



Facets of mindfulness mediate behavioral inhibition systems and emotion dysregulation



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ABSTRACT

Behavioral motivation is regulated through the behavioral inhibition system (BIS) and the behavioral approach system (BAS), which underlie responses to emotional stimuli and are thought to influence emotion dysregulation. Research shows that mindfulness may increase the efficacy of emotion regulation among those with psychological symptoms, but the relationships between behavioral motivation and mindfulness have been only minimally explored. This study examines relationships between behavioral motivation systems and emotion dysregulation as mediated by mindfulness facets. Mediation was tested in a sample of 246 college students ($M_{\text{age}} = 19.28$, 61.8% female, 81.3% Caucasian) using a multiple mediator bootstrapping method. Results revealed an indirect relationship between BIS sensitivity and increased emotion dysregulation through underutilization of three distinct mindfulness skills: act with awareness, non-judging, and non-reactivity. Mindfulness facets did not mediate relationships between BAS sensitivity and emotion dysregulation, though BAS Reward Responsiveness directly predicted increased emotion dysregulation while BAS Drive was marginally associated with decreased emotion dysregulation. Findings delineate specific relationships between BIS/BAS, mindfulness skills, and emotion dysregulation while suggesting mindfulness training may be useful for BIS sensitive individuals.

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1. Introduction

Gray's behavioral theory of motivation (Gray, 1982) postulates two distinct neurologically based systems that underlie emotion-driven action and capture individual differences in sensitivity to environmental cues. The behavioral inhibition system (BIS) underlies reactions to aversive stimuli (i.e., threat of punishment) and results in the inhibition of approach behavior (Carver & White, 1994). This system is coupled with negative affect and thus responsible for the experience of negative emotions such as fear, anxiety, frustration, anger, guilt, and sadness (Dillard & Peck, 2001; Fowles, 1987). On the other hand, the behavioral approach system (BAS) underlies reactions to appetitive stimuli, controls goal-directed behavior, and is responsive to signals of reward and escape from punishment (Carver & White, 1994). As such, BAS is tied to positive affective states and thus responsible for experiences of positive emotions such as hope, relief, happiness, and contentment (Dillard & Peck, 2001; Fowles, 1987).

BIS and BAS are fundamentally linked to emotion and regulation of affective processes. Increased BIS sensitivity predicts higher levels of negative affect (Hundt et al., 2013; Leen-Feldner, Zvolensky, Feldner, & Lejuez, 2004) and greater incidence of self-reported emotion regulation difficulties (Tull, Gratz, Latzman, Kimbrel, & Lejuez, 2010). Additionally, extreme levels of BIS sensitivity are associated with increased risk for anxiety and depressive disorders (Muris, Merckelbach, Schmidt, Gadet, & Bogie, 2001) and have been directly linked to generalized anxiety disorder (Maack, Tull, & Gratz, 2012). Alternatively, high levels of reward sensitivity (BAS) are associated with greater reduction of negative affect during positively perceived situations (Hundt et al., 2013) and higher overall positive affect (Meyer & Hofmann, 2005). Interestingly, extreme BAS sensitivity is implicated in bipolar disorder (Fletcher, Parker, & Manicavasagar, 2013), and predicts increased impulsivity (Fowles, 1987), mania (Meyer & Hofmann, 2005), and externalizing behavior problems (Colder & O'Connor, 2004). Often, BAS is measured using Carver and White's BIS/BAS Scale (Carver & White, 1994) which conceptualizes BAS as a multifaceted construct comprised of three subcategories: the propensity to focus on positive outcomes of goal directed behavior (i.e., Reward Responsiveness), persistence of behavior in pursuit of a goal (i.e., Drive), and the tendency to engage in spontaneous behavior when excitement or reward is likely (i.e., Fun Seeking). Differing relationships have

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been evidenced between these individual facets of BAS and affective processes. For example, BAS Drive has been found to predict increased positive affect, while BAS Fun Seeking has been shown to predict both positive and negative affect (Meyer & Hofmann, 2005). Moreover, BAS Reward predicts less difficulty with emotion regulation while BAS Fun Seeking predicts increased emotion regulation difficulties (Tull et al., 2010). Taken together, these findings not only indicate strong associations between BIS, individual BAS facets, and emotion regulation, but also highlight the need for investigation into factors influencing differences in emotion regulation abilities between BIS and BAS sensitive individuals.

Mindfulness is one factor that has been effective in increasing well-being among those with psychological symptoms. Although several conceptualizations of mindfulness exist, experts agree that mindfulness includes attention focused on the immediate moment with the ability to describe or label experience, and general attitudes of openness and acceptance (Bishop et al., 2006; Brown & Ryan, 2003). Therapies such as Dialectical Behavior Therapy (Linehan, 1993), Mindfulness-Based Cognitive Therapy (Segal, Williams, & Teasdale, 2002), and Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 1999) have integrated mindfulness training as a way of increasing the efficacy of emotion regulation and reducing psychological symptoms (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Hill & Updegraff, 2012). For example, mindfulness is associated with increased cognitive reappraisal in patients with depression and decreased rumination and worry in patients with depression and anxiety (Desrosiers, Vine, Klemanski, & Nolen-Hoeksema, 2013). It has been argued that because mindfulness is a multi-dimensional construct, it is important to examine components of mindfulness in relation to psychological processes. One multidimensional model of mindfulness constructed from several other existing measures found five facets of mindfulness: (1) Observing the immediate experience, (2) Describing/labeling the experience in words, (3) Acting with Awareness, (4) Non-judgment of experience, and (5) Non-reactivity to inner experience (Baer et al., 2006). Specific components of mindfulness have been directly linked to emotion regulation in past research; all aspects except Observing are negatively associated with emotion dysregulation (Baer et al., 2006), where low Non-judgment and low Awareness seem to be particularly predictive of emotion regulation problems (Vujanovic, Bonn-Miller, Bernstein, McKee, & Zvolensky, 2010).

