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Mindfulness Facets Associated with Perceived Stress: The Role of Nonreactivity

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Abstract

Dispositional, or trait, mindfulness reflects an individual difference in the tendency to experience mindfulness naturally. Increased dispositional mindfulness is associated with lower levels of stress, but previous research has not identified which facets of dispositional mindfulness are responsible for this association. Using a standard multiple regression model, we examined which of five identified mindfulness facets predicted perceived stress measure scores among an unselected sample of undergraduate students. Results indicated that three mindfulness facets, Nonjudging (β = -.400, p < .001), Nonreactivity (β = -.339, p < .001), and Acting with Awareness (β = -.269, p < .001), significantly predicted perceived stress. In a subsequent hierarchical multiple regression analysis, in which Nonjudging and Acting with Awareness were entered in Step 1, the addition of Nonreactivity in Step 2 explained an additional 11.9% of the variance in perceived stress. These results are consistent with early mindfulness theories suggesting that increased nonjudgmental awareness of present moment experience lessens stress reactivity over time, eventually lowering perceived stress. Future research is needed to elucidate the role of stress reactivity versus recovery in the observed association between mindfulness and stress. Furthermore, the benefits of these mindfulness facets may not be limited to reductions in perceived stress.

Keywords: Mindfulness; Perceived stress; Dispositional mindfulness; Stress reactivity

Introduction

Mindfulness research has grown exponentially over the past decade. Jon Kabat-Zinn defined mindfulness as "the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment to moment" ([1], p. 145) after developing Mindfulness-Based Stress Reduction (MBSR). This intensive 8-week curriculum teaches a series of formal and informal mindfulness meditation and movement practices over approximately 30 hours of instruction. Since its inception in 1979, numerous randomized controlled trials have established the efficacy of MBSR and various adaptations known collectively as mindfulness-based interventions [2].

As the benefits of mindfulness-based interventions emerged in academic research literatures, psychological scientists developed self-report measures of dispositional, or trait, mindfulness. Such measures were designed to assess individual differences in the tendency to experience mindfulness naturally, regardless of whether or not one has received mindfulness training. The *Mindful Attention Awareness Scale* (MAAS), narrowly conceptualized trait mindfulness as a unidimensional construct reflecting awareness (i.e., a continuous background monitoring of experience) and attention (i.e., the process of focusing such awareness to specific stimuli or aspects of experience). Other mindfulness measures, such as the *Kentucky Inventory of Mindfulness Skills* (KIMS; [3]) and the *Freiburg Mindfulness Inventory* (FMI; [4]), included further conceptually related mindfulness components. In addition to the capacity to pay attention and act with awareness measured by the MAAS, these questionnaires also measured capabilities such as the tendency not to react to inner experience (Nonreactivity), the ability to accept one's feelings and other internal experiences without judgment (Nonjudging), and/or the ability to describe feelings verbally (Describing). Baer and colleagues [5] later combined all five dispositional mindfulness questionnaires available at that time and conducted a series of factor analyses, resulting in a five-factor structure solution. Their subsequent *Five Facet Mindfulness Questionnaire* (FFMQ) measured each of the five identified mindfulness facets separately: Nonreactivity, Observing, Acting with Awareness, Describing, and Nonjudging. Subsequent research largely has reported satisfactory validity and internal consistency of the FFMQ (e.g., [6]), found predicted differences between participant groups and expected

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significant correlations with related constructs [7], and demonstrated increases in all mindfulness facets following mindfulness-based intervention [8]. Furthermore, increased dispositional mindfulness has been identified as a mechanism of change in mindfulness-based intervention mediational studies [9].

If increases in dispositional mindfulness following mindfulness-based interventions are at least partially responsible for the observed decreases in stress-related outcome measures, then individuals without mindfulness meditation training who naturally score high on dispositional mindfulness measures should exhibit lower levels of stress than individuals low in trait mindfulness. Indeed, dispositional mindfulness was negatively related to reported stressful events [10] and to post-traumatic stress following negative life events [11]. In laboratory studies, higher dispositional mindfulness was associated with reduced physiological reactivity and subjective distress in response to: 1) the Trier Social Stress Test [12], 2) a challenging social competence interview task [13], 3) a CO_2 inhalation task conducted with suppression instructions [14], and 4) hyperventilation tasks conducted with clinically anxious and non-anxious participants [15].

