire (MQ) was designed to measure four facets of mindfulness: 'mindful observation,' 'letting go,' 'nonaversion,' and 'nonjudgment' (Chadwick et al., 2008). The MQ was revised to improve the psychometric properties of the scale and was named the Southampton Mindfulness Questionnaire (SMQ). The authors recommend interpreting the SMQ unidimensionally. The Cognitive and Affective Mindfulness Scale (CAMS) was also designed to measure four facets of mindfulness: attention, awareness, present-focus, and acceptance/nonjudgment (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007). Although the items represent four facets of mindfulness, the authors suggest interpreting the instrument unidimensionally. The CAMS was revised to improve the psychometric properties of the scale and was named The Cognitive and Affective Mindfulness Scale-Revised (CAMS-R).

Other researchers have suggested that mindfulness is a multi-faceted construct. Lau and colleagues developed the Toronto Mindfulness Scale (TMS) and found empirical support for mindfulness being represented by two facets: 'curiosity' or awareness of present moment experience with curiosity and 'decentering' or awareness of one's experience with some distance and disidentification. Baer, Smith, and Allen (2004) developed the Kentucky Inventory of Mindfulness Skills (KIMS) and found empirical support for mindfulness as being represented by four facets: observing, describing, acting with awareness, and accepting without judgment.

Baer, Smith, Hopkins, Kietemeyer, and Toney (2006) administered the MAAS, FMI, KIMS, CAMS, and MQ to examine the facet structure of mindfulness. The authors performed a factor analysis and identified five facets of mindfulness: 'observing inner

experience' (attending to sensations, perceptions, thoughts, and feelings), 'nonreactivity to inner experience' (refraining from impulsive reactions to the experience), 'acting with awareness' (concentration or nondistraction), 'describing experience' (describing or labeling with words), and 'nonjudging of inner experience' (refraining from judgments or self-criticism about having an experience). The authors then constructed the Five Facet Mindfulness Questionnaire (FFMQ) to measure these five separate facets of mindfulness, although this instrument can also be used to measure mindfulness as an overall construct.

Mindfulness in Clinical Settings

Mindfulness has been called "the heart" of Buddhist meditation (Thera, 1962). Mindfulness can be viewed as an inherent human capacity to pay attention, moment by moment (Kabat-Zinn, 2003). Various Buddhist traditions have brought awareness to one's capacity to be mindful. Although there is a common conceptual framework stemming from Buddhist tradition that underlies mindfulness training, actual practices of mindfulness vary considerably. In the West, interventions that incorporate some form of mindfulness training have become more popular in recent years and are used to treat a wide range of psychological conditions.

Mindfulness-based stress reduction. Mindfulness-based stress reduction (MBSR), formerly known as the stress reduction and relaxation program (SR-RP), was developed in a behavioral medicine setting for populations with a wide range of chronic pain and stress-related disorders (Kabat-Zinn, 1990). MBSR was designed to give instruction in mindfulness practice and guidance in integrating mindfulness into everyday life for improving physical and emotional well-being and reducing psychological stress. It is taught in a structured format in which participants meet weekly for a 2.5 hour class

for eight to ten weeks and an all-day intensive mindfulness session around the sixth week. Reviews have demonstrated that participation in MBSR is associated with greater improvements in a variety of medical and psychological conditions, including cancer, chronic pain, generalized anxiety and panic disorder, binge eating disorder, and co-occuring medical and psychological conditions (Baer, 2003, Grossman, Niemann, Schmidt, & Walach, 2004; Ledesma & Kumano, 2009; Fjorback, Arendt, Ørnbøl, Fink, & Walach, 2011). MBSR has also been shown to reduce stress in nonclinical populations (Chiesa & Serretti, 2009).

Mindfulness-based cognitive therapy. Mindfulness-based cognitive therapy (MBCT) was partially based on the MBSR program developed by Jon Kabat-Zinn (1990). MBCT, formally known as Attentional Control Training (ACT), was developed specifically to prevent the relapse of major depressive episodes by incorporating mindfulness training into a traditional cognitive behavioral therapy model (Teasdale, Segal, and Williams, 1995). It is a structured group intervention in which participants attend a two-hour weekly class for eight weeks and a one day-long class after the fifth week (Segal, Williams, & Teasdale, 2013). It follows the cognitive behavioral approach by focusing on interrupting automatic thought processes that lead to depressive rumination, while incorporating mindfulness training by teaching the participant to focus less on reacting to incoming stimuli, and instead accepting and observing them without judgment (Teasdale, Segal, and Williams, 1995). Reviews have shown that MBCT is associated with greater improvements than treatment as usual for a wide range of conditions, including depression, anxiety, and bipolar disorder (Chiesa & Serretti, 2011; Piet & Hougaard, 2011; Fjorback, Arendt, Ørnbøl, Fink, & Walach, 2011).

Acceptance and commitment therapy. Acceptance and commitment therapy (ACT) is based on principles of behavior analysis (Hayes, Strosahl, & Wilson, 1999). This intervention uses acceptance and mindfulness strategies with commitment and behavior-change strategies to improve psychological outcomes. ACT uses the following mindfulness strategies to help clients develop psychological flexibility: acceptance, contact with the present moment, and observing the self. It also uses techniques that focus on values, committed action, and cognitive defusion, or attending to the ongoing process of thought. Reviews suggest that ACT is an effective treatment for a wide range of physical and psychological conditions including pain, trichotillomania, obsessive-compulsive disorder, schizophrenia, stress, anxiety, depression, bipolar disorder, smoking cessation, drug abuse, and the management of epilepsy and diabetes (Powers, Zum Vörde Sive Vörding, & Emmelkamp, 2009; Pull, 2009).

Dialectical behavior therapy. Dialectical behavior therapy (DBT) was designed to treat borderline personality disorder (BPD) by combining traditional cognitive-behavioral techniques for emotion regulation and reality testing with a commitment to acceptance and change (Linehan, 1993). Linehan describes three mindfulness "what" skills (observe, describe, participate) and three mindfulness "how" skills (nonjudgmentally, one-mindfully, effectively). A recent meta-analysis demonstrated that DBT was effective in treating individuals with BPD (Kliem, Kröger, & Kosfelder, 2010). Studies have indicated that DBT is effective in treating co-occurring BPD and substance abuse (Linehan, et al., 1999; can den Bosch, Verheul, Schippers, & Brink, 2002) In addition, other studies have shown that DBT is effective in treating individuals with binge eating disorder (Telch, Agras, & Linehan, 2001), bulimia nervosa (Safer, Telch, &

Agras, 2001), and suicidal behavior (Linehan, 1987; Rathus & Miller, 2002; Katz, Cox, Gunasekara, & Miller, 2004).

Substance-Related Disorders

The increasing prevalence of alcohol use and alcohol use disorders has become a concern worldwide and in the United States. According to results from the World Health Organization's (WHO) 2004 Global Status Report on Alcohol, there are about two billion people worldwide who consume alcoholic beverages and 76.3 million people with diagnosable alcohol use disorders. The United States ranks forty-first out of 157 countries in terms of adult per capita alcohol consumption, with 8.51 liters of alcohol consumed per year (WHO, 2004). According to results from the 2010 National Survey on Drug Use and Health (NSDUH), nearly one quarter (23.1%) of Americans aged 12 and over participated in binge drinking, i.e., having five or more drinks on the same occasion on at least one day in the past 30 days (SAMHSA, 2011). Heavy drinking, defined as binge drinking on at least five days in the past 30 days, was reported by 6.7% of the population (SAMHSA, 2011). Furthermore, the rate of binge drinking among young adults aged 18 to 25 was 40.6% while the rate of heavy drinking was 13.6% (SAMHSA, 2011).

Substance abuse and dependence. In the previous version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000), substance abuse was defined as "a maladaptive pattern of substance use manifested by recurrent and significant adverse consequences related to the repeated use of substances" (p. 198). Substance dependence was characterized by "a cluster of cognitive, behavioral and physiological symptoms indicating that the individual continues

use of the substance despite significant substance-related problems" (American Psychiatric Association, 2000, p. 192). However, in the most recent version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013a), the DSM-IV-TR criteria substance abuse and substance dependence have been combined into single substance use disorders specific to each substance of abuse within a new "Substance-Related and Addictive Disorders" category. In the DSM-5, substance use disorders are characterized by "a cluster of cognitive, behavioral, and physiological symptoms indicating that the individual continues using the substance despite significant substance-related problems" (American Psychiatric Association, 2013b, p. 483). Each substance use disorder is divided into mild, moderate, and severe subtypes. Whereas DSM-IV-TR substance abuse diagnostic criteria required only one symptom, a DSM-5 diagnosis now requires at least two symptoms. According to the American Psychiatric Association, the distinction between abuse and dependence was based on the concept of abuse as a mild or early phase and dependence as the more severe manifestation (American Psychiatric Association, 2013b). The diagnosis of substance dependence was removed because it connoted an addictive process instead of a more typical physiological response to a substance.

