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The association between dispositional mindfulness, psychological well-being, and perceived health in a Swedish population-based sample

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Abstract

Objectives—There is increasing recognition of the links between mindfulness, decreased stress, and healthier psychological functioning. However, the majority of this research has been conducted in US samples and the mechanisms through which mindfulness decreases stress and increases well-being are not well understood. The aim of this study was to examine the relations between mindfulness and psychological functioning in a general population sample in Sweden.

Design—This cross-sectional study examined the association of mindfulness and five subscales of mindfulness with depression, anxiety, positive states of mind (PSOM), and perceived health.

Methods—In the spring of 2007, a random population-based sample of $N=1,000$ individuals aged 18–60 years in Sweden was contacted by mail with a request to participate in the study.

Results—Mindfulness and some of its subscales, in particular *Acting with awareness* and *Non-reactivity to inner experiences*, were strongly related to PSOM and perceived health, and inversely related to depression and anxiety. Tests of the moderating role of mindfulness showed that the associations of perceived stress with depression and perceived health were diminished for those with higher levels of mindfulness.

Conclusions—Mindfulness is strongly related to well-being and perceived health. Results suggest that dispositional mindfulness might buffer against the negative influence of perceived stress on psychological well-being. These findings give additional support for the use of mindfulness training as a way of improving psychological functioning among people experiencing stress.

Mindfulness-based programmes and therapies have become increasingly used over the last decade (Baer, 2003). Mindfulness, or mindful awareness, is derived from Buddhist tradition and it concerns a self-regulation of awareness towards present mental states and processes, and involves a non-evaluative openness and acceptance towards those moment-to-moment experiences (Bishop *et al.*, 2004). Mindfulness theory from both Eastern and Western traditions suggests that mindfulness is a basic human capacity occurring at variable levels and that it can be trained by practising various forms of meditation (Brown, Ryan, & Creswell, 2007; Kabat-Zinn, 2003). Mindfulness training is integrated in several structured training programmes and therapies such as mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1990), mindfulness-based cognitive therapy (Segal, Williams, & Teasdale,

2002), dialectical behaviour therapy (Linehan, 1993), and acceptance and commitment therapy (Hayes, 2005). These treatments have shown promising results in improving psychological outcomes. In particular, MBSR programmes have shown a strong potential for decreasing stress-related complaints and increasing well-being (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Bishop, 2002; Bishop *et al.*, 2004; Grossman, Niemann, Schmidt, & Walach, 2004; Ott, Norris, & Bauer- Wu, 2006; Shapiro, Carlson, Astin, & Freedman, 2006; Smith, Richardson, Hoffman, & Pilkington, 2005).

Several efforts have been made to assess mindfulness through self-report, and a methodological study using a pool of several available mindfulness questionnaires by Baer and colleagues suggests a structure of mindfulness that consists of five factors (Baer *et al.*, 2006): (a) observing (being aware of inner and outer sensations, emotions, and cognitions), (b) describing (being able to mentally or verbally label sensations, emotions, and cognitions), (c) acting with awareness (being focused on one's current activity, rather than acting automatically), (d) non-judging of inner experiences (recognizing but avoiding evaluation of one's thoughts and feelings), and (e) non-reactivity to inner experiences (allowing sensations, cognitions, and emotions to come and go, without attention getting caught up in them).

Mindfulness theory (Brown *et al.*, 2007; Kabat-Zinn, 2003) suggests that mindfulness is both a basic human capacity occurring at variable levels and an ability that can be trained by practising various forms of meditation. In this study, we wanted to examine how mindfulness as a human capacity, not related to specific training, related to different psychological outcomes. Higher dispositional mindfulness has been found to be associated with well-being and positive mood, and lower levels of depression, anxiety, and stress (Brown & Ryan, 2003; Carlson & Brown, 2005). It has also been suggested that being mindful increases the possibility of controlling behaviour and making behavioural decisions that lead to increased well-being and goal attainment (Brown *et al.*, 2007). However, the mechanisms through which mindfulness decreases stress and increases well-being are not well understood. The fact that a number of previous studies have demonstrated decreases in stress-related complaints as a result of mindfulness training suggests that it might be possible that higher levels of dispositional mindfulness buffer against or moderate the negative influences of stress on psychological functioning.

