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## Mindfulness Moderates The Association Between Internalizing Symptomatology And Emotional Eating

Ti Hsu

*William & Mary - Arts & Sciences*, [ti.hsu13@gmail.com](mailto:ti.hsu13@gmail.com)

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Mindfulness Moderates the Association between Internalizing Symptomatology  
and Emotional Eating

Ti Hsu

Tainan City, Taiwan

B.A., St. John's College, 2017

A Thesis presented to the Graduate Faculty of The College of William &  
Mary in Candidacy for the Degree of  
Master of Science

Department of Psychological Sciences

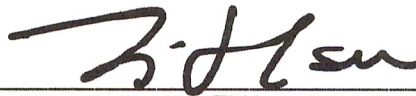
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## APPROVAL PAGE

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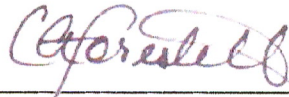
Master of Science



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Ti Hsu

Approved by the Committee April 2020



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Committee Chair

Catherine Forestell, Associate Professor, Psychological Sciences  
College of William & Mary



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Adrian Bravo, Assistant Professor, Psychological Sciences  
College of William & Mary



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Xiaowen Xu, Assistant Professor, Psychological Sciences  
College of William & Mary

## COMPLIANCE PAGE

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## ABSTRACT

Emotional eating is defined as the tendency to increase food consumption in order to modify negative emotional states. Although it is counter to the more typical response of decreasing food intake in the face of distress, emotional eating is observed in both eating disordered and healthy populations and is associated with overweight and obesity.

Theories on emotional eating attribute its cause to inadequate emotion regulation, specifically an inability to draw awareness to and accept distress. Mindfulness, or the ability to pay attention to one's internal and external experiences, is negatively associated with both emotional eating and psychological distress. Only one study to date (Pidgeon et al., 2013), however, has examined the moderating role of trait mindfulness in the relationship between psychological distress and emotional eating. Pidgeon and colleagues utilized a mainly undergraduate sample, and a unidimensional measure of mindfulness, which failed to capture the complexity of the construct. The present study replicated and extended the findings of Pidgeon and colleagues with the Five Factor Mindfulness Questionnaire to probe the effects of specific facets of mindfulness on the relationship between internalizing distress and emotional eating in a diverse community sample ( $N = 248$ ).

Results indicated that depression significantly interacted with *nonjudging of inner experience*. Analysis of the interaction revealed that there were significant differences between low, average, and high levels of *nonjudging* only at low levels of depression. At low levels of depression, those who were high in *nonjudging* endorsed less emotional eating than those who were average or low in *nonjudging*. Anxiety did not significantly interact with any of the five mindfulness facets to predict emotional eating. These findings further delineate the moderating role of specific aspects of trait mindfulness in the association between depressive symptoms and emotional eating and may inform more targeted intervention and prevention efforts.

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To my parents for their endless love and support

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## Introduction

### 1. Emotional Eating: Theories and Mechanisms

Emotional eating, or the tendency to increase food consumption in response to aversive emotional states (Heatherton & Baumeister, 1991), has been associated with risk for key health concerns, including disordered eating (Danner et al., 2012; Leehr et al., 2015), and overweight and obesity (Elfhag & Linne, 2005, Nguyen-Rodriguez et al., 2008). With worldwide rates of obesity continuing to rise irrespective of socioeconomic status, geographical location, and ethnicity (Chooi et al., 2019), it is increasingly urgent to acknowledge the contribution of unhealthy consummatory behaviors such as emotional eating and to identify protective factors against the risks they present.

It is important to note that experiences of negative emotions and stress are generally associated with decreased rather than increased food intake (Gold & Chrousos, 2002; Stone & Brownell, 1994), as stress usually corresponds with physiological changes that facilitate a flight or fight response. These responses include a variety of gastrointestinal processes that include inhibition of gastric motility, which mimic internal sensations associated with feeding-induced satiety (Gold & Chrousos, 2002; van Strien et al., 2014), as well as the release of appetite-inhibiting hormones such as catecholamine (Blair et al., 1991). As these physiological responses are also chief correlates of satiety, distress should typically lead to feelings of fullness, and therefore decreased consumption. In emotional eaters, however, physiological inhibition is overruled, and these

individuals show the atypical response of increased food intake in response to negative emotions (Oliver et al., 2000; van Strien et al., 2013; Wallis & Hetherington, 2004). It is important to note that this atypical response to stress is not only found in overweight or eating-disordered populations (Greeno & Wing, 1994), but also occurs in relatively healthy individuals (Newman et al., 2007; Elfhag & Linne, 2005).

Theories that explain why emotional eating occurs in response to negative affect are centered around the hypothesis that the overconsumption of food is an attempt to regulate or cope with stress and/or negative emotions (Heatherton & Baumeister, 1991; Stice et al., 2001). Past studies have posited that emotional eating distracts and averts the individual's attention away from the distressing stimulus or event (Parkinson & Totterdell, 1999), thereby providing an escape from negative self-awareness and ego-threatening information (Heatherton & Baumeister, 1991). That is, the experience of eating certain foods redirects awareness away from the negative emotion and toward the food, which subsequently results in overconsumption and offsets the upsetting experience (Tice & Bratslavsky, 2000; Lehman & Rodin, 1989). Emotional eating is also linked to alexithymia, a set of cognitive-emotional deficits that include the inability to identify and express emotions and an avoidance in coping them (Pinaquy et al., 2003). These theories suggest that it is not the mere experience of negative emotion, rather it is an inability to regulate emotions, i.e., to draw awareness to, accept, and express the negative emotion experienced in the moment, that

induces emotional eating. In other words, when distressed, emotional eaters are unable to maintain a non-judgmental state of awareness of, and attention to the present moment. This experience is referred to as mindfulness in the psychological literature (Kabat-Zinn, 1990).

## **2. Mindfulness and its Role in Emotion Regulation**

Mindfulness has been operationalized in a myriad of different ways (for a review, see Quaglia et al., 2015), but there are two features that are commonly identified. First, mindfulness bases attention and awareness in the present moment. This includes paying attention to one's emotional reactions, mental images, mental talk, perceptual experiences, and body sensations. Second, it involves adopting an attitude of openness and acceptance toward one's experience, whether it be emotional or physical (Creswell, 2017). Finally, mindfulness has been conceptualized as both a trait and a state (Bishop et al., 2004; Brown & Ryan, 2004; Carmody & Baer, 2008), with previous studies suggesting that the two are related, but ultimately separate constructs (Bravo et al., 2018; Thompson & Waltz, 2007).