In the DSM-5, the criteria for an alcohol use disorder include: (1) alcohol is often taking in larger amounts or over a longer period than was intended; (2) Persistent desire or unsuccessful efforts to cut down or control alcohol use; (3) a great deal of time is spent in activities necessary to obtain alcohol, use alcohol, or recover from its effects; (4) craving, or a strong desire or use to use alcohol; (5) recurrent alcohol use resulting in a failure to fulfill major role obligations at work, school, or home; (6) continued alcohol

use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol; (7) important social, occupational, or recreational activities are given up or reduced because of alcohol use; (8) recurrent alcohol use in situations in which it is physically hazardous; (9) alcohol use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by alcohol; (10) tolerance; and (11) withdrawal (American Psychiatric Association, 2013a, p. 483-484). The DSM-5 substance use disorder criteria are nearly identical to the DSM-IV substance abuse and dependence criteria combined into a single list, with two exceptions: Craving was added to the list of symptoms, and the symptom of recurrent substance-related legal problems was removed due to cultural considerations (American Psychiatric Association, 2013b).

Alcohol abuse in college students. The consequences of excessive drinking on college campuses include academic problems, injury, assault, driving while intoxicated (DWI), death, police involvement, and alcohol abuse and dependence. According to the National Institute on Alcohol and Alcoholism (2002), about 25% of college students report that using alcohol resulted in problematic consequences, such as missing classes, falling behind in school work, performing badly on papers and exams, and receiving lower grades overall. In 2001, it is estimated that 599,000 or 10.5% of students were unintentionally injured under the influence of alcohol, 646,000 or 12% were assaulted or hit by a drinking college student, and 97,000 or 2% experienced a sexual assault or date rape perpetrated by another drinking college student (Hingson, Zha, & Weitzman, 2009). In 2005, approximately 3,360,000 or 28.9% of students between the ages of 18 and 24 drove under the influence of alcohol, a two percent increased from 1998 (Hingson, Zha,

& Weitzman, 2009). In 2005, 1,825 college students between the ages of 18 and 24 died from alcohol-related unintentional injuries, including motor vehicle crashes, a three percent increased from 1998 (Hingson, Zha, & Weitzman, 2009). Findings from the 2001 Harvard School of Public Health College Alcohol Study indicate that little change in overall binge drinking occurred between 1993 and 2001, except for a sharp rise in frequent binge drinking among students attending all-women's colleges (Wechsler et al., 2002). However, the frequency of drinking and self-induced harm caused by drinking increased over the study period. Furthermore, 31% of a sample of more than 14,000 college students met criteria for a diagnosis of alcohol abuse and 6% for a diagnosis of alcohol dependence in the past 12 months, according to questionnaire-based self-reports about their drinking (Knight et al., 2002).

Despite the negative consequences of excessive alcohol use, drinking has become a "culture" across college campuses (Borsari & Carey, 2001). Alcohol is present at many social functions and part of many peer interactions. Many view college as a place to drink excessively before assuming the responsibilities of adulthood. Given the prevalence of alcohol use and alcohol-related problems on college campuses, it is important for researchers to understand factors that may prevent someone from engaging in alcohol abuse. The current study focuses on the role that mindfulness might play in alcohol-related problems in the college population.

Mindfulness and alcohol-related disorders. There has been an increasing body of research demonstrating a relationship between mindfulness and resistance to substance abuse and related problems. Using the Five Facet Mindfulness Questionnaire (FFMQ) and the Young Adult Problems Screening Test (YAPST), Fernandez, Wood, Stein, and

Rossi (2010) demonstrated a negative association between alcohol use and the facets 'act with awareness' and 'describe.' The results of this study suggest that individuals who are able to stay focused on the present, and who can label and verbalize their thoughts or feelings may be less likely to engage in heavy alcohol consumption. In addition, the results of this study indicate a negative relationship between the facet 'nonjudging' and alcohol-related consequences, suggesting that the ability to observe one's thoughts and feelings without judging them may prevent an individual from engaging in risk-taking behavior.

Using the FFMQ and the Life History Calendar (LHC), Eisenlohr-Moul, Walsh, Charnigo, Lynam, and Baer (2012) demonstrated a significant interaction between the facets 'observing' and 'nonreactivity.' 'Observing' was associated with more periods of alcohol use at lower levels of 'nonreactivity' but was associated with fewer periods of alcohol use at higher levels of 'nonreactivity.' The authors suggest that more reactive or dysfunctional forms of observation, such as rumination, may predict greater levels of alcohol use.

Using a factor of the Alcohol Use Disorders Identification Test representing alcohol consumption (AUDIT-C) and the FFMQ, Murphy and MacKillop (2011) found a negative relationship between the facet 'nonjudging' and alcohol use, indicating that individuals who score highly on the 'nonjudging' facet of mindfulness are less likely to use alcohol. Using a factor of the AUDIT representing adverse consequences of drinking (AUDIT-ADC), the results indicated a negative relationship between the facets 'acting with awareness,' 'nonjudging,' and 'nonreactivity' and adverse consequences of drinking. The results suggest that individuals who score highly on the 'acting with

awareness,' 'nonjudging,' and 'nonreactivity' facets of mindfulness may be less likely to experience adverse consequences of drinking.

Mindfulness-based interventions for substance-related disorders. Several interventions that incorporate mindfulness-based meditation or mindfulness training have been developed to treat substance use disorders. Empirical support for the effectiveness of these interventions for substance use disorders has been promising.

Bowen and colleagues (2006) evaluated the effectiveness of Vipassana meditation (VM), a Buddhist mindfulness-based practice, on substance use in an incarcerated population. VM is a 10-day course in which participants learn to be more mindful through detached self-observation without reacting. The participants are taught to accept thoughts and feelings as independent events and not as direct reflections of the self. The results of the study indicated that participants in the VM course, as compared with those receiving treatment-as-usual, showed significant reductions in alcohol, marijuana, and crack cocaine use, reductions in alcohol-related problems and psychiatric symptoms, and increases in the level of optimism. Because the participants in the VM course had positive psychosocial outcomes and a reduction in psychiatric symptoms, the authors suggest that VM may be an effective treatment for individuals with co-occurring substance abuse and mental health disorders.

Spiritual Self Schema Therapy (3-S) was developed for the treatment of addiction and HIV risk behavior (Avants & Margolin, 2004). It teaches meditation and mindfulness skills, integrating Buddhist principles with modern cognitive self-schema theory. It focuses on changing an individual's self-schema, or the way that a person views him or herself. Because an individuals' self-schema is influenced by his or her

spiritual or religious beliefs, 3-S is adapted to each individual's spiritual or religious beliefs. Research on the effectiveness of 3-S has demonstrated that a shift in self-schema was related to change in drug use and other HIV risk behaviors (Avants, Beitel, & Margolin, 2005; Margolin et al., 2007).

Witkiewitz, Marlatt, and Walker (2005) developed Mindfulness-Based Relapse Prevention (MBRP) by incorporating meditation and mindfulness training into cognitive behavioral models of treatment to prevent or limit the occurrence of relapse episodes of substance use. The goal of MBRP is to "develop awareness and acceptance of thoughts, feelings, and sensations through practicing mindfulness; and to utilize these mindfulness skills as an effective coping strategy in the face of high-risk situations" (Witkiewitz, Marlatt, & Walker, 2005, p. 221). MBRP includes cognitive behavioral techniques, such as identifying high-risk situations and coping skills training, and mindfulness practices intended to increase discriminative awareness and acceptance, teaching clients to observe physical, cognitive, emotional, or craving states without "automatically" reacting. A study evaluating the effectiveness of an 8-week MBRP program demonstrated that MBRP participants, as compared to participants receiving treatment as usual, had significantly lower rates of substance use, greater decreases in craving, and increases in acceptance and acting with awareness after intervention (Bowen et al., 2009). A recent study found that MBRP participants, as compared to participants receiving treatment as usual, had lower depressive symptom scores, lower craving scores, and less substance use (Witkiewitz & Bowen, 2010).