According to Lazarus and Folkman's stress and coping model the activation of coping responses is initiated by an appraisal of an event as harmful, threatening, or challenging (Lazarus & Folkman, 1984). It has been suggested that the attentional aspect of mindfulness might be related to the appraisal of symptoms of stress (Salmon *et al.*, 2004). A lack of attention to signs of stress might lead to an accumulation of stress symptoms without appropriate coping responses, and subsequent reduction of health and well-being. An increased awareness of symptoms of stress at relatively low levels, related to higher dispositional mindfulness, might positively influence coping and buffer against the negative influence of stress. Further, it has been suggested that higher degree of mindfulness enables increased clarity of awareness and a greater access to one's knowledge and abilities, both intellectual and emotional (Brown *et al.*, 2007). Such greater access to inner capacities might positively influence stress appraisal and facilitate positive coping responses. In a review of studies of the mechanisms of mindfulness, Baer (2009) concluded that greater ability to react mindfully to daily experiences, i.e., observe and describe present moment experiences non-judgmentally, non-reactively, and with greater awareness, might reduce rumination, fear of emotion, and avoidance of emotional stimuli, and thus, improve coping ability and reduce maladaptive behaviour in the context of stressful events (Baer, 2009).

In this study, we are interested in understanding the association between mindfulness and psychological functioning. We wanted to examine the association between mindfulness and negative psychological states, such as depression and anxiety, as well as positive affective states. There is increasing support for the idea that positive mood and negative mood are related but distinct constructs (Folkman, 2008; Fredrickson, 2004) and merit studies exploring their unique correlates. Emerging evidence is showing that positive affect seems to have a stronger association with health outcomes than negative affect (Danner, Snowdon, & Friesen, 2001; Moskowitz, 2003; Ostir, Markides, Black, & Goodwin, 2000; Ostir, Markides, Peek, & Goodwin, 2001).

Individual differences in the dispositional tendency to be mindful have been demonstrated in a few studies (Baer *et al.*, 2006; Brown & Ryan, 2003; Brown *et al.*, 2007) and the assessment of mindfulness in meditating and non-meditating samples has been initially validated (Baer *et al.*, 2008), but mindfulness is generally assessed only among participants of specific intervention programmes or therapies. Further, most of the published studies of the relationship between mindfulness and psychological well-being have been conducted in North America and have not used population-based samples. In this study, we use a random population-based sample in Sweden and clearly operationalize and measure mindfulness as it is currently conceptualized in the literature making it possible to look at a number of different facets of mindfulness and how these related to psychological outcomes. To our knowledge, no previous study has tested the moderating effect of mindfulness on the relationship between perceived stress and psychological well-being.

The aim of this study was to examine the association of dispositional mindfulness with psychological functioning and well-being in an adult, population-based sample in Sweden. In particular, this study was guided by two main research questions: (1) are the different facets of mindfulness differently related to psychological well-being and perceived health? (2) Does mindfulness moderate the impact of perceived stress symptoms on psychological outcomes such as anxiety, depression, and positive states of mind (PSOM)?

Method

Study sample and recruitment

In the spring of 2007, a random population-based sample of $N = 1,000$ individuals aged 18–60 years in Sweden was contacted by mail with a request to participate in the study. The addresses were retrieved from the Swedish Census Registry using random sampling with specifications regarding age range and equal numbers of men and women. Along with the invitation letter, a questionnaire was sent that included self-report measures of mindfulness, perceived stress, overall perceived health, PSOM, anxiety, and depression. The purpose of the study as described in the invitation letter was: ‘During the past decades there has been an increased interest in and attention around different types of relaxation, stress management, and meditation techniques. To increase our knowledge about the relationship between mindful awareness, wellbeing and experience of stress we are conducting a study’. Those agreeing to participate were encouraged to complete and return the questionnaire in an attached return envelope with pre-paid postage. No compensation for participation was offered, but one mailed reminder was sent to those not responding to the initial invitation. A total of $N = 382$ respondents returned the questionnaire (38% of the target sample). Sample demographics are presented in Table 1. Compared to the total population in Sweden, study respondents were more likely to be women; and have higher education and higher income (all $p < .001$).