Many researchers have examined trait mindfulness as a multi-component construct (Baer et al., 2004; Baer et al., 2006; Christopher et al., 2012). One model (Baer et al., 2006) posits that trait mindfulness is comprised of five distinct facets, which include the ability to observe and bring awareness to experiences, to describe those experiences, to focus attention on the present moment, to adopt a nonjudgmental attitude toward experiences, and to refrain from impulsive

reactions to experience. A recent meta-analysis of 93 independent studies (Tomlinson et al., 2018), provided robust evidence that trait mindfulness is inversely related to depressive and anxiety symptoms, as well as factors that contribute to their development, such as levels of perceived stress, or anxiety sensitivity.

Trait mindfulness has been posited to reduce distress through altering the way individuals respond to negative experiences. It is positively associated with adaptive emotional outcomes (Pearson et al., 2015) such as emotion regulation, and lower emotional reactivity. Higher levels of mindfulness have also been reported to predict more adaptive physiological and emotional responding after the experience of negative emotions (Fogarty et al., 2015), such as the ability to observe and accept unpleasant experiences without having to escape them (Arch & Craske 2006, 2010; Bieling et al., 2012). These findings indicate that mindfulness may moderate associations between psychological distress and certain behavioral responses, such as emotional eating, thereby reducing the likelihood that negative experiences trigger maladaptive patterns of reactivity (Adams et al., 2014).

### **3. Does Trait Mindfulness Moderate the Relationship between Internalizing Symptoms and Emotional Eating?**

Past studies have established links between internalizing symptomatology and emotional eating behavior. For instance, anxiety has been found to contribute to the risk for emotional eating among both healthy adolescent girls

(Nguyen-Rodriguez et al., 2009) as well as obese adults with (Masheb & Grilo, 2006) and without (Schneider et al., 2010) binge-eating disorder. Studies have also established a direct and positive association between depression and emotional eating in large samples of non-obese adults (Ouwens et al., 2009; Konttinen et al., 2010; Konttinen et al., 2019). Furthermore, distinct facets of trait mindfulness (i.e., *describing, acting with awareness, nonjudging of inner experience* and *nonreactivity to inner experience*) have demonstrated negative associations with symptoms of depression and/or anxiety in both clinical (Desrosiers et al., 2013) and non-clinical samples (Brown et al., 2015; Cash & Whittingham, 2010).

There have been a limited number of studies which have examined the five facets of the FFMQ in tandem with emotional eating. One study (Tak et al., 2015) reported significant negative associations between *describing, awareness, non-judging, and non-reactivity* and emotional eating. Although most studies examining mindfulness using the FFMQ and eating behaviors have explored associations between the five facets and disordered eating, they have highlighted similar facets of mindfulness. For example, Adams and colleagues (2012) found that *awareness, describing, and nonjudging* negatively predicted symptoms of Bulimia and Anorexia Nervosa, while *observing* predicted higher anorexic symptoms. Lavender and colleagues (2011) reported similar results, with *awareness, nonreactivity, nonjudging, and describing* emerging as unique predictors of eating pathology above and beyond depression and anxiety



symptoms. These associations provide further incentive to determine whether mindfulness moderates the relationship between disorders such as anxiety and depression and emotional eating.

Only one study to date (Pidgeon et al., 2013) has examined emotional eating in tandem with depression, anxiety, and mindfulness. This study found that although mindfulness did not moderate the relationship between anxiety and emotional eating, it moderated the association between depression and emotional eating. In breaking down this interaction using simple slopes, the authors reported a significant effect of depression on emotional eating in those who were high in mindfulness, such that as depression increased, emotional eating also increased. They also reported that for those who were low in mindfulness, there was no effect of depression on emotional eating. Perhaps more interesting was the authors' contention that "...at lower scores of depression, high mindfulness was associated with lower emotional eating scores relative to low mindfulness. In contrast, at higher levels of depression, high mindfulness was associated with [only] marginally larger emotional eating scores relative to low mindfulness." (p. 266). However, this statement was not supported by an analysis of conditional effects of mindfulness at different levels of depression.

It is surprising that no other studies have examined this specific question more closely. Our study was designed to not only replicate, but also extend these findings through addressing the limitations of the previous study. There were two

major limitations delineated by Pidgeon and colleagues. First, their study had a sample of primarily undergraduate students ( $N = 157$ ) almost three quarters of whom were female. In addition to the limited generalizability of results, this is also a small sample size for detecting moderation effects. Second, Pidgeon and colleagues utilized the Mindfulness Awareness Attention Scale (MAAS; Brown & Ryan, 2003) as a measure of trait mindfulness. The MAAS is a unidimensional 15-item measure that includes items such as “I could be experiencing some emotion and not be conscious of it until sometime later” and “I snack without being aware that I’m eating”. The MAAS has therefore been criticized for being more of a measure of mindlessness, rather than mindfulness (Grossman, 2011). Other theoretical work on mindfulness, however, has conceptualized the construct as a multidimensional one which consists of a broader range of phenomena that includes not only awareness to the present moment, but also an ability to focus one’s attention “in a nonjudgmental or accepting way on the experience occurring in the present moment” (Baer et al., 2006).

To address the first of these limitations, we recruited a community sample of 248 individuals with a more equitable gender distribution (55.6% female) in the current study. Although Pidgeon and colleagues did not report on the racial/ethnic distribution of their sample, we recruited a socioeconomically and racially diverse sample to ensure generalizability. To address the second limitation, we chose the Five-Facet Mindfulness scale (FFMQ; Baer et al., 2006), which assesses five distinct facets of mindfulness: *describing, observing, acting*

*with awareness, nonjudging of inner experience, and nonreactivity to inner experience.*

We hypothesized that higher levels of depression and anxiety symptoms would predict higher levels of emotional eating, as mentioned above, this association has been established by multiple studies (e.g., Nguyen-Rodriguez et al., 2009; Konttinen et al., 2010; Konttinen et al., 2019).

Our next hypotheses, which involved the main effects of the FFMQ facets were based on Monitor and Acceptance Theory (MAT; Lindsay & Creswell, 2017; 2019). MAT is a theoretical account which explains the effects of mindfulness on affective and health outcomes through two active mechanisms: attention monitoring and acceptance. MAT posits that the ability to monitor attention, which corresponds to the *observe* facet of the FFMQ, may improve cognitive functioning outcomes, but at the same time increase affective reactivity and therefore poor health outcomes (e.g., poorer subjective health and more medical visits for psychological as well as physical health; Consedine & Butler, 2014). We therefore predicted that *observing*, which has also been positively associated with disordered eating symptoms (Adams et al., 2012) would predict higher levels of emotional eating. In addition to this, we hypothesized that *describing, awareness, nonjudging, and nonreactivity*, which have been found to be negatively associated with unhealthy eating behaviors in multiple studies (Adams et al., 2012; Lavender et al., 2011; Tak et al., 2015), would negatively predict emotional eating.