Several recent studies have examined the effectiveness of mindfulness-based training on substance abuse outcomes. Zgierska and colleagues (2009) conducted a

review of 25 studies that evaluated mindfulness-based interventions for substance abuse. The interventions that were evaluated in the studies include Vipassana meditation, Mindfulness Based Stress Reduction, Spiritual Self Schema, Acceptance and Commitment Therapy and Dialectical Behavior Therapy. The results of the review indicated that the majority of the studies showed positive outcomes among participants in a mindfulness-based intervention, compared to baseline or other treatments. Mindfulness-based interventions are a promising treatment for substance abuse, although more research is needed to establish whether particular interventions are more effective in treating substance abuse than treatment-as-usual. To understand why mindfulness can be effective in treating substance abuse problems, this study examined the potential mechanisms through which mindfulness exerts an influence on alcohol abuse and related problems.

Potential Mediators

This current study is based on previous work by Hölzel and colleagues (2011), in which attention regulation, emotion regulation, body awareness, and change in perspective on the self were proposed as other psychological processes that might act as mechanisms through which mindfulness exerts an influence on well-being and psychological symptoms. It investigated whether the proposed mechanisms of mindfulness may have a clinically significant influence on substance use and related problems.

Attention regulation. Attention regulation can be defined as "sustaining attention on the chosen object; whenever distracted, returning attention to the object" (Hölzel et al., 2011, p. 539). Attention regulation is often referred to as executive

attention. Studies have demonstrated that meditators perform better than nonmeditators on the Attention Network Test, an executive attention task (Jha et al., 2007; van den Hurk et al. 2010). One study demonstrated that only five days of meditation practice led to improvements on the Attention Network Test (Tang et al., 2007). Results of the effect of mindfulness practice on performance on the Stroop task, a classic test of executive attention, are mixed. Studies have demonstrated that meditators had better scores on the Stroop task than nonmeditators (Chan & Woollacott, 2007; Moore & Malinowski, 2009). Another study demonstrated that a 20-minute meditation intervention modeled after a Zen meditation on breathing results in better scores on the Stroop task (Wenk-Sormaz, 2005). Whereas several studies have demonstrated a positive relationship between mindfulness and performance on the Stroop task, one study did not find improvements in the Stroop task after an 8-week Mindfulness-Based Stress Reduction program (Anderson, Lau, Segal, & Bishop, 2007).

Attention regulation may prevent one from engaging in alcohol abuse considering the role that attention and memory play in substance abuse disorders. According to Tiffany (1990), drug and alcohol use is governed by memory-based, drug-use action plans established by repetitive, habitual drug use and operate automatically, with little conscious awareness or effort. The "cocktail-party effect," in which more attention is devoted to stimuli with learned significance than to stimuli without such significance, has implications for substance use. Stimuli related to drug or alcohol use, or external "triggers," can recruit attention in individuals with a history of exposure to these stimuli. One study demonstrated that alcoholics have difficulty not attending to alcohol-related color-words (e.g., beer) on a modified Stroop task (Stetter, Achkermann, Blizer, Straube,

& Mann, 2006). Several studies have achieved similar results (Sharma, Albery, & Cook, 2001; Johnsen, Laberg, Cox, Vaksdal, & Hugdahl, 1994; Stormark, Laberg, Nordby, & Hugdahl, 2000).

Cox, Hogan, Kristian, and Race (2002) administered the Stroop task to alcohol abusers prior to and after completing inpatient treatment and to a control group of non-abusers. They found that alcohol abusers whose treatment was unsuccessful had a significant increase in attentional distraction for alcohol stimuli during inpatient treatment, unlike control participants and alcohol abusers whose treatment was successful. Furthermore, alcohol abusers who did not complete treatment were highly distracted by alcohol-related stimuli at treatment admission, compared to alcohol abusers who had completed treatment and control participants. Therefore, improving attention regulation may prevent an individual from engaging in alcohol abuse if the individual is able to focus his or her attention away from drug-related cues that may trigger relapse.

Emotion regulation. Emotion regulation can also be defined as the way in which humans control their experience and expression of emotion under distress (Fox, Hong, & Sinha, 2008) or "exposing oneself to whatever is present in the field of awareness; letting oneself be affected by it; refraining from internal reactivity "(Hölzel et al., 2011, p. 539). Emotion regulation can be separated into two components: reappraisal and exposure, extinction, and reconsolidation. Reappraisal has been suggested as a mechanism through which emotion gets regulated by mindfulness. Reappraisal is defined as "approaching ongoing emotional reactions in a different way (nonjudgmentally, with acceptance)" (Hölzel et al., 2011, p. 539). For the purposes of this study, emotion regulation will be measured as a single construct, defined as being aware of and responding to emotions.

Several studies have demonstrated a relationship between mindfulness training and an increase in the ability to regulate emotions. Ortner and colleagues (2007) examined the relationship between mindfulness and emotional interference, or having one's attention distracted by emotional stimuli. Individuals who are able to regulate their emotions and disengage their attention from emotional stimuli would show less emotional interference. They found that individuals enrolled in a 7-week mindfulness training program showed a reduction in emotional interference, compared to individuals who engaged in relaxation meditation or received no treatment. Furthermore, participants with more mindfulness meditation experience showed less emotional interference than those with less experience. Mindfulness meditation has been shown to decrease negative mood states, improve positive mood states, and reduce distractive and ruminative thoughts and behaviors (Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010; Jain et al., 2007). Another study found that mindful breathing may help reduce emotional reactivity to repetitive thoughts (Feldman, Greeson, & Senville, 2010).

According to the cognitive model of substance abuse, situations lead to dysfunctional thoughts, which lead to negative emotions, which then lead to an urge to use drugs or alcohol (Beck, Wright, Newman, & Liese, 1993). Several studies have demonstrated a relationship between difficulties in emotion regulation and substance abuse (Fox, Hong, & Sinha, 2008; Fox, Axelrod, Paliwal, Sleeper, & Sinha, 2007; Bonn-Miller, Vujanovic, & Zvolensky, 2008; Berking, et al., 2011). Therefore, better emotion regulation may prevent someone from engaging in alcohol abuse.

Body awareness. Body awareness is typically taught during mindfulness training. Hölzel and colleagues (2011, p. 539) define body awareness as a focus on "an

object of internal experience; sensory experiences of breathing, emotions, or other body sensations."

Hölzel, Ott, Hempel, and Stark (2006) found that seven of 10 meditators reported a more differentiated experience of body sensations since they had begun meditating. The results of another study demonstrated that participants in a mindfulness-based stress reduction course had increases in the 'observe' scale of the Five Facets of Mindfulness Questionnaire, which includes questions that represent body awareness (Carmody & Baer, 2008). Although individuals report an increase in body awareness after they have begun meditating or have received mindfulness training, empirical evidence that meditators experience greater body awareness than nonmeditators is limited.

There are no known empirical studies supporting a relationship between body awareness and resistance to alcohol use and related problems. Nevertheless, because body awareness can be defined as noticing or attending to body sensations it corresponds to the 'observing' facet of mindfulness. Therefore, it is possible that body awareness may act as a mechanism through which the 'observing' facet of mindfulness exerts an influence on alcohol use. More research is needed to examine this relationship. The current study focused on the relationship between mindfulness, body awareness, and alcohol use and related problems.

Change in perspective on the self. Mindfulness training may result in a change in one's perspective of the self or "detachment from identification with a static sense of self" (Hölzel et al., 2011, p. 539). In Buddhist philosophy, when the self is experienced as static rather than transitory, there is a tendency to become rigid and attached to one's self-image and identity, often leading to defensiveness and habitual modes of responding.

The sense of self can alternatively be experienced as a product of an ongoing mental process. This process involves a detachment from identification with the permanent, unchanging sense of self, resulting in a "deconstruction of the self" (Hölzel et al., 2011). As a result of this process, the self is viewed as something that changes over time. This change in perspective of the self is often a function of being able to first acknowledge the transitory nature of one's thoughts and feelings, an insight that arises from mindfulness meditation or being mindful. It has also been referred to as "reperceiving," or the ability to disidentify oneself from one's experiences to observe them without reaction or judgment (Shapiro, Carlson, Astin, & Freedman, 2006), "decentering," or the ability to observe one's thoughts and feelings as temporary, objective events in the mind, as opposed to reflections of the self that are necessarily true (Fresco et al., 2007), or the development of the "observer perspective," where one is able to observe their experiences without reaction, attachment, or judgment (Kerr, Josyula, & Littenberg, 2011). Mindfulness fosters an awareness of the transitory nature of one's thoughts, feelings, and sense of self. One learns to 'detach', 'disidentify' or 'decenter' from these ongoing mental and self processes.