However, little research has investigated whether any of the five separate facets of mindfulness identified by Baer et al. [5] are uniquely responsible for this observed association between dispositional mindfulness and stress. Kabat-Zinn's [16] original rationale for teaching mindfulness in his Stress Reduction Clinic posited that increased awareness of one's habitual patterns of stress reactivity allows for a mindfulness-mediated alternative response. This alternative response is deliberate, and therefore, likely to be more skillful than one's automatic habitual behavioral reactions. From this theoretical view, as individuals practice responding – instead of reacting–to stressors over time, internal reactivity to such stressors weaken and recovery quickens. Thus, mindfulness training hypothetically supports the development of internal nonreactivity to external and internal stimuli, ultimately reducing perceived stress.

Preliminary neurobiological studies of mindfulness-based interventions support this nonreactivity hypothesis. In their comparison of MBSR to a well-matched active control stress-management intervention, Rosenkranz et al. [17] found that participants randomized to MBSR exhibited significantly smaller inflammatory responses to the TSST than the active control group, despite equivalent reductions on self-report distress measures and TSST-evoked cortisol responses. A functional MRI investigation of the effects of MBSR among social anxiety disorder patients [18] found that MBSR was associated with reductions in both subjective negative emotional experience and amygdala activity during a breath-focused laboratory attention task. Taren et al. [19] found that stressed unemployed community adult participants randomized to a three-day intensive mindfulness meditation intervention showed reduced right amygdala-subgenual anterior cingulate cortex (sgACC) resting state functional connectivity (rsFC) when compared to a control group receiving a well-matched relaxation training intervention without a mindfulness component. This neurobiological index of the amygdala–a brain region associated with coordinating the processing of stress-related stimuli and physiological stress reactions–also was associated with higher self-reported perceived stress over the past month in their larger sample of 130 community adults. Taken together, this research suggests that enhanced nonreactivity plays a pivotal role in producing the observed clinical benefits following mindfulness training. Furthermore, the larger sample findings of Taren et al. also demonstrated that their biological measure of stress reactivity was positively associated with perceived stress before intervention delivery. However, it remains unclear whether the subjective self-report Nonreactivity facet of dispositional mindfulness is specifically associated with perceived stress above and beyond any associations between perceived stress and the other four mindfulness facets among meditation-naïve participants.

The current investigation therefore was conducted to test the hypothesis that the Nonreactivity facet of dispositional mindfulness is uniquely associated with perceived stress after accounting for associations between perceived stress and other mindfulness facets in an unselected sample of undergraduate students. We first examined which of the five mindfulness facets identified by Baer et al. [5] predicted perceived stress measure scores in a standard multiple regression model. We then conducted a hierarchical multiple regression analysis to examine whether Nonreactivity explained additional variance in perceived stress scores after accounting for overlapping variance shared by the other facets.

Methods

Participants and procedure

A total of 114 undergraduate students (Mean age = 23.3 years, *SD* = 4.17) were recruited through an online research participant recruitment system and/or classroom announcements. The sample consisted of 27 men (23.68%) and 87 women (76.32%). Participants were White/Caucasian (51.75%), Hispanic (21.93%), Mixed or Other ethnicity/race (9.65%), Asian (8.77%), African American (4.39%), Native American (1.75%), and Pacific Islander (1.75%). All participants completed both questionnaire measures online via Qualtrics survey software in the laboratory before they performed computerized cognitive tasks as part of a larger experimental study, the results from which will not be reported here.

Measures

Five Facet Mindfulness Questionnaire: The FFMQ [5] measures the tendency to respond to situations mindfully. Items are rated on a 5-point Likert scale, ranging from 1 (*never or very rarely true*) to 5 (*very often or always true*). The 39-item FFMQ consists of five subscales: Observing, Describing, Acting with Awareness, Nonjudging of experience, and Nonreactivity to inner experience. Sample items include "When I'm walking, I deliberately notice the sensations of my body moving" (Observing), "I'm good at finding words to describe my feelings" (Describing), "When I do things, my mind wanders off and I'm easily distracted" (Acting with Awareness), "I criticize myself for having irrational or inappropriate emotions" (Nonjudging), and "I perceive my feelings and emotions without having to react to them" (Nonreactivity). Research has established the psychometric properties of the FFMQ across studies, with adequate internal consistencies among subscales (α coefficients ranged from .74-.90 in the current sample), evidence of construct and predictive validity, and confirmative factor analyses [20].