Last, given a lack of previous findings on how the facets of the FFMQ may differ across levels of depression and anxiety symptoms, our hypothesis on the interaction between internalizing symptoms and the mindfulness facets are mainly exploratory in nature. However, given the promising results of Pidgeon and colleagues (2013), which indicate the existence of an interaction between mindfulness and depression, we tentatively hypothesized that *nonjudging* and *nonreactivity*, two facets posited by MAT to promote emotion regulation and more favorable affect and health outcomes (Curtiss et al., 2017), would attenuate the associations between internalizing distress and emotional eating, such that as internalizing symptoms increased, those who reported high levels of *nonjudging* and *nonreactivity* would report lower levels of emotional eating relative to those who may be average or low in those facets.

## **Method**

### **Participants**

Participants were a sample of 248 individuals (55.6% female) ranging from 18.12 - 34.75 years of age ( $M = 25.53$ ,  $SD = 3.77$ ,  $Median = 26.14$ ). They were recruited online through Qualtrics Panels. Inclusion criteria included being 18 years of age or older, and ability to read and write in English. Participants were two thirds (67.7%) white; 23.0% African American; 1.6% American Indian or Alaska Native; 4.8% Asian; and 2.8% Multiracial. Of these, 2.9% reported that their ethnicity was Hispanic or Latino. The sample was socioeconomically diverse, with 9.7% of all participants reporting a family income of \$150,000 or

more, 19.7% reporting an income range between \$80,000 to \$149,000, 54.0% reporting an income range between \$39,000 to \$79,000, and 16.5% reporting incomes that were less than \$19,000 a year. All testing procedures were approved by and were in accordance with the ethical standards of the Protection of Human Subjects Committee at William & Mary (PHSC-2019-06-06-13699-caforestell).

## **Measures**

**Depression and Anxiety Symptoms.** To assess depression symptoms, we administered the Inventory of Depression and Anxiety Symptoms (IDAS; Watson et al., 2007) General Depression subscale, which is composed of 20 items (e.g., “I felt inadequate”, “I felt depressed”) that are rated on a 5-point Likert-type scale (1=“not at all” to 5 = “extremely”). The subscale demonstrated excellent internal consistency, with  $\alpha = 0.92$ . To assess anxiety symptoms, we administered the Anxious Mood subscale from the 99-item version of the IDAS. This subscale is composed of 7 items (e.g., “I found myself worrying all the time”, “I felt anxious”) that are rated on a 5-point Likert-type scale (1= “not at all” to 5 = “extremely”). It also demonstrated excellent internal consistency, with  $\alpha = 0.93$ . The IDAS provides dimensional assessments of both mood and anxiety disorder symptoms and has been shown to have good reliability and validity in both clinical and non-clinical samples (Watson et al., 2007; Watson et al., 2008; Stasik-O’Brien et al., 2018).

**Mindfulness.** Trait mindfulness was assessed using the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006), a 39-item multidimensional measure. The FFMQ is based on a factor analysis of the items of the five most widely used mindfulness questionnaires, including the MAAS, the Freiburg Mindfulness Inventory (Walach et al., 2001), the Southampton Mindfulness Questionnaire (Chadwick et al., 2008), the Kentucky Inventory of Mindfulness Skills (Baer et al., 2004), and the Cognitive and Affective Mindfulness Scale (Feldman et al., 2004), and in this way encompasses the diverse conceptualizations of mindfulness.

It assesses five distinct facets: *describing*, *observing*, *acting with awareness*, *nonjudging of inner experience*, and *nonreactivity to inner experience*. The *observing* subscale (8 items) assesses an individual's ability to notice and attend to internal and external experiences, including cognitions, emotions, sensations, sights, smells, and sounds (e.g., "I notice the smells and aromas of things"). The *describing* subscale (8 items) measures an individual's ability to label internal experiences with words (e.g., "I am good at finding words to describe my feelings"). *Acting with awareness* (8 items) involves the ability to attend to one's activities in the moment and is the opposite of behaving automatically and mechanically (e.g., "I find myself doing things without paying attention" reverse scored). *Nonjudging of inner experience* (8 items) assesses one's ability to accept one's inner state and take a nonevaluative stance towards feelings and thoughts (e.g., "I think some of my emotions are bad or

inappropriate and I should not feel them” reverse scored). Finally, the *nonreactivity to inner experience* subscale (7 items) measures one’s tendency to allow thoughts and emotions to come and go, without becoming overly involved in or attached to them (e.g., “I perceive my feelings and emotions without having to react to them”). All items are rated on a 5-point Likert-type scale (1= “never or very rarely true” to 5 = “very often or always true”). The five subscales individually demonstrated adequate to good internal consistency, with  $\alpha$ -values ranging from .75 to .91. The FFMQ has also been shown to have good reliability and validity in community, student, and clinical samples (Baer et al., 2006; Baer et al., 2008; Bohlmeijer et al., 2011).

**Emotional Eating.** We administered the Three-Factor Eating Questionnaire Revised 18-Item (TFEQ; Karlsson, Persson, Sjostrom & Sullivan, 2000) to assess trait emotional eating. The measure includes three subscales, which assess emotional eating, cognitive restraint, and uncontrolled eating. The emotional eating subscale includes items such as “When I feel anxious, I find myself eating”, and “When I feel blue, I often overeat”. Items are rated on a 4-point Likert-type scale (1 = “definitely false” to 4 = “definitely true”). The scale demonstrated good internal consistency,  $\alpha = 0.86$ , and has been shown to be a valid and reliable measure of eating behavior not only in obese samples but also the general population (Karlsson et al., 2000; Anglé et al., 2009.)

## **Procedure**

All participants completed a battery of surveys online consisting of questions assessing levels of trait mindfulness, depression and anxiety, and finally, emotional eating. Informed consent was obtained from all participants, and they were offered payments by Qualtrics Panels for participating in the survey.

### **Statistical Analysis**

After ensuring that the outcome measure of emotional eating was normally distributed and free of outliers, moderation analyses were conducted using the PROCESS macro for SPSS (Version 3.0; Hayes, 2017). The emmeans R package (Lenth, 2020; R Development Core Team, 2010) was used to probe significant interactions. This package calculates pairwise contrasts of each distinct combination of the moderator and predictor and utilizes the Tukey method for  $p$ -value adjustments and Type I error control. While Pidgeon and colleagues tested their moderation hypotheses using hierarchical regression models, we entered our variables simultaneously into all models, as the two approaches have been shown to produce equivalent results (Hayes, 2017).