Several studies have investigated the early steps involved in the process of changing perceptions of the self during mindfulness training. One study found that participants demonstrated a development of an "observing self" over the course of an 8-week mindfulness-based stress reduction course (Kerr, Josyula, & Littenberg, 2011). Another study found significant changes in self-reports of internal and external aspects of self-representation after completion of a 7-day mindfulness retreat. Haimerl and Valentine (2001) found that increased meditation experience was associated with positive

development on a measure of self-transcendence. Cloninger, Svrakic, and Przybeck (1993) define self-transcendence as "identification with everything conceived as essential and consequential parts of a unified whole… there is no individual self because there is no meaningful distinction between self and other – the person is simply aware of being an integral part of the evolution of the cosmos." One study found that mindful breathing was associated with higher levels of decentering (Feldman, Greeson, & Senville, 2010). Other studies have found an increase in decentering after participation in a mindfulness-based stress reduction program (Carmody, Baer, Lykins, & Olendzki, 2009; Lau, et al., 2006).

Given the limited literature on substance abuse and change in perceptions of the self, it is unclear whether individuals who have begun changing how they view themselves are less likely to engage in alcohol abuse. Nevertheless, research on the effectiveness of 3-S demonstrating that a shift in self-schema was related to change in drug use and other HIV risk behaviors suggests that change in perspective of the self may be related to lower levels of drug use (Avants, Beitel, & Margolin, 2005; Margolin et al., 2007).

Present study

The current study examined the possible mediating roles that the following psychological processes might take in the relationship between mindfulness and alcohol use: attention regulation, emotion regulation, body awareness, and change in perspective on the self. Research has consistently demonstrated a negative relationship between mindfulness and alcohol abuse. Although many studies induce mindfulness through meditation or mindfulness training to examine post-treatment outcomes, for the purposes

of this study mindfulness was examined as a dispositional trait. Mindfulness was viewed as a protective factor that may prevent someone from engaging in alcohol abuse and experiencing alcohol-related problems. The research questions and hypotheses were as follows:

First Study Question: What is the relationship between mindfulness and alcohol use? It was hypothesized that a significant negative relationship would be found between mindfulness and alcohol use.

Second Study Question: What is the relationship between mindfulness and attention regulation, emotion regulation, body awareness, and change in perspective on the self? It was predicted that a significant positive relationship would be found between mindfulness and each of the factors mentioned. However, given the conflicting or insufficient literature on the relationship between mindfulness and attention regulation, as well as body awareness, this element of the study was exploratory in nature.

Third Study Question: What is the relationship between alcohol use and attention regulation, emotion regulation, body awareness, and change in perspective on the self? It was predicted that a significant negative relationship would exist between alcohol use and each of the variables enumerated.

Fourth Study Question: Do the proposed factors (attention regulation, emotion regulation, body awareness, and change in perspective on the self) mediate the relationship between mindfulness and alcohol use? It was hypothesized that each of the factors would mediate the relationship between mindfulness and alcohol use. However, given the limited literature on the relationships between body awareness and substance

abuse, and change in perspective on the self and substance abuse, this element of the study was also exploratory.

Method

Participants

Eastern Illinois University students ($N = 165$) from undergraduate psychology classes during the Spring 2013 semester were asked to participate in the current study. Students enrolled in introductory psychology classes may participate in research studies for credit to apply to their course grade. Those from other classes received extra credit for participating. The sample size met the required size based on the power analysis, in which it was determined that 107 participants would be needed to achieve a desired power of .95 and an anticipated medium effect size. Eighty-two percent of the students in the sample were between the ages of 18 to 21 ($M = 20$, $Mdn = 20$), 24% of which were in their first year at the university. The sample was predominantly female ($n = 122$, 78%). One hundred twelve (71%) were White/Caucasian, 36 (23%) Black/African American, 3 (2%) Hispanic, and 2 (1%) multi-ethnic. The remaining 3% were Asian American, Hawaiian or Pacific Islander, or of other unspecified ethnicity.

Materials

Five Facet Mindfulness Questionnaire (FFMQ). Baer and colleagues (2006) developed the FFMQ as a 39-item self-report measure of mindfulness, reflecting five facets of mindfulness ('observing,' 'describing,' nonjudging,' 'nonreactivity,' and 'acting with awareness'). For example, respondents endorsing the item "I notice the smells and aromas of things" would score higher on the 'observing' facet. Respondents endorsing the item "My natural tendency is to put my experiences into words" would score higher

on the 'describing' facet. An example of an item on the 'nonjudging' scale is "I criticize myself for having irrational or inappropriate emotions." Items on this scale are reverse scored. An example of an item on the 'nonreactivity' scale is "When I have distressing thoughts or images I am able just to notice them without reacting." An example of an item on the 'acting with awareness' facet is "When I do things, my mind wanders off and I'm easily distracted." Items on this scale are reverse scored. Respondents rate items on a 5-point likert scale, ranging from "never or very rarely true" to "very often or always true." The FFMQ has good internal consistency, with alpha coefficients ranging from .75 to .91. In addition, the FFMQ has good construct validity in meditating and nonmeditating samples (Baer et al., 2008). For the purposes of this study, mindfulness was measured as a unidimensional construct. Thus, an overall score was obtained for each participant. For the full scale, see Appendix B.

Alcohol Use Disorder Identification Test (AUDIT). The AUDIT is a 10-item self-report measure developed by the World Health Organization as a method to screen for excessive drinking and to assist in assessment (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). The AUDIT measures hazardous and harmful patterns of alcohol consumption. Each of the questions has a set of responses to choose from with a score from zero to four. Examples of items include "How often do you have a drink containing alcohol" and "Have you or someone else been injured because of your drinking?" The AUDIT has good internal reliability, with alpha coefficients ranging from .80-.86 (Fleming, Barry, & MacDonald, 1991; Barry & Fleming, 1993). The authors suggest that total scores of eight or more are indicators of hazardous and harmful alcohol use, as well as possible alcohol dependence. The AUDIT was interpreted dimensionally with lower

scores indicating less alcohol use and related problems and higher scores indicating more alcohol use and related problems. For the full scale, see Appendix C.

Attentional Control Scale. The Attentional Control scale is a 20-item questionnaire designed to measure two major components of voluntary attention (attention focusing and attention shifting) related to anterior system functioning (Derryberry & Reed, 2002). Examples of items include "I can quickly switch from one task to another" and "I can become interested in a new topic very quickly when I need to." Items are scored on a 4-point Likert scale from "almost never" to "always." Eleven items are reverse-scored. The measure yields one total scale and two subscales (attention focusing and attention shifting). The authors reported an alpha coefficient of .88 for internally consistency. An overall score was obtained for each participant. Elevated scores infer greater ability to regulate one's attention and lower scores infer limited ability. For the full scale, see Appendix D.

Difficulties in Emotion Regulation Scale (DERS). The DERS is a 36-item self-report questionnaire designed to measure difficulties in emotion regulation across six scales: nonacceptance of emotional responses, difficulties in engaging in goal directed behavior, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity (Gratz & Roemer, 2004). For the purposes of this study, the DERS was used to measure emotion regulation as an overall construct. Examples of items include "I experience my emotions as overwhelming and out of control" and "When I'm upset, I believe that I will end up feeling very depressed." Items are scored on a 5-point Likert scale from "almost never" to "almost always." Eleven items are reverse scored. The authors report an alpha

coefficient of .93 for internal consistency and a p-value of .88 for test-retest reliability. An overall score was obtained for each participant. More elevated scores imply greater ability to regulate one's emotions and lower scores infer greater levels of emotion dysregulation. For the full scale, see Appendix E.

Body Awareness Questionnaire. The Body Awareness Questionnaire is an 18-item self-report measure designed to measure "attentiveness to normal nonemotive body processes, specifically, sensitivity to body cycles and rhythms, ability to detect small changes in normal functioning, and ability to anticipate bodily reactions" (Shields, Mallory, & Simon, 1989, p. 802). Examples of items include "I am always aware of changes in my energy level when I eat certain foods" and "I notice distinct body reactions when I am fatigued." Items are scored on a 7-point Likert scale from "not at all true of me" to "very true of me." One item is reverse-scored. The scale is internally consistent with an alpha coefficient of .82. The authors reported an alpha coefficient of .80. for test-retest reliability. An overall score was obtained for each participant. More elevated scores indicate greater awareness of body sensations or processes and lower scores infer lesser awareness. For the full scale, see Appendix F.

Experiences Questionnaire (EQ), Decentering Scale. The Decentering Scale of the EQ consists of 11 items designed to measure decentering, defined as "the ability to observe one's thoughts and feelings as temporary, objective events in the mind, as opposed to reflections of the self that are necessarily true" (Fresco, et al., 2007). Examples of items include "I can separate myself from my thoughts and feelings" and "I have the sense that I am fully aware of what is going on around me and inside me." Items are scored on a 5-point Likert scale from "never" to "all the time." The authors

report an alpha coefficient of .83 for internal consistency. An overall score was obtained for each participant. Higher scores imply greater ability to view one's thoughts and feelings as temporary and separate from the self and lowers scores infer lesser ability. For the full scale, see Appendix G.