Psychosocial measures

Mindfulness—The Five Facet Mindfulness Questionnaire (FFMQ; Baer *et al.*, 2006) was used to assess mindfulness. Three independent translators translated the FFMQ into Swedish for this study and the final version was decided upon through expert consensus by a team of Swedish psychologists. The FFMQ is a 39-item instrument structured on a five-point Likert type scale that ranges from 1 ‘never or very rarely true’ to 5 ‘very often or always true’, and it is composed of five subscales: observing, describing, acting with awareness, non-judgment of inner experiences, and non-reactivity to inner experiences. The *Observing* subscale (range: 8–40) is measured with eight items, e.g., ‘When I’m walking, I deliberately notice the sensations of my body moving’; ‘When I take a shower or bath, I stay alert to the sensations of water on my body’. The *Describing* subscale (range: 8–40) consists of eight items, e.g., ‘I’m good at finding words to describe my feelings’; ‘I can easily put my beliefs, opinions, and expectations into words’. *Acting with awareness* (range: 8–40) contains eight items, e.g., ‘When I do things, my mind wanders off and I’m easily distracted’; ‘I don’t pay attention to what I’m doing because I’m daydreaming, worrying, or otherwise distracted’. The *non-judging* of inner experiences (range: 8–40) has eight items, e.g., ‘I criticize myself for having irrational or inappropriate emotions’; ‘I tell myself I shouldn’t be feeling the way I’m feeling’, and the *non-reactivity* to inner experiences (range: 7–35) consists of seven items, e.g., ‘I perceive my feelings and emotions without having to react to them’; ‘I watch my feelings without getting lost in them’. In the current sample, the Cronbach’s alpha coefficient for the subscales ranged from .75 to .91. The correlations among the mindfulness subscales ranged from $-.04$ (between observing and acting with awareness) to $.55$ (between acting with awareness and non-reactivity to inner experiences). The subscales were normally distributed in the sample and means were comparable with those of a US community sample (Baer *et al.*, 2008). A confirmatory factor analysis (CFA) of the FFMQ scale was conducted using groups of items as indicators of the five latent factors as suggested by Baer *et al.* (2008). Variables were treated as continuous and maximum-likelihood estimator (MLR) was used to analyse covariances. Model fit was determined by examining chi-square tests of model fit as well as values for root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), and the comparative fit index (CFI). RMSEA close to or lower than $.06$, SRMR close to or lower than $.08$, and CFI close to or higher than $.95$ were considered the criteria for a good model fit as suggested by Hu and Bentler (1998). The chi-square difference testing was performed using a strategy described by Muthen and Muthen (2005). The model gave support for the suggested five-factor model ($\chi^2 = 157.62$; RMSEA = $.06$ (90% confidence interval (CI) [$.05$, $.07$]); SRMR = $.05$; CFI = $.96$). The five-factor model showed substantially better model fit than a one-factor model with a general mindfulness factor ($\chi^2 = 1,474.38$; RMSEA = $.23$ (90% CI [$.22$, $.24$]); SRMR = $.20$; CFI = $.41$), and better fit than a four-factor model combining the non-reactivity and acting with awareness factors ($\chi^2 = 351.10$; RMSEA = $.10$ (90% CI [$.09$, $.11$]); SRMR = $.07$; CFI = $.89$). The chi-square difference tests showed significant differences between the five-factor model and both the one-factor model ($\Delta\chi^2 = 1,114.01$, $\Delta df = 10$, $p < .001$), and the four-factor model ($\Delta\chi^2 = 204.09$, $\Delta df = 4$, $p < .001$). Additionally, a multi-group analysis of measurement invariance regarding gender and age (two age groups were used, i.e., 19–39 and 40–60) was conducted as described by Brown (2006). First, separate CFA were used to examine the hypothesized five-factor structure of the FFMQ in each subgroup. Second, the hypothesis that the indicators of the five factors should show the same factors structure over different subgroups was tested in a multi-group CFA. Next, the hypothesis that all factor loading should be the same over all subgroups was tested by restricting the loadings to be invariant in the multi-group CFA. Finally, the hypothesis that item intercepts should be the same across subgroups was tested by imposing constraints declaring invariance. The multi-group CFA models assuming equal form, equal factor loading, and equal intercepts indicated that the FFMQ was invariant across both gender and age ($\Delta\chi^2_{\text{gender}} = 9.98$, $\Delta df =$