Individual models were run predicting emotional eating from depression symptoms and emotional eating from anxiety symptoms, and each of the five mindfulness facets were entered into separate models in order to assess their unique contribution to the prediction of emotional eating and their interaction with anxiety and depression symptoms. The four remaining facets were included in each moderation model as covariates to account for their effects. Similar to



Pidgeon et al (2013), sex (Female = 0; Male = 1) was also entered as a covariate within each model, as eating behaviors have been shown to differ by sex (for a review, see Herman & Polivy, 2009). Pidgeon and colleagues (2013) also included a measure of general nutrition knowledge as a covariate. Although nutrition knowledge has been posited to be an important factor for mindfulness-based interventions such as mindful eating (Fung et al., 2016; Warren et al., 2017), it was not significantly associated levels of anxiety, depression, or emotional eating, and only weakly correlated with mindfulness in Pidgeon and colleagues' study. Therefore, we chose to exclude it from our models.

All variables were standardized to produce standardized regression coefficients. Significant effects were determined by a 95% bias-corrected bootstrapped interval (based on 10,000 bootstrapped samples) that does not contain zero. Significant interaction terms were displayed by plotting predicted outcome values and conditional effects at levels of the moderator recommended by Cohen and colleagues (2003).

## **Results**

### **Descriptive Statistics**

Descriptive statistics for all main study variables, in addition to Pearson and point-biserial correlations among these variables, are presented in Table 1. Emotional eating was found to be significantly positively correlated with anxiety symptoms, depression symptoms, and negatively correlated with the *awareness* and *nonjudging of inner experience* subscales of the FFMQ. Anxiety symptoms

were found to be significantly positively associated with the *observing* subscale of the FFMQ, and negatively correlated with the *nonjudging of inner experience*, *acting with awareness*, and *describing* subscales of the FFMQ. Depression symptoms were found to be negatively correlated with the *nonjudging of inner experience*, *acting with awareness*, and *describing* facets of mindfulness.

### **Moderation Analyses**

**Depression.** First, we examined the main effects of, and interactions between, depression symptoms and the five facets of the FFMQ (see Table 2). Results indicate that there was a significant main effect of depression (all  $p$ 's < .001) on emotional eating in all five models, such that higher levels of depression predicted higher levels of emotional eating while controlling for sex and the five FFMQ facets.

We then examined the interactions between depression symptoms and each of the five facets of the FFMQ (see Table 2). This analyses revealed that *non-judging of inner experience* interacted with depression symptoms ( $\beta = 0.137$ ,  $SE = 0.054$ ,  $t(2.54)$ ,  $p < .05$ ) to predict emotional eating. Conditional effects of depression were calculated at low (1  $SD$  below the mean), average, and high (1  $SD$  above the mean) levels of *non-judging of inner experience*. As shown in Figure 1, this analysis indicated that the relationship between depressive symptoms and emotional eating was strongest at high ( $\beta = .442$ ,  $SE = 0.103$ ,  $p < .001$ ), compared to average ( $\beta = 0.310$ ,  $SE = 0.074$ ,  $p < .001$ ), and low ( $\beta = 0.177$ ,  $SE = 0.082$ ,  $p < .05$ ) levels of *nonjudging*.

Analyses of pairwise contrasts revealed that at low levels of depression, there were significant differences in emotional eating between high, average, and low levels of *nonjudging* (all  $p < .05$ ). Those who are high in *nonjudging* endorsed significantly lower levels of emotional eating than those who are average in *nonjudging*, and those who were average in *nonjudging* endorsed significantly lower levels emotional eating than those who were low in *nonjudging*. However, there were no significant differences in emotional eating as a function of *nonjudging* at high (all  $ps = .96$ ) or average (all  $ps = .52$ ) levels of depression.

**Anxiety.** As shown in Table 3, anxiety demonstrated a significant main effect in all five models (all  $p$ 's  $< .001$ ), such that higher levels of anxiety predicted higher levels of emotional eating. *Acting with awareness* ( $\beta = -0.172$ ,  $SE = 0.085$ ,  $p < .05$ ) and *observing* ( $\beta = -0.165$ ,  $SE = 0.083$ ,  $p < .015$ ) also demonstrated significant main effects, such that higher levels of *awareness* and *observing* predicted lower levels of emotional eating. Analyses also indicate that there were no significant interactions between any of the five facets of the FFMQ and anxiety.

## Discussion

The present study was a replication and extension of a study conducted by Pidgeon and colleagues (2013) on the moderating role of trait mindfulness in the relationship between psychological distress and emotional eating. Our study utilized the FFMQ, a multidimensional measure of trait mindfulness with five distinct factors (*observing*, *describing*, *acting with awareness*, *non-judging*, and

*non-reactivity*) as opposed to Pidgeon and colleagues' use of the MAAS, which is unidimensional.

We first predicted that higher levels of both depression and anxiety symptoms would predict higher levels of emotional eating. Results confirmed this hypothesis and therefore conflicted with those of Pidgeon and colleagues (2013), who failed to report significant effects for depression or anxiety after controlling for age and nutrition knowledge. It is possible that differences between our analyses and that of Pidgeon et al in which covariates were used account for the diverging findings. We chose to exclude general nutrition knowledge as a covariate in our models, even though it has been shown to be a factor in some mindfulness-based interventions targeting eating, because our study was cross-sectional and trait-focused in nature. However, our findings corroborate the previously established positive association between internalizing symptomatology and emotional eating behavior in the literature (Nguyen-Rodriguez et al., 2010; Konttinen et al., 2010), and contribute to growing evidence suggesting that this association exists in healthy, non-obese samples as well as clinically obese samples.

Our second hypothesis predicted that *observing* would positively predict emotional eating behaviors. Contrary to this hypothesis, it was found to negatively predict levels of emotional eating after controlling for the effects of all other facets. This contradicts MAT, which posits that endorsing *observing* alone increases affective reactivity and therefore may increase stress-related health

outcomes (Lindsay & Creswell, 2017), one of which could be emotional eating. In fact, one study demonstrated that low levels of emotional awareness predict emotional eating not only cross-sectionally, but also as assessed by actual food intake in the face of induced distress (Moon & Berenbaum, 2009). Therefore, this lack of a significant result for *observing* may reflect previous concerns about the facet, as it has also generally had little predictive value in community samples (Baer et al., 2006; Cash & Whittingham, 2010).

We also hypothesized that *describing*, *acting with awareness*, *nonjudging of inner experiences*, and *nonreactivity* would predict emotional eating behaviors. Surprisingly, *describing* and *nonreactivity*, despite having demonstrated negative associations with disordered eating behaviors in previous studies (Lavender et al., 2011; Tak et al., 2015) did not significantly predict emotional eating in our sample. *Acting with awareness* and *nonjudging of inner experience*, however, were indeed negatively associated with emotional eating after controlling for other facets.