To date, research on the relations between mindfulness and behavioral motivation systems (i.e., BIS and BAS) has been limited. One study investigating mindfulness, rumination, behavioral inhibition and approach, and frontal brain asymmetry (Keune, Bostanov, Kotchoubey, & Hautzinger, 2012) found that higher levels of mindfulness were related to lower BIS sensitivity in a sample of German college students. Of the three subscales of BAS, only BAS Drive was found to be positively correlated with mindfulness. In another study investigating how mindfulness and BIS relate to well-being, an inverse relationship was established between BIS sensitivity and mindfulness; however, BAS sensitivity was not assessed in this study (Sauer, Walach, & Kohls, 2011). Because both studies investigated mindfulness as a unified construct, relationships between mindfulness facets and behavioral motivation systems are largely understudied, particularly in US samples and in conjunction with assessment of emotion dysregulation.

It is important to note that BIS and BAS have been extensively investigated in relation to personality (Erdle & Rushton, 2010), and found to consistently relate to emotional stability (i.e., the inverse of neuroticism) and extroversion. Specifically, higher BIS scores predict decreased emotional stability (or increased neuroticism), while higher BAS sensitivity is coupled with increased extroversion (Keiser & Ross, 2011; Prabhakaran, Kraemer, & Thompson-Schill, 2011; Smits & Boeck, 2006). Moreover, the personality facets

of emotional stability and extroversion are related to emotion regulation tendencies (Gross & John, 2003) and to mindfulness (Giluk, 2009). One study (Fetterman, Robinson, Ode, & Gordon, 2010) found that mindfulness mediated the relationship between emotional stability and indices of behavioral dysregulation (impulsivity, self-control) which are conceptually related to emotion dysregulation. Thus, we feel that any investigation into factors relating to BIS/BAS should include controls for these personality factors to rule out these global personality traits as alternative explanations for relationships between BIS or BAS and emotion dysregulation via mindfulness.

The current study aims to expand upon existing knowledge about emotion dysregulation, mindfulness, and BIS/BAS sensitivity. Specifically, we are interested in examining how subcategories of mindfulness may mediate the relationship between BIS/BAS sensitivity and difficulties with emotion regulation. We hypothesized that while controlling for personality factors (i.e., extroversion and emotional stability), mindfulness facets will mediate the relationship between BIS sensitivity and emotion dysregulation such that higher levels of BIS sensitivity will be associated with lower levels of mindfulness, which will in turn be associated with higher levels of emotional dysregulation. Alternatively, we predict that while still holding personality factors constant, BAS facets will vary in their relation to mindfulness and emotion dysregulation. Specifically, we hypothesize that while BAS Reward and BAS Fun Seeking will be directly related to emotion dysregulation (as evidenced by existing literature), this relationship may not be mediated by mindfulness facets for either subscale. Furthermore, because BAS Drive is the only subscale of BAS to be linked to mindfulness, but not directly to emotion dysregulation, we predict this facet to be associated with decreased emotion dysregulation through increased utilization of mindfulness factors.

2. Methods

2.1. Participants and procedure

Participants were 246 undergraduate students recruited through a general psychology subject pool at a large Mid-Southern university, with a mean age of 19.28 ($SD = 2.06$). The majority (61.8%) of the sample was female and participants were primarily Caucasian (81.3%). Participants completed multiple self-report measures online in exchange for course credit. Four cases were excluded due to missing data for all items on one or more of the included scales, leaving a total of 242 participants included in the final study analyses.

2.2. Measures

2.2.1. Behavioral inhibition and activation

The *BIS/BAS Scale* (BIS/BAS; Carver & White, 1994) is a 20-item self-report measure assessing sensitivity to both behavioral inhibition and approach systems. BIS/BAS is comprised of four subscales (BIS, BAS Reward Responsiveness, BAS Drive, and BAS Fun Seeking) where all items are assessed on a four-point Likert scale ranging from 1 (*very true of me*) to 4 (*very untrue of me*). All subscales demonstrated acceptable internal reliability in the present study: BIS ($\alpha = .74$), BAS Reward Responsiveness ($\alpha = .79$), BAS Drive ($\alpha = .78$), and BAS Fun Seeking ($\alpha = .73$).

2.2.2. Mindfulness

The *Five Facet Mindfulness Questionnaire* (FFMQ; Baer et al., 2006) is a 39-item questionnaire assessing five factors of mindfulness: Observe, Describe, Act with Awareness, Non-judging, and Non-reactivity, where higher scores reflect greater mindfulness.

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