Procedure

Participants enrolled in introductory psychology classes completed all scales through the University's online research management system, SONA. Those from other psychology classes were asked to complete the survey through Qualtrics. The students completed the survey online after reading an informed consent statement, which informed them of potential harms that may occur in the study, their right to withdraw any time without penalty, and their right to anonymous confidential participation. They were given a brief demographic questionnaire, followed by a battery of six measures. The order of presenting the measures was counterbalanced to avoid order effects. The students were provided with a printable debriefing statement upon completion of the survey, which included information on the purpose of the study, contact information for questions or concerns regarding the study, and contact information for students who have concerns about substance abuse. The average length of completion was 21.11 min (*SD* = 17.14).

Results

The present study investigated the relationship between mindfulness and alcohol use. The dependent (predicted) variable was alcohol use and alcohol-related problems, measured dimensionally. Mindfulness, the independent (predictor) variable, was measured as a trait. The proposed mediating variables between mindfulness and alcohol

use were attention regulation, emotion regulation, body awareness, and change in the perspective on the self.

Internal Consistency of the Various Measures

Cronbach's alpha coefficients were calculated for each of the measures in the study as shown in Table 1. The measures exhibited good or excellent internal consistency using rules of thumb provided by George and Mallery (2005). The Cronbach's alpha values for the FFMQ are similar to those reported in previous studies. The Cronbach's alpha values for the AUDIT, DERS, Body Awareness Questionnaire, and EQ were higher than those reported in previous studies (Fleming, Barry, & MacDonald, 1991; Barry & Fleming, 1993; Gratz & Roemer, 2004; Shields, Mallory, & Simon, 1989; Fresco, et al., 2007). However, the Cronbach's alpha value for the Attentional Control Scale (α = .82) was lower than the value reported by Derryberry and Reed (2002; α = .88).

Table 1

Internal Consistency of the Various Measures (N = 157)

Measure	Cronbach's α
Five Facet Mindfulness Questionnaire (FFMQ)	.86
Alcohol Use Disorder Identification Test (AUDIT)	.90
Attentional Control Scale	.82
Difficulties in Emotion Regulation Scale (DERS)	.94
Body Awareness Questionnaire	.88
Experiences Questionnaire (EQ), Decentering Scale	.86

Description of the Study Sample

Of the 165 participants who completed the measures, eight were removed due to missing items or problematic responses (e.g., showing no variation in responses to items). Of the remaining 157 participants, none were excluded from the analysis using standardized residuals, Mahalanobis distances, and Cook's distances as criteria for removal. Although eight participants were identified as possible outliers using Mahalanobis distances and Cook's distances as criteria, no one had standardized residual values that exceeded 3.30. With a strict removal of all potential outliers, there was a slight loss of power in a few of the relationships but the direction of the relationships did not change. Thus, none of the potential outliers were removed during the analyses.

Table 2 below shows the mean and standard deviation for each of the study variables. The average mindfulness score of 125.69 is consistent with a previous study that used the FFMQ to measure mindfulness in students (M = 129.55, SD = 13.94) and meditators (M = 148.94, SD 14.51; de Bruin, Topper, Muskens, Bögels, & Kamphuis, 2012). Although the findings suggest that the participants in this study had an average tendency to be mindful, it is likely that the sample was primarily composed of non-meditators.

Table 2

Descriptive Statistics on Mindfulness, Alcohol Use, and Proposed Mediators (N = 157)

Variable	*M*	*SD*	Possible Range of Scores
Mindfulness	125.69	16.95	39 – 195
Alcohol Use and Related Problems	8.02	7.27	0 – 40
Attention Regulation	49.65	8.18	20 – 80
Emotion Regulation	131.36	23.48	36 – 180
Body Awareness	79.71	16.92	18 – 126
Change in Perspective on the Self	39.03	7.36	11 – 55

According to the AUDIT manual (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), scores of eight or more indicate hazardous and harmful alcohol use. Seventy (45%) of the participants had scores of eight of more, suggesting that these participants were engaging in problematic alcohol use. This finding was consistent with previous studies using the AUDIT with a sample of college students (Fleming, Barry, & MacDonald, 1991; Kokotailo et al., 2004).

No cut-off scores were provided by developers of the measures for attention regulation, emotion regulation, body awareness, and change in perspective on the self to classify respondents on the respective variables. However, higher scores on each are interpreted as exhibiting higher degrees of the variable. The average attention regulation score fell in the middle of the possible range of scores, suggesting that participants exhibited a moderate ability to regulate one's attention. The average emotion regulation, body awareness, and change in perspective on the self scores tended towards the upper

range of possible scores, indicating that the individuals had a greater ability to regulate emotions, to be aware of body sensations or processes, and to view their thoughts and feelings as temporary and separate from the self.

Relationship Between Mindfulness and Alcohol Use

First Study Question: What is the relationship between mindfulness and alcohol use? Table 3 shows the correlations between each variable. Mindfulness was found to be negatively correlated with alcohol use and related problems ($r = -.24$, $p = .002$).

Table 3

Correlations between Mindfulness, Proposed Mediators, and Alcohol Use (N = 157)

	1	2	3	4	5	6
Mindfulness	-	-.24**	.55***	.69***	.19*	.50***
Alcohol Use and Related Problems		-	-.07	-.29***	-.05	-.21**
Attention Regulation			-	.45***	.08	.38***
Emotion Regulation				-	.05	.45***
Body Awareness					-	.06
Change in Perspective on the Self						-

*$p < .05$ **$p < .01$ ***$p < .001$

Relationships Between Mindfulness and Attention Regulation, Emotion Regulation, Body Awareness, and Change in Perspective on the Self

Second Study Question: What is the relationship between mindfulness and attention regulation, emotion regulation, body awareness, and change in perspective on the self? As shown in Table 3, mindfulness was found to be positively correlated with

attention regulation ($r = .55, p < .001$), emotion regulation ($r = .69, p < .001$), body awareness ($r = .19, p = .02$), and change in perspective on the self ($r = .50, p < .001$).

Relationships Between Alcohol Use and Attention Regulation, Emotion Regulation, Body Awareness, and Change in Perspective on the Self

Third Study Question: What is the relationship between alcohol use and attention regulation, emotion regulation, body awareness, and change in perspective on the self? Table 3 shows that alcohol use was negatively correlated with emotion regulation ($r = -.29, p < .001$) and change in perspective on the self ($r = -.21, p = .01$), but not with attention regulation and body awareness.

Identifying Mediators of the Relationship Between Mindfulness and Alcohol Use

Fourth Study Question: Do the proposed factors (attention regulation, emotion regulation, body awareness, and change in perspective on the self) mediate the relationship between mindfulness and alcohol use?

Step 1 of the Baron and Kenny procedure (1986) for testing mediation will be identical for the four proposed mediators. It requires that the predictor (mindfulness) must first be correlated with the predicted variable (alcohol use). A linear regression shows that mindfulness was a significant predictor of alcohol use, $\beta = -.24$, $t(155) = -3.12, p = .002$. This was similarly addressed in the results for the first study question discussed above. The results of the remaining steps for testing mediation are discussed separately by proposed mediator below.

Attention Regulation. Step 2 requires that the predictor (mindfulness) be correlated with the mediator (attention regulation). A linear regression indicates that

mindfulness was positively correlated with attention regulation, $\beta = .55$, $t(155) = 8.09$, $p < .001$. This was similarly addressed in the results for the second study question.

Step 3 tests if the relationship between the potential mediator (attention regulation) and the predicted variable (alcohol use) remains significant while controlling for the predictor. Table 4 shows that the relationship between attention regulation and alcohol use was not statistically significant while controlling for mindfulness, $\beta = .09$, $t(154) = .96$, $p = .34$. Thus, no further analyses were conducted with attention regulation.

Table 4

Summary of the Multiple Regression Analysis with Attention Regulation as a Potential Mediator (N = 157)

Variable	*B*	*SE B*	β
Attention Regulation	.08	.08	.09
Mindfulness	-.13	.04	-.29**

Note. $R^2 = 0.07$; adjusted $R^2 = .05$
$^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$

Emotion Regulation. Step 2 examines the relationship between the predictor (mindfulness) and the mediator (emotion regulation). A linear regression indicates that mindfulness was a significant predictor of emotion regulation, $\beta = .69$, $t(155) = 11.71$, $p < .001$.