This finding highlights MAT's proposition about the attenuating effects of the acceptance of experience (*nonjudging*) on negative health outcomes. If emotional eating occurs as an attempt to escape from or avoid negative emotions and thoughts (Heatheron & Baumeister, 1991, Litwin et al., 2017), then the *non-judging* facet, or the ability to compassionately accept difficult emotions and thoughts in the moment, may counteract avoidant tendencies and thereby reduce emotional eating. Similar findings have also been reported in clinically

obese samples (Levin et al., 2014) and samples who suffer from disordered eating (Sala et al, 2020). The current finding in a non-clinical sample suggests that these skills may apply more generally than previously posited.

These results are also consistent with the existing literature on mindfulness-based interventions designed to address emotional eating. A meta-analytic review indicated that mindfulness effectively decreased both emotional eating and binge eating in overweight/obese, eating disordered, as well as non-clinical samples (Katterman et al., 2014), and an exploratory study demonstrated the effectiveness in a Mindfulness-Based Stress Reduction (MBSR) program in reducing emotional eating scores (Levoy et al., 2017). In addition to this, the ability to adopt a non-judgmental attitude towards the experience of eating has been highlighted in interventions based on the concept of Mindful Eating (Framson et al., 2009; Dalen et al., 2019).

Our third hypothesis tentatively anticipated that *nonjudging* and *nonreactivity*, which contribute to the ability to accept monitored experiences as explained by MAT, would attenuate the relationship between anxiety and depression symptoms and emotional eating. Our results partially confirmed this hypothesis, with *non-judging of inner experience* as the only FFMQ facet that demonstrated a significant moderating effect. Findings indicated that, at low levels of depression, those who are high in *nonjudging* reported lower levels of emotional eating than those who were average or low. However, there were no significant differences at average or high levels of depression. To provide a

diagnostic context for these findings, only individuals who were high in depression in our sample, with a score of 68.43 or more on the general depression subscale of the IDAS, exceeded the established balanced cutoff for that scale (55.50; Stasik-O'Brien et al., 2019). This indicated that *non-judging* may only have a protective effect against emotional eating behaviors at non- or sub-clinical levels of depression.

Although nonjudging was found to moderate the relationship between depression and emotional eating, it did not moderate the association between anxiety and emotional eating. The lack of a significant moderating effect of any of the five mindfulness facets on the association between anxiety and emotional eating in our study replicates the findings of Pidgeon and colleagues (2013). However, it is important to note that *observing*, *describing*, and *acting with awareness* were reported to significantly interact with social anxiety to predict emotional eating in a study examining bariatric surgery candidates (Dalrymple et al., 2018). The non-clinical nature of our sample could therefore account for the null findings, and future studies should further explore mechanisms which contribute to the association between anxiety and mindfulness in non-obese and non-overweight samples to delineate factors which may contribute to differences between clinical and nonclinical samples.

We also tentatively hypothesized that *nonreactivity* would emerge as a significant moderator of the relationship between anxiety or depressive symptoms and emotional eating, since it is posited by MAT to contribute to

acceptance (Lindsay & Creswell, 2017). However, *nonreactivity* did not significantly interact with anxiety or depressive symptoms in our models. Given that it has been inconsistently associated with depressive and anxiety symptoms (Barnhofer et al., 2011; Bohlmeijer et al., 2011; Cash & Whittingham, 2011; Desrosiers et al., 2010) as well as emotional eating behaviors (Kerin et al., 2019; Levin et al., 2014) in the literature, this lack of an effect is perhaps unsurprising. However, more research is required to assess why *nonjudging* but not *nonreactivity* interacted with internalizing symptoms even though they have both been posited to contribute to the key mechanism of acceptance in MAT.

The primary limitation of the current study is its cross-sectional design. All variables of interest were assessed at one timepoint, which makes it difficult to draw causal inferences from the data, and to determine whether associations between variables would differ over alternative timeframes (e.g., over weeks or months; Carlson & Morrison, 2009). A longitudinal and/or experimental framework would allow for the for the establishment of causal relationships and the determination of mechanisms through which state mindfulness may act to affect emotions that induce eating behavior in real time.

The present study also relied on self-report to measure emotional eating, rather than assessments of food intake, which may be more reflective of actual tendencies to consume in the face of distress. Another limitation of the current study is that we did not take previous mindfulness meditation experience into account, since all four facets, with the exception of *acting with awareness* have



been found to be significantly correlated with meditation experience, even after for age and education (Baer et al., 2008). Our study also did not evaluate levels of mindful eating (Framson et al., 2009), which measures individual levels of mindfulness as applied to eating behaviors specifically. Future studies should include a measure of mindful eating in addition to the FFMQ in order to assess further associations between mindfulness in general and mindfulness as applied to food-related experiences.

Despite these limitations, this study possesses several strengths. First, participants in Pidgeon and colleagues' study (2013) were primarily female ( $N = 157$ ; 42 males, 115 females) undergraduate students. We recruited a community-based sample that was evenly split between males and females ( $N = 248$ ; 110 males; 138 females), and racially and socioeconomically diverse to enhance generalizability. Second, with the use of the FFMQ, as opposed to the employment of the MAAS in previous studies, our results provided a more nuanced and sensitive perspective on how specific facets of mindfulness contribute to the relationship between depression and emotional eating. The emergence of *nonjudging of inner experience* as a moderating facet in the relationship between depression and emotional eating bolsters the developing understanding on the unique roles played by individual facets of mindfulness in relationships between psychopathology and unhealthy behavioral outcomes. Our results also delineated the specific contexts (e.g., levels of depressive symptoms) at which *nonjudging* provides a protective effect, which may further

inform mindfulness-based interventions directed at eating (e.g., Mindful Eating; Dalen et al., 2010; Hepworth, 2010; Miller et al., 2012), thereby promoting wellness in non-clinical populations.

**Table 1.**  
*Descriptive Statistics and Correlations*

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Sex	1										
2. Race	.07	1									
3. Income	-.16**	-.07	1								
4. Observing	.03	.01	-.08	1							
5. Describing	.04	-.02	-.04	.32**	1						
6. Awareness	.05	-.07	.08	-.38**	.23**	1					
7. Nonjudging	-.03	-.06	.05	-.42**	.17**	.68**	1				
8. Nonreactivity	.05	.01	-.12	.60**	.30**	-.26**	-.27**	1			
9. Anxiety	-.03	.02	.11	.13*	-.16*	-.38**	-.51**	-.06	1		
10. Depression	.02	.10	.08	.08	-.26**	-.47**	-.54**	.02	.82**	1	
11. Emotional Eating	-.01	.09	.04	.06	-.08	-.31**	-.34**	.06	.35**	.39**	1
Mean				26.35	25.23	24.33	23.35	21.72	18.25	52.16	6.72
Standard Deviation				6.16	5.07	6.49	6.96	4.93	8.03	16.27	2.77

Note.  $N = 248$ . \* $p < .05$ , \*\* $p < 0.01$ . Awareness = Acting with Awareness; Nonjudging = Nonjudging of inner experience; Nonreactivity = Nonreactivity to inner experience.