10, $p > .05$; $\Delta\chi^2_{\text{age}}=3.45$, $\Delta df=10$, $p > .05$), and the fit indices demonstrated adequate model fit for both gender (RMSEA = .07 (90% CI [.06, .08]); SRMR = .07; CFI = .95) and age (RMSEA = .06 (90% CI [.05, .07]); SRMR = .06; CFI = .96).

Anxiety and depression—Anxiety and depression were assessed with the Hospital Anxiety and Depression Scale, a 14-item scale intended for non-psychiatric populations that has been frequently used within health care settings (Bjelland, Dahl, Haug, & Neckelmann, 2002). The scale has also been used in community samples and a large population-based study demonstrated that it had adequate psychometric properties (Mykletun, Stordal, & Dahl, 2001). Responses are indicated on four-point scales from 0 to 3. It consists of two separate subscales measuring current state depression ($\alpha = .83$) and anxiety ($\alpha = .85$). The scales were slightly positively skewed but the scales means were comparable with earlier reported data from community samples (Crawford, Henry, Crombie, & Taylor, 2001).

Positive states of mind—PSOM were measured using the PSOM Scale, a six-item scale measuring positive emotional and cognitive experiences (Adler, Horowitz, Garcia, & Moyer, 1998; Horowitz, Adler, & Kegeles, 1988). It assesses experiences of focused attention, productivity, responsible caretaking, restful repose, sharing, and sensuous non-sexual pleasure. Responses are indicated on five-point Likert type scales from 1 ‘not at all’ to 5 ‘very much’. Cronbach’s alpha in this study was .86. The scale was normally distributed and the mean valued slightly higher than mean values reported for the USA (Horowitz *et al.*, 1988).

Perceived stress—Perceived stress was assessed with the Perceived Stress Scale (PSS). The PSS is a 10-item scale measuring perceptions of stressful experiences during the past month (Cohen, Kamarck, & Mermelstein, 1983). Responses are indicated on five-point scales from 0 ‘never’ to 4 ‘very often’. The PSS has previously been used in several different populations. In this sample, the internal consistency was .86. The scale was normally distributed and had a range from 0 to 40.

Perceived health—Perceived health was measured with two items where the respondents were asked to indicate, on a seven-point scale, their degree of satisfaction with their physical health and their quality of life. The scale is part of the EORTC-QLQ-C30 questionnaire (Aaronson *et al.*, 1993) and constitutes a scale of Global Health with a range from 0 to 100. The scale has been used extensively in health care population but also in large-scale population samples (Michelson, Bolund, Nilsson, & Brandberg, 2000). In this sample, the internal consistency was .81, the scale was slightly positively skewed and the mean values were somewhat lower than values reported from a previous population based study in Sweden (Michelson *et al.*, 2000).

Analysis

Data were analysed using PASW Statistics 18.0 and MPlus 5.0 software. ANOVA procedures were used to test demographic differences in mindfulness scores. Pearson product-moment correlations