Step 3 examines the relationship between the potential mediator (emotion regulation) and the predicted variable (alcohol use) while controlling for the predictor (mindfulness). Table 5 shows that the relationship between emotion regulation and alcohol was statistically significant while controlling for mindfulness, $\beta = -.24$, $t(154) = -2.27$, $p = .03$.

Table 5

Summary of the Multiple Regression Analysis with Emotion Regulation as a Potential Mediator (N = 157)

Variable	*B*	*SE B*	*β*
Emotion Regulation	-.07	.03	-.24*
Mindfulness	-.03	.05	-.08

Note. $R^2 = 0.09$; adjusted $R^2 = .08$
$^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$

Step 4 examines the relationship between the predictor (mindfulness) and the predicted variable (alcohol use) while controlling for the potential mediator (emotion regulation). Table 5 indicates that when emotion regulation was controlled, mindfulness did not remain a significant predictor of alcohol use, $\beta = -.08$, $t(154) = -.75$, $p = .45$. Therefore, emotion regulation fully mediated the relationship between mindfulness and alcohol use. A Sobel's test was statistically significant ($z = -3.61$, $p < .001$), confirming the mediation.

Body Awareness. Step 2 tests the relationship between the predictor (mindfulness) and the mediator (body awareness). A linear regression shows that mindfulness was a significant predictor of body awareness, $\beta = .19$, $t(155) = 2.41$, $p = .02$.

Step 3 tests the relationship between the potential mediator (body awareness) and the predicted variable (alcohol use) while controlling for the predictor (mindfulness). Table 6 shows that the relationship between body awareness and alcohol use is not statistically significant while controlling for mindfulness, $\beta = -.01$, $t(154) = -.08$, $p = .94$. Thus, no further analyses were conducted with body awareness.

Table 6

Summary of the Multiple Regression Analysis with Body Awareness as a Potential Mediator (N = 157)

Variable	*B*	*SE B*	*β*
Body Awareness	-.003	.03	-.01
Mindfulness	-.10	.03	-.24**

Note. $R^2 = 0.06$; adjusted $R^2 = .05$
*$p < .05$ **$p < .01$ ***$p < .001$

Change in Perspective on the Self. Step 2 tests the relationship between the predictor (mindfulness) and the mediator (change in perspective on the self). A linear regression shows that mindfulness was a significant predictor of change in perspective on the self, $\beta = .50$, $t(155) = 7.15$, $p < .001$.

Step 3 examines the relationship between the potential mediator (change in perspective on the self) and the predicted variable (alcohol use) while controlling for the predictor (mindfulness). Table 7 shows that the relationship between change in perspective on the self and alcohol use is not statistically significant while controlling for mindfulness, $\beta = -.12$, $t(154) = -1.29$, $p = .20$. Thus, no further analyses were conducted with change in perspective on the self.

Table 7

Summary of the Multiple Regression Analysis with Change in Perspective on the Self as a Potential Mediator (N = 157)

Variable	*B*	*SE B*	*β*
Change in Perspective on the Self	-.11	.09	-.12
Mindfulness	-.08	.04	-.19*

Note. $R^2 = 0.07$; adjusted $R^2 = .06$
*$p < .05$ **$p < .01$ ***$p < .001$

In sum, although mindfulness was predictive of alcohol use and each of the four proposed mediators, attention regulation, body awareness, and change in perspective on the self were not correlated with alcohol use when mindfulness was controlled. Mindfulness was a better predictor of alcohol use than any of these three variables. On the other hand, emotion regulation fully mediated the relationship between mindfulness and alcohol use.

Discussion

The current study examined the relationship between mindfulness and alcohol use. Specifically, this study investigated: 1) whether mindfulness is related to alcohol use and alcohol-related problems; 2) whether mindfulness is related to attention regulation, body awareness, emotion regulation, and change in perspective on the self; 3) whether alcohol use is related to attention regulation, emotion regulation, body awareness, and change in perspective on the self; and 4) whether the relationship between mindfulness and alcohol use would be mediated by attention regulation, body awareness, emotion regulation, and change in perspective on the self.

Relationship between Mindfulness and Alcohol Use

The relationship between mindfulness and alcohol use was tested and it was predicted that mindfulness and alcohol use would be negatively correlated; that is, as mindfulness increased there is less involvement with alcohol and alcohol-related problems. The results of the current study support this prediction. Perhaps being more mindful enhances one's ability to observe one's thoughts, desires, compulsions, and habits, reducing the likelihood of engaging in heavy alcohol consumption. This finding is consistent with the results of previous studies that have demonstrated a relationship

between mindfulness as a trait and substance abuse and related problems (Fernandez, Wood, Stein, & Rossi; Eisenlohr-Moul, Walsh, Charnigo, Lynam, & Baer, 2012; Murphy & MacKillop, 2011). Furthermore, it is consistent with the results of previous studies that have used mindfulness-based meditation or mindfulness training to treat substance use disorders (Bowen et al., 2006; Avants, Beitel, & Margolin, 2005; Margolin et al., 2007; Bowen et al., 2009; Witkiewitz & Bowen, 2010; Zgierska et al., 2009).

Relationships between Mindfulness and Attention Regulation, Emotion Regulation, Body Awareness, and Change in Perspective on the Self

The relationships between mindfulness and the potential mediating variables (attention regulation, emotion regulation, body awareness, and change in perspective on the self) were also explored. It was hypothesized that mindfulness would be related to each of the potential mediators.

The results of the current study support the prediction that mindfulness is positively correlated with each of the potential mediators. As mindfulness increased higher levels of attention regulation, emotion regulation, body awareness, and change in perspective on the self were observed. These findings are consistent with the results of previous studies demonstrating a relationship between mindfulness and emotion regulation (Ortner et al., 2007; Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010; Jain et al., 2007; Feldman, Greeson, & Senville, 2010), as well as change in perspective on the self (Kerr, Josyula, & Littenberg, 2011; Haimerl and Valentine, 2001; Feldman, Greeson, & Senville, 2010; Carmody, Baer, Lykins, & Olendzki, 2009; Lau, et al., 2006). Although one study did not find improvements in an executive attention task after an 8-week Mindfulness-Based Stress Reduction program (Anderson, Lau, Segal, & Bishop,

2007), several studies have demonstrated a positive relationship between mindfulness and attention regulation (Jha et al., 2007; van den Hurk et al. 2010; Tang et al., 2007; Chan & Woollacott, 2007; Moore & Malinowski, 2009; Wenk-Sormaz, 2005). The finding that mindfulness is positively correlated with body awareness is consistent with the results of previous studies demonstrating that individuals report an increase in body awareness after they have begun meditating or have received mindfulness training (Hölzel, Ott, Hempel, and Stark, 2006; Carmody & Baer, 2008). In addition, the study results support the model of mindfulness proposed by Hölzel and colleagues (2011), in which attention regulation, emotion regulation, body awareness, and change in perspective on the self were proposed as mechanisms through which mindfulness exerts an influence on well-being and psychological symptoms.

Relationships between Alcohol Use and Attention Regulation, Emotion Regulation, Body Awareness, and Change in Perspective on the Self

The findings also demonstrated that alcohol use was negatively correlated with emotion regulation and change in perspective on the self, respectively. As levels of emotion regulation and change in perspective on the self increased, alcohol use decreased. These results are consistent with the results of previous studies demonstrating an inverse relationship between substance abuse and emotion regulation (Fox, Hong, & Sinha, 2008; Fox, Axelrod, Paliwal, Sleeper, & Sinha, 2007; Bonn-Miller, Vujanovic, & Zvolensky, 2008; Berking, et al., 2011), as well as change in perspective on the self (Avants, Beitel, & Margolin, 2005; Margolin et al., 2007).

In contrast, the results of this study did not demonstrate a relationship between alcohol use and attention regulation, or alcohol use and body awareness. Although

previous research indicates that individuals who use alcohol are highly distracted by alcohol-related stimuli (Stetter, Achkermann, Blizer, Straube, & Mann, 2006; Sharma, Albery, & Cook, 2001; Johnsen, Laberg, Cox, Vaksdal, & Hugdahl, 1994; Stormark, Laberg, Nordby, & Hugdahl, 2000), increased attention regulation in general may not necessarily protect an individual from developing problems with alcohol use.

Identifying Mediators of the Relationship between Mindfulness and Alcohol Use

The present study predicted that the relationship between mindfulness and alcohol use would be mediated by attention regulation, body awareness, emotion regulation, and change in perspective on the self. However, given the limited literature on the relationships between body awareness and substance abuse, and change in perspective on the self and substance abuse, this portion of the study was exploratory.