**Table 2.** Summary of Unique Effects of Depression Symptoms, FFMQ Facets, and their Interactions on Emotional Eating Behavior

	Emotional Eating			
	$\beta$	SE	<i>p</i>	95% CI
<i>Describing</i>				
Constant	0.030	0.080	.72	-0.13, 0.19
Depression	<b>0.271</b>	<b>0.072</b>	<b>&lt;.001</b>	<b>0.13, 0.41</b>
<i>Describing</i>	0.072	0.069	.29	-0.06, 0.21
<i>Describing</i> x Depression	0.068	0.056	.23	-0.04, 0.18
<i>Observing</i>	-0.111	0.083	.18	-0.28, 0.05
<i>Awareness</i>	-0.124	0.086	.15	-0.29, 0.04
<i>Nonjudging</i>	-0.143	0.090	.11	-0.32, 0.03
<i>Nonreactivity</i>	0.031	0.074	.67	-0.11, 0.18
Sex	-0.028	0.118	.82	-0.13, 0.19
<i>Observing</i>				
Constant	0.013	0.078	.87	-0.14, 0.17
Depression	<b>0.273</b>	<b>0.072</b>	<b>&lt;.001</b>	<b>0.13, 0.42</b>
<i>Observing</i>	-0.132	0.084	.12	-0.30, 0.03
<i>Observing</i> x Depression	-0.057	0.054	.30	-0.16, 0.05
<i>Describing</i>	0.083	0.069	.24	-0.05, 0.23
<i>Awareness</i>	-0.153	0.086	.08	-0.32, 0.02
<i>Nonjudging</i>	-0.160	0.090	.08	-0.34, 0.02
<i>Nonreactivity</i>	0.020	0.074	.79	-0.13, 0.17
Sex	-0.018	0.118	.88	-0.25, 0.21
<i>Acting with Awareness</i>				
Constant	0.022	0.083	.79	-0.14, 0.19
Depression	<b>0.274</b>	<b>0.073</b>	<b>&lt;.001</b>	<b>0.13, 0.42</b>
<i>Awareness</i>	-0.134	0.086	.12	-0.30, 0.03
<i>Awareness</i> x Depression	0.028	0.055	.62	-0.08, 0.14
<i>Describing</i>	0.075	0.069	.28	-0.06, 0.21
<i>Observing</i>	-0.109	0.086	.20	-0.28, 0.06
<i>Nonjudging</i>	-0.145	0.091	.11	-0.32, 0.03
<i>Nonreactivity</i>	0.026	0.074	.73	-0.12, 0.17
Sex	-0.020	0.118	.86	-0.25, 0.21
<i>Nonjudging of Inner Experience</i>				
Constant	0.095	0.086	.27	-0.07, 0.26
Depression	<b>0.310</b>	<b>0.074</b>	<b>&lt;.001</b>	<b>0.16, 0.45</b>
<i>Nonjudging</i>	-0.100	0.091	.28	-0.28, 0.08
<i>Nonjudging</i> x Depression	<b>0.132</b>	<b>0.057</b>	<b>&lt;.05</b>	<b>0.02, 0.24</b>
<i>Describing</i>	0.078	0.068	.25	-0.06, 0.21
<i>Observing</i>	-0.067	0.085	.43	-0.24, 0.10
<i>Awareness</i>	-0.121	0.085	.15	-0.29, 0.05
<i>Nonreactivity</i>	0.026	0.073	.72	-0.12, 0.17
Sex	-0.053	0.118	.65	-0.28, 0.18

<i>Nonreactivity to Inner Experience</i>				
Constant	0.007	0.078	.92	-0.15, 0.16
Depression	<b>0.272</b>	<b>0.072</b>	<b>&lt;0.001</b>	<b>0.13, 0.41</b>
<i>Nonreactivity to Inner Experience</i>	0.027	0.074	.72	-0.12, 0.17
<i>Nonreactivity x Depression</i>	-0.037	0.049	.45	-0.13, 0.06
Symptoms				
<i>Describing</i>	0.075	0.069	.28	-0.06, 0.21
<i>Observing</i>	-0.127	0.084	.13	-0.29, 0.04
<i>Awareness</i>	-0.144	0.086	.09	-0.31, 0.02
<i>Nonjudging</i>	-0.154	0.090	.09	-0.33, 0.02
Sex	-0.016	0.118	.89	-0.25, 0.22

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**Table 3.** Summary of Unique Effects of Anxiety Symptoms, FFMQ Facets, and their Interactions on Emotional Eating Behavior