Perceived Stress Scale: The 10-item PSS [21] measures appraisal of situations as stressful over the past month with items rated on a 5-point Likert scale ranging from 0 (*never*) to 4 (*very often*). Sample questions include, "In the last month, how often have you felt that you were on top of things?" and "In the last month, how often have you felt confident about your ability to handle your personal problems?" The 10-item version of the scale has shown excellent internal consistency reliability (α = .89 in current sample), test-retest reliability, and factor structure [22].

Results

Preliminary analyses

Table 1 presents descriptive statistics and correlation coefficients among study variables. Small to moderate negative correlations were found between FFMQ subscales and the PSS, with correlation coefficients ranging from r = -0.14, *ns* (Observing and PSS) to r = -0.44, $p < .001$ (Nonjudging and PSS). FFMQ total scores (M = 130.01, SD = 15.69) were comparable to previous studies involving college populations (M = 129.55, SD = 13.94) [23], while the mean PSS score in the current sample (M =18.46, SD = 7.07) was slightly higher than those reported in previous research using a college sample (M =16.04, SD = 6.71) [24].

Univariate and multivariate assumptions necessary for regression analysis were tested, including normality of residuals, independence of residuals, homoscedasticity, and multicollinearity. Tukey's test (p = 0.84) and visual inspection of QQ-Plot and scatterplots indicated independence of residuals and homoscedasticity. Variance inflation factor (< 10), tolerance (> 0.1), and condition index (< 30) showed no signs of multicollinearity. Suppression effects were not evident as the standardized betas, semi-partial correlations, and correlations were approximately similar.

Standard multiple regression analysis

A standard multiple linear regression model (Model 1) was specified such that the five facets of the FFMQ predict Perceived Stress Scale scores. Results indicated that the five facets of the FFMQ accounted for 37.8% variance in perceived stress, $F(5, 108) = 13.11$, $p < .001$. As shown in Table 2, Nonjudging (β = -.400, $p < .001$), Nonreactivity (β = -.339, $p < .001$), and Acting with Awareness (β = -.269, $p < .001$) significantly predicted perceived stress, while the regression coefficients of the Observing and Describing facets did not reach significance.

Hierarchical multiple regression analysis

In order to evaluate the unique effects of Nonreactivity beyond those of Nonjudging and Acting with Awareness, a hierarchical multiple regression analysis was conducted with Perceived Stress Scale scores as a dependent variable (Model 2). Nonjudging and Acting with Awareness scores were entered in Step 1 and Nonreactivity was added in Step 2. In Step 1, Nonjudging (β = -.361, $p < .001$) and Acting with Awareness (β = -.261, $p < 0.01$) significantly predicted perceived stress, $F(2, 111) = 18.35$, $p < .001$, $R^2 = .248$. The addition of Nonreactivity in Step 2 explained an additional 11.9% of the variance in perceived stress, $F(3, 110) = 21.26$, $p < .001$, $R^2 = .367$.

Table 1: Descriptive Statistics and Correlations among Study Variables (N = 114).

	Correlations							
	Mean	*SD*	1	2	3	4	5	6
PSS	18.46	7.07	1					
Non-reactivity	21.5	4.28	-.31***	1				
Non-judge	27.19	6.55	-.44***	-0.07	1			
Act-with-Awareness	26.26	4.97	-.39***	-0.04	.38***	1		
Observe	26.56	5.72	-0.14	.45***	-.20**	-0.05	1	
Describe	28.48	5.34	-.27**	.48***	.23*	.20*	.43***	1

Note: *$p < 0.05$, **$p < 0.01$, and ***$p < 0.001$

Table 2: The Five Facets of Mindfulness as Predictors of Perceived Stress.