Because attention regulation was not significantly correlated with alcohol use, it could not be tested as a mediator. In other words, increases in attention regulation that result from increased mindfulness may not necessarily lead to less alcohol use and alcohol-related problems. Attention regulation corresponds to the facet of mindfulness, 'acting with awareness' (concentration or nondistraction). However, the results of this study suggest that attention regulation does not as a mechanism through which the 'acting with awareness' facet of mindfulness exerts an influence on alcohol use. Attention regulation may not be predictive of alcohol use when it is analyzed separately from mindfulness as an overall construct.

Similarly, body awareness could not be tested as a mediator because it was not significantly correlated with alcohol use. Although increases in mindfulness may lead to higher levels of body awareness, increased body awareness may not necessarily lead to

less alcohol use and alcohol-related problems. This finding is not surprising given the limited literature on body awareness and alcohol use.

Although mindfulness, change in perspective on the self, and alcohol use are significantly correlated with each other, the relationship between change in perspective on the self and alcohol use did not retain its statistical significance while controlling for mindfulness. Thus, the relationship between mindfulness and alcohol use is not mediated by changes in how one views oneself. What this finding also implies is that although changes in how one sees oneself may have some bearing on one's involvement with alcohol, such an influence may not be as a significant or as direct as the role that mindfulness plays in alcohol use.

The tests of mediation, however, demonstrated that emotion regulation fully mediated the relationship between mindfulness and alcohol use. This finding indicates that mindfulness facilitates the ability to regulate one's emotions. In turn, having enhanced abilities of dealing with emotions reduced involvement with alcohol and having alcohol-related issues. Thus, emotion regulation is one of the mechanisms upon which mindfulness influences alcohol use. This finding is not surprising given the extensive literature on emotion regulation and mindfulness (Ortner et al., 2007; Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010; Jain et al., 2007; Feldman, Greeson, & Senville, 2010), as well as alcohol abuse (Fox, Hong, & Sinha, 2008; Fox, Axelrod, Paliwal, Sleeper, & Sinha, 2007; Bonn-Miller, Vujanovic, & Zvolensky, 2008; Berking, et al., 2011). In sum, among the four mediators proposed in the Hölzel et al. (2011) model of mindfulness, only emotion regulation emerged as a mediator of the relationship between mindfulness and alcohol use.

Clinical Implications

Although the current study does not implement mindfulness training, the results suggest that mindfulness training may lead to better emotion regulation, reducing one's vulnerability to use alcohol and experience alcohol-related problems. To specifically improve emotion regulation, techniques that emphasize non-judgment and acceptance of emotions can be used to maximize the possibility that emotion regulation will improve. If an individual learns to become aware of one's emotions without judging them, he or she may be less likely to develop problematic alcohol use. Likewise, the results of the current study support the effectiveness of mindfulness-based treatments that specifically target emotion regulation. For example, DBT teaches clients how to manage negative and overwhelming emotions by becoming aware of them, accepting them, and then letting them go rather than dwelling on the negative emotions. The results of the current study suggest that this technique may lead to less problematic alcohol use.

Likewise, mindfulness training may lead to higher levels of attention regulation, body awareness, and change in perspective on the self. For example, mindfulness training may be helpful for an individual who has difficulty regulating one's attention. However, results of the current study suggest that these psychological processes may not directly address issues concerning alcohol use and alcohol-related problems.

The results of this study demonstrated that although increased emotion regulation and change in perspective on the self were associated with less alcohol use, increased body awareness and attention regulation were not. Therefore, techniques that emphasize emotion regulation and change in perspective on the self may be useful in reducing one's vulnerability to developing problematic alcohol use. Although mindfulness training may

enhance body awareness and change in perspective on the self, these processes may not specifically impact alcohol use.

Limitations of the Study and Suggestions for Future Research

The current study has several limitations worth noting. First, it was purely correlational and cannot be used to imply causation. Mindfulness was measured as a trait, requiring the examination of the level of mindfulness possessed by the individual. This study demonstrated that mindfulness as a trait appears to be associated with lower levels of alcohol use, but how will mindfulness training itself impact alcohol use? Future studies may have participants complete a mindfulness training program and examine the differences between pre- and post-mindfulness and alcohol use. Similarly, future studies can be conducted to verify causally the full mediation by emotion regulation observed in this study. Researchers can examine whether mindfulness training leads to improvements in emotion regulation, protecting someone from heavy consumption of alcohol. More direct rather than mediated influences might emerge when mindfulness is examined as an intervention as opposed to a trait. Although emotion regulation may have an influence on one's involvement with alcohol, such an influence may not be as a significant as the role that mindfulness plays in alcohol use when tested causally. Additionally, the current study assumes a causal sequence that is outlined in the Holzel model, but is unable to directly verify the direction of the causality. It may be that mindfulness does not elicit increases in emotion regulation or decreases in alcohol use, but that emotion regulation and lower levels of alcohol use lead to increased mindfulness. Future studies should test the direction of the causation.

Another limitation of the current study is that the results are limited to the unique demographics of participants in the study, primarily White or Caucasian female college students between the ages of 18 to 21 years. The study sample showed high levels on the AUDIT with approximately 45 percent of the participants engaging in problematic alcohol use. Lower levels of alcohol use may be found if this study was replicated using the general population, potentially also changing the current findings. In addition, future studies may include individuals from the clinical population, such as those diagnosed with an alcohol use disorder (American Psychiatric Association, 2013a).

Finally, the current study relied solely on self-report measures, without corroboration from other more objective ones. For example, attention regulation was measured using a self-report questionnaire. However, it can also be measured using executive attention tasks, such as the Attention Network Test or Stroop task. A clinician trained in detecting and observing alcohol use and related problems may arrive at different ratings from that obtained in a self-report measure. Similar criticisms may be raised concerning the measures used for the other variables in the current study. Future studies may incorporate clinical interviews and/or objective instruments to measure these variables. The use of observational measure may also help reduce biased responding by participants. Although the current study was anonymous and participants were given the opportunity of participating on their personal computer, it is likely that participants may have been biased not to answer questions honestly so that they would be perceived in the most socially acceptable manner.

Conclusion

Mindfulness training has gained prominence as a mechanism to facilitate and enhance psychological well-being. The current study attempted to test how mindfulness can specifically address alcohol use. The results of the current study show that mindfulness is associated with increased attention regulation, emotion regulation, body awareness, and change in perspective on the self, but that it is only increased emotion regulation that, in turn, is predictive of less alcohol use. Although the current research is neither entirely conclusive nor exhaustive, these findings add to the literature on the effectiveness of mindfulness.

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Appendix A: Demographic Information

Instructions: Please provide a response to the following statements.

1. Age: _____

2. Gender: Male or Female

3. Ethnicity:

_____ White/Caucasian

_____ Black/African-American

_____ Hispanic

_____ Native American

_____ Asian American

_____ Hawaiian or Pacific Islander

_____ Multi-ethnic

_____ Other

4. Year in School

_____ Freshman

_____ Sophomore

_____ Junior

_____ Senior

_____ Graduate

5. Academic Major: _____

Appendix B: Five Facet Mindfulness Questionnaire

Instructions: Please rate each of the following statements using the scale provided. Write the number in the blank that best describes your own opinion of what is generally true for you.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Often true	Very often or always true

_____ 1. When I'm walking, I deliberately notice the sensations of my body moving.

_____ 2. I'm good at finding words to describe my feelings.

_____ 3. I criticize myself for having irrational or inappropriate emotions.

_____ 4. I perceive my feelings and emotions without having to react to them.

_____ 5. When I do things, my mind wanders off and I'm easily distracted.

_____ 6. When I take a shower or bath, I stay alert to the sensations of water on my body.

_____ 7. I can easily put my beliefs, opinions, and expectations into words.

_____ 8. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.

_____ 9. I watch my feelings without getting lost in them.

_____ 10. I tell myself I shouldn't be feeling the way I'm feeling.

_____ 11. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.

_____ 12. It's hard for me to find the words to describe what I'm thinking.

_____ 13. I am easily distracted.

_____ 14. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.

_____ 15. I pay attention to sensations, such as the wind in my hair or sun on my face.

_____ 16. I have trouble thinking of the right words to express how I feel about things.

_____ 17. I make judgments about whether my thoughts are good or bad.

_____ 18. I find it difficult to stay focused on what's happening in the present.

_____ 19. When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it.

_____ 20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.

_____ 21. In difficult situations, I can pause without immediately reacting.

_____ 22. When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words.

_____ 23. It seems I am "running on automatic" without much awareness of what I'm doing.

_____ 24. When I have distressing thoughts or images, I feel calm soon after.

_____ 25. I tell myself that I shouldn't be thinking the way I'm thinking.

_____ 26. I notice the smells and aromas of things.

_____ 27. Even when I'm feeling terribly upset, I can find a way to put it into words.

_____ 28. I rush through activities without being really attentive to them.

_____ 29. When I have distressing thoughts or images I am able just to notice them without reacting.

_____ 30. I think some of my emotions are bad or inappropriate and I shouldn't feel them.

_____ 31. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.

_____ 32. May natural tendency is to put my experiences into words.

_____ 33. When I have distressing thoughts or images, I just notice them and let them go.

_____ 34. I do jobs or tasks automatically without being aware of what I'm doing.

_____ 35. When I have distress thoughts or images, I judge myself as good or bad, depending what the thought/image is about.