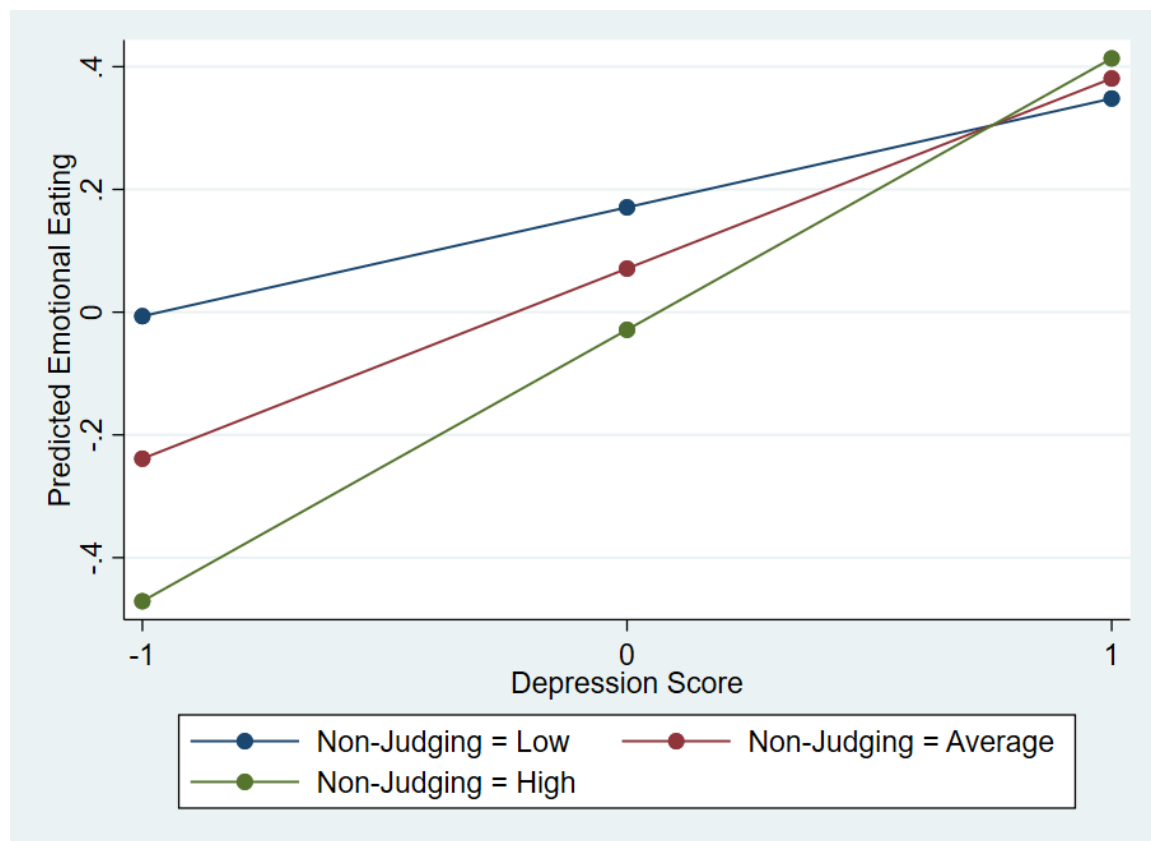
	Emotional Eating			
	$\beta$	SE	$p$	95% CI
<i>Describing</i>				
Constant	0.012	0.079	.88	-0.14, 0.17
Anxiety Symptoms	<b>0.238</b>	<b>0.070</b>	<b>= .001</b>	<b>0.10, 0.38</b>
<i>Describing</i>	0.043	0.070	.53	-0.09, 0.18
<i>Describing</i> x Anxiety	0.092	0.055	.10	-0.02, 0.20
<i>Observing</i>	-0.156	0.083	.06	-0.32, 0.01
<i>Awareness</i>	-0.162	0.084	.06	-0.33, 0.004
<i>Nonjudging</i>	-0.148	0.091	.10	-0.33, 0.03
<i>Nonreactivity</i>	0.073	0.080	.34	-0.08, 0.22
Sex	0.005	0.118	.97	-0.23, 0.24
<i>Observing</i>				
Constant	0.003	0.079	.97	-0.15, 0.16
Anxiety Symptoms	<b>0.234</b>	<b>0.070</b>	<b>= .001</b>	<b>0.10, 0.37</b>
<i>Observing</i>	<b>-0.165</b>	<b>0.083</b>	<b>&lt; .05</b>	<b>-0.33, -0.002</b>
<i>Observing</i> x Anxiety	-0.036	0.055	.52	-0.14, 0.07
<i>Describing</i>	0.057	0.070	.42	-0.10, 0.19
<i>Awareness</i>	<b>-0.180</b>	<b>0.085</b>	<b>&lt; .05</b>	<b>-0.35, -0.01</b>
<i>Nonjudging</i>	-0.163	0.091	.08	-0.34, -0.01
<i>Nonreactivity</i>	0.059	0.080	.44	-0.09, 0.21
Sex	0.003	0.119	.98	-0.23, 0.24
<i>Acting with Awareness</i>				
Constant	0.015	0.082	.86	-0.15, 0.18
Anxiety Symptoms	<b>0.242</b>	<b>0.071</b>	<b>= .001</b>	<b>0.10, 0.38</b>
<i>Awareness</i>	<b>-0.172</b>	<b>0.085</b>	<b>&lt; .05</b>	<b>-0.91, -0.21</b>
<i>Awareness</i> x Anxiety	0.044	0.058	.44	-0.07, 0.16
<i>Describing</i>	0.052	0.069	.45	-0.08, 0.19
<i>Observing</i>	-0.149	0.085	.08	-0.32, 0.01
<i>Nonjudging</i>	-0.146	0.092	.12	-0.33, 0.04
<i>Nonreactivity</i>	0.062	0.076	.42	-0.09, 0.21
Sex	0.004	0.119	.97	-0.23, 0.24
<i>Nonjudging of Inner Experience</i>				
Constant	0.048	0.085	.57	-0.12, 0.23
Anxiety Symptoms	<b>0.257</b>	<b>0.072</b>	<b>&lt; .001</b>	<b>0.12, 0.40</b>
<i>Nonjudging</i>	-0.138	0.091	.13	-0.32, 0.04
<i>Nonjudging</i> x Anxiety	0.090	0.058	.12	-0.02, 0.20
<i>Describing</i>	0.051	0.069	.46	-0.08, 0.19
<i>Observing</i>	-0.130	0.085	.13	-0.30, 0.04

<i>Awareness</i>	-0.160	0.085	.06	-0.33, 0.01
<i>Nonreactivity</i>	0.056	0.076	.46	-0.09, 0.21
<i>Sex</i>	-0.006	0.118	.96	- 0.24, 0.23
<i>Nonreactivity to Inner Experience</i>				
Constant	-0.005	0.079	.94	-0.16, 0.15
Anxiety Symptoms	<b>0.232</b>	<b>0.070</b>	<b>= .001</b>	<b>0.09, 0.37</b>
<i>Nonreactivity</i>	0.071	0.077	.36	-0.08, 0.22
<i>Nonreactivity x Anxiety</i>	-0.026	0.049	.59	-0.12, 0.07
<i>Describing</i>	0.052	0.069	.46	-0.08, 0.19
<i>Observing</i>	<b>-0.170</b>	<b>0.084</b>	<b>&lt;.05</b>	<b>-0.34, -0.004</b>
<i>Awareness</i>	<b>-0.180</b>	<b>0.085</b>	<b>&lt;.05</b>	<b>-0.34, 0.01</b>
<i>Nonjudging</i>	-0.157	0.091	.09	-0.34, 0.02
<i>Sex</i>	0.009	0.119	.94	-0.22, 0.24

---

**Figure 1**

*Simple slopes of depression on emotional eating at levels of nonjudging*





## Appendix A

**Demographics Measures**

What sex was assigned to you at birth?

- Male (0)
- Female (1)

What is your gender?

- Male (1)
- Female (2)
- Trans male (3)
- Trans female (4)
- Gender non-conforming (5)
- Self-identify (please specify) (6) \_\_\_\_

What is your race? (Select all that apply)

- White (0)
- African American / Black (1)
- American Indian or Alaskan Native (2)
- Asian American / Asian (3)
- Native Hawaiian or Other Pacific Islander (4)
- Bi- or Multiracial (5) \_\_\_\_

What is your ethnicity? (Select all that apply)

- Non-Hispanic / Latino/a (0)
- Hispanic / Latino/a (1)

What is your current relationship status?