Predictors	Model 1			Model 2		
	β	*β*	p	β	*β*	p
Step 1						
Non-reactivity	-0.559	-0.339	<.001	-	-	-
Non-judge	-0.432	-0.4	<.001	-0.366	-0.339	<.001
Act –with-Awareness	-0.382	-0.269	<.001	-0.369	-0.259	0.004
Observe	-0.143	-0.116	0.212	-	-	-
Describe	0.118	0.089	0.362	-	-	-
Step 2						
Non-judge	-	-	-	-0.39	-0.361	<.001
Act –with-Awareness	-	-	-	-0.371	-0.261	0.002
Non-reactivity	-	-	-	-0.57	-0.345	<.001
ΔR^2				11.9%, p < .001		
Total R^2	35%, p < .001			36.7%, p < .001		

Discussion

Three of the five dispositional mindfulness facets identified by Baer et al. [5] predicted perceived stress measure scores in this unselected undergraduate student sample. It was not surprising that two of these facets included Acting with Awareness and Nonjudging, as these two particular aspects of mindfulness are fundamental to Kabat-Zinn's [1] definition of mindfulness. As predicted, Nonreactivity also was associated with perceived stress, and Nonreactivity significantly predicted perceived stress scores after accounting for the effects of Acting with Awareness and Nonjudging in the hierarchical multiple regression model. This finding that Nonreactivity explained a significant amount of unique variance in the prediction of perceived stress scores is consistent with Kabat-Zinn's [16] early claim that increased mindfulness – defined as nonjudgmental awareness of present moment experience – lessens stress reactivity over time, which ultimately lowers perceived stress. Importantly, the current study demonstrated relationships between specific mindfulness facets and perceived stress among undergraduate students in the absence of formal mindfulness training by measuring *dispositional* mindfulness, the natural tendency to experience such mindfulness qualities.

The finding that both Acting with Awareness and Nonreactivity dispositional mindfulness facets predicted perceived stress also is consistent with laboratory research. Greater self-reported levels of the Acting with Awareness facet in particular was associated with reduced physiological and/or emotional reactivity in response to a variety of experimental stress tasks [12,13,15]. Within this context, our findings raise the intriguing possibility that the Acting with Awareness and Nonjudging facets of mindfulness emphasized by Kabat-Zinn [1] provide a foundation of optimal psychological conditions, which in turn, support nonreactivity to difficult experiences when they occur. As the Acting with Awareness and Nonjudging facets promote Nonreactivity over time, this natural development of interacting mindfulness capacities eventually may lower an individual's level of perceived stress. Nevertheless, future research certainly is needed to delineate exactly how the specific dispositional mindfulness facets interact over time to reduce perceived stress. Furthermore, rigorous experimental methods are required to demonstrate that reduced perceived stress is indeed a consequence – and not merely a correlate – of these dispositional mindfulness facets in the absence of formal mindfulness training, especially given demonstrated increases in state mindfulness during times of stress [10].

Another unresolved issue involves the distinction between initial reactivity to a stressor and subsequent recovery following the stressor. Kadziolka et al. [13] found that more mindful participants not only exhibited less physiological activation during exposure to an emotionally challenging social task, they also demonstrated greater parasympathetic recovery immediately following the task. In an investigation of dispositional mindfulness and responses to a distressing emotional writing task, Fogarty et al. [25] found that increased mindfulness among men was associated with *greater* initial physiological reactivity as well as superior physiological recovery after the task. Further analyses revealed that Nonreactivity mindfulness facet scores in particular were associated with this pattern of improved physiological regulation. These results were not observed among women. This recent research suggests that recovery ultimately may be the more important factor in the effective regulation of stress for some individuals, calling into question exactly which aspects of physiological and emotion regulation are captured by the Nonreactivity FFMQ subscale. Future research explicating how the different dispositional mindfulness facets relate to initial stress reactivity as well as stress recovery could advance theoretical models beyond Kabat-Zinn's original model.

The current investigation found relationships between the self-reported dispositional mindfulness facets of Acting with Awareness, Nonjudging, and Nonreactivity and a measure of perceived stress. These observed relationships may not be limited to perceived stress, however. Baer et al. [5] found that these same three facets predicted psychological symptoms above and beyond the remaining facets, and Bodenlos et al. [26] found positive associations between Acting with Awareness and Nonjudging facets and general measure of emotional well-being. Tomfohr et al. [27] found that elevated Acting with Awareness and elevated Nonjudging facet scores together were associated with lower blood pressure, while higher levels of Observing were associated with increased physical health (as measured by circulating interleukin-6) only if Nonreactivity scores also were high. Future research might contribute to this growing map depicting how the interrelated dispositional mindfulness facets relate to various measures of psychological functioning, physical health, and emotional well-being.

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