_____ 36. I pay attention to how my emotions affect my thoughts and behavior.

_____ 37. I can usually describe how I feel at the moment in considerable detail.

_____ 38. I find myself doing things without paying attention.

_____ 39. I disapprove of myself when I have irrational ideas.

Appendix C: Alcohol Use Disorder Identification Test

Instructions: Because alcohol use can affect your health and can interfere with certain medications and treatments, it is important that we ask some questions about your use of alcohol. Your answers will remain confidential so please be honest. Please circle the response below each question that best describes your answer.

1. How often do you have a drink containing alcohol?

Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week

2. How many drinks containing alcohol do you have on a typical day when you are drinking?

1 or 2	3 or 4	5 or 6	7 to 9	10 or more

3. How often do you have six or more drinks on one occasion?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily

4. How often during the last year have you found that you were not able to stop drinking once you had started?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily

5. How often during the last year have you failed to do what was normally expected of you because of drinking?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily

6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily

7. How often during the last year have you had a feeling of guilt or remorse after drinking?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily

8. How often during the last year have you been unable to remember what happened the night before because of you drinking?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily

9. Have you or someone else been injured because of your drinking?

No	Yes, but not in the last year	Yes, during the last year

10. Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?

No	Yes, but not in the last year	Yes, during the last year

Appendix D: Attentional Control Scale

Instructions: Please provide a response to the following statements.

1	2	3	4
Almost never	Sometimes	Often	Always

_____ 1. It's very hard for me to concentrate on a difficult task when there are noises around.

_____ 2. When I need to concentrate and solve a problem, I have trouble focusing my attention.

_____3. When I am working hard on something, I still get distracted by events around me.

_____ 4. My concentration is good even if there is music in the room around me.

_____ 5. When concentrating, I can focus my attention so that I become unaware of what's going on in the room around me.

_____ 6. When I am reading or studying, I am easily distracted if there are people talking in the same room.

_____ 7. When trying to focus my attention on something, I have difficulty blocking out distracting thoughts.

_____ 8. I have a hard time concentrating when I'm excited about something.

_____ 9. When concentrating I ignore feelings of hunger or thirst.

_____ 10. I can quickly switch from one task to another.

_____ 11. It takes me a while to get really involved in a new task.

_____ 12. It is difficult for me to coordinate my attention between the listening and writing required when taking notes during lectures.

_____ 13. I can become interested in a new topic very quickly when I need to.

_____ 14. It is easy for me to read or write while I'm also talking on the phone.

_____ 15. I have trouble carrying on two conversations at once.

_____ 16. I have a hard time coming up with new ideas quickly.

_____ 17. After being interrupted or distracted, I can easily shift my attention back to what I was doing before.

_____ 18. When a distracting thought comes to mind, it is easy for me to shift my attention away from it.

_____ 19. It is easy for me to alternate between two different tasks.

_____ 20. It is hard for me to break from one way of thinking about something and look at it from another point of view.

Appendix E: Difficulties in Emotion Regulation Scale

Instructions: Please indicate how often the following statements apply to you by writing the appropriate number from the scale below on the line beside each item.

1	2	3	4	5
Almost never (0-10%)	Sometimes (11-35%)	About half the time (36-65%)	Most of the time (66-90%)	Almost always (91-100%)

_____ 1. I am clear about my feelings.

_____ 2. I pay attention to how I feel.

_____ 3. I experience my emotions as overwhelming and out of control.

_____ 4. I have no idea how I am feeling.

_____ 5. I have difficulty making sense out of my feelings.

_____ 6. I am attentive to my feelings.

_____ 7. I know exactly how I am feeling.

_____ 8. I care about what I am feeling.

_____ 9. I am confused about how I feel.

_____ 10. When I'm upset, I acknowledge my emotions.

_____ 11. When I'm upset, I become angry with myself for feeling that way.

_____ 12. When I'm upset, I become embarrassed for feeling that way.

_____ 13. When I'm upset, I have difficulty getting work done.

_____ 14. When I'm upset, I become out of control.

_____ 15. When I'm upset, I believe that I will remain that way for a long time.

_____ 16. When I'm upset, I believe that I will end up feeling very depressed.

_____ 17. When I'm upset, I believe that my feelings are valid and important.

_____ 18. When I'm upset, I have difficulty focusing on other things.

_____ 19. When I'm upset, I feel out of control.

_____ 20. When I'm upset, I can still get things done.

_____ 21. When I'm upset, I feel ashamed at myself for feeling that way.

_____ 22. When I'm upset, I know that I can find a way to eventually feel better.

_____ 23. When I'm upset, I feel like I am weak.

_____ 24. When I'm upset, I feel like I can remain in control of my behaviors.

_____ 25. When I'm upset, I feel guilty for feeling that way.

_____ 26. When I'm upset, I have difficulty concentrating.

_____ 27. When I'm upset I have difficulty controlling my behaviors.

_____ 28. When I'm upset, I believe there is nothing I can do to make myself feel better.

_____ 29. When I'm upset, I become irritated at myself for feeling that way.

_____ 30. When I'm upset, I start to feel very bad about myself.

_____ 31. When I'm upset, I believe that wallowing in it is all I can do.

_____ 32. When I'm upset, I lost control over my behavior.

_____ 33. When I'm upset, I have difficulty thinking about anything else.

_____ 34. When I'm upset, I take time to figure out what I'm really feeling.

_____ 35. When I'm upset, it takes me a long time to feel better.

_____ 36. When I'm upset, my emotions feel overwhelming.

Appendix F: Body Awareness Questionnaire

Instructions: Listed below are a number of statements regarding your sensitivity to normal, nonemotive body processes. For each statement, select a number from 1 to 7 that best describes how the statement describes you and place the number in the box to the right of the statement.

Not at all true of me						Very true of me
1	2	3	4	5	6	7

_____ 1. I notice differences in the way my body reacts to various foods.

_____ 2. I can always tell when I bump myself whether or not it will become a bruise.

_____ 3. I can always know when I've exerted myself to the point where I'll be sore the next day.

_____ 4. I am always aware of changes in my energy level when I eat certain foods.

_____ 5. I know in advance when I'm getting the flu.

_____ 6. I know I'm running a fever without taking my temperature.

_____ 7. I can distinguish between tiredness because of hunger and tiredness because of lack of sleep.

_____ 8. I can accurately predict what time of day lack of sleep will catch up with me.

_____ 9. I am aware of a cycle in my activity level throughout the day.

_____ 10. I *don't* notice seasonal rhythms and cycles in the way my body functions.

_____ 11. As soon as I wake up in the morning, I know how much energy I'll have during the day.

_____ 12. I can tell when I go to bed how well I will sleep that night.

_____ 13. I notice distinct body reactions when I am fatigued.

_____ 14. I notice specific body responses to changes in the weather.

_____ 15. I can predict how much sleep I will need at night in order to wake up refreshed.

_____ 16. When my exercise habits change, I can predict very accurately how that will affect my energy level.

_____ 17. There seems to be a "best" time for me to go to sleep at night.

_____ 18. I notice specific bodily reactions to being overhungry.

Appendix G: Experiences Questionnaire, Decentering Scale

Instructions: Please provide a response to the following statements.

1	2	3	4	5
Never				All the time

_____ 1. I am better able to accept myself as I am.

_____ 2. I can slow my thinking at times of stress.

_____ 3. I notice that I don't take difficulties so personally.

_____ 4. I can separate myself from my thoughts and feelings.

_____ 5. I can take time to respond to difficulties.

_____ 6. I can treat myself kindly.

_____ 7. I can observe unpleasant feelings without being drawn into them.

_____ 8. I have the sense that I am fully aware of what is going on around me and inside me.

_____ 9. I can actually see that I am not my thoughts.

_____ 10. I am consciously aware of a sense of my body as a whole.

_____ 11. I view things from a wider perspective.