- Single (1)
- In a relationship (2)
- Married, in a domestic partnership, or engaged (3)
- Divorced or separated (4)
- Widowed (5)
- Other (please specify) (6) \_\_\_\_

What is your family of origin's yearly household income (from all sources)?

- \$150,000 and above (0)
- \$120,000 to \$149,000 (1)
- \$100,000 to \$119,000 (2)
- \$80,000 to \$99,000 (3)
- \$60,000 to \$79,000 (4)
- \$40,000 to \$59,000 (5)
- \$20,000 to \$39,000 (6)
- \$19,000 and under (7)

## Appendix B

**Inventory of Depression and Anxiety Symptoms: General Depression Scale**

**[Instruction]** Below is a list of feelings, sensations, problems, and experiences that people sometimes have. Read each item to determine how well it describes your recent feelings and experiences. Then select the option that best describes how much you have felt or experienced things this way during the past two weeks, including today.

1. I felt exhausted
2. I felt depressed
3. I felt inadequate
4. I felt fidgety, restless
5. I had thoughts of suicide
6. I slept very poorly
7. I blamed myself for things
8. I had trouble falling asleep
9. I felt discouraged about things
10. I thought about hurting myself
11. I did not have much of an appetite
12. I felt like eating less than usual
13. I looked forward to things with enjoyment (reverse-scored)
14. I felt like I had a lot of energy (reverse-scored)
15. I had little interest in my usual hobbies or activities
16. I had trouble concentrating
17. I had trouble making up my mind
18. I talked more slowly than usual
19. I found myself worrying all the time
20. It took a lot of effort for me to get going

*Note.* Items were rated on a 5-point Likert-type scale (1 = *Not at all*; 2 = *A little bit*; 3 = *Moderately*; 4 = *Quite a bit*; 5 = *Extremely*)

## Appendix C

**Inventory of Depression and Anxiety Symptoms: Anxious Mood Scale**

**[Instruction]** Below is a list of feelings, sensations, problems, and experiences that people sometimes have. Read each item to determine how well it describes your recent feelings and experiences. Then select the option that best describes how much you have felt or experienced things this way during the past two weeks, including today.

1. I worried a lot
2. I felt anxious
3. I worried about the future
4. I felt fearful
5. I found myself worrying all the time
6. I felt tense
7. I felt nervous

*Note.* Items were rated on a 5-point Likert-type scale (1 = *Not at all*; 2 = *A little bit*; 3 = *Moderately*; 4 = *Quite a bit*; 5 = *Extremely*)

## Appendix D

**The Five Facet Mindfulness Questionnaire**

**[Instruction]** 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 = never or very rarely true; 2 = rarely true; 3 = sometimes true; 4 = often true; 5 = very often or always true

1. When I'm walking, I deliberately notice the sensations of my body moving. [*Observing*]
2. I'm good at finding words to describe my feelings. [*Describing*]
3. I criticize myself for having irrational or inappropriate emotions. [*Nonjudging*; reverse-scored]
4. I perceive my feelings and emotions without having to react to them. [*Nonreactivity*]
5. When I do things, my mind wanders off and I'm easily distracted. [*Awareness*; reverse-scored]
6. When I take a shower or bath, I stay alert to the sensations of water on my body. [*Observing*]
7. I can easily put my beliefs, opinions, and expectations into words. [*Describing*]
8. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted. [*Awareness*; reverse-scored]
9. I watch my feelings without getting lost in them. [*Nonreactivity*]
10. I tell myself I shouldn't be feeling the way I'm feeling. [*Nonjudging*; reverse-scored]
11. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions. [*Observing*]
12. It's hard for me to find the words to describe what I'm thinking. [*Describing*; reverse-scored]
13. I am easily distracted. [*Awareness*; reverse-scored]
14. I believe some of my thoughts are abnormal or bad and I shouldn't think that way. [*Nonjudging*; reverse-scored]
15. I pay attention to sensations, such as the wind in my hair or sun on my face. [*Observing*]
16. I have trouble thinking of the right words to express how I feel about things. [*Describing*; reverse-scored]
17. I make judgments about whether my thoughts are good or bad. [*Nonjudging*; reverse-scored]
18. I find it difficult to stay focused on what's happening in the present. [*Awareness*; reverse-scored]

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. [*Nonreactivity*]
20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing. [*Observing*]
21. In difficult situations, I can pause without immediately reacting. [*Nonreactivity*]
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. [*Describing*; reverse-scored]
23. It seems I am “running on automatic” without much awareness of what I’m doing. [*Awareness*; reverse-scored]
24. When I have distressing thoughts or images, I feel calm soon after. [*Nonreactivity*]
25. I tell myself that I shouldn’t be thinking the way I’m thinking. [*Nonjudging*; reverse-scored]
26. I notice the smells and aromas of things. [*Observing*]
27. Even when I’m feeling terribly upset, I can find a way to put it into words. [*Describing*]
28. I rush through activities without being really attentive to them. [*Awareness*; reverse-scored]
29. When I have distressing thoughts or images I am able just to notice them without reacting. [*Nonreactivity*]
30. I think some of my emotions are bad or inappropriate and I shouldn’t feel them. [*Nonjudging*; reverse-scored]
31. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow. [*Observing*]
32. My natural tendency is to put my experiences into words. [*Describing*]
33. When I have distressing thoughts or images, I just notice them and let them go. [*Nonreactivity*]
34. I do jobs or tasks automatically without being aware of what I’m doing. [*Awareness*; reverse-scored]
35. When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about. [*Nonjudging*; reverse-scored]
36. I pay attention to how my emotions affect my thoughts and behavior. [*Observing*]
37. I can usually describe how I feel at the moment in considerable detail. [*Describing*]
38. I find myself doing things without paying attention. [*Awareness*; reverse-scored]
39. I disapprove of myself when I have irrational ideas. [*Nonjudging*; reverse-scored]

## Appendix E

**Three-Factor Eating Questionnaire: Emotional Eating Subscale**

**[Instruction]** Please read each statement and select from the multiple choice options the answer that indicates the frequency with which you find yourself feeling or experiencing what is being described in the statements below.

1. When I feel anxious, I find myself eating.
2. When I feel blue, I often overeat.
3. When I feel lonely, I console myself by eating.

*Note.* Items were rated on a 4-point Likert-type scale (1 = definitely false; 2 = mostly false; 3 = mostly true; 4 = definitely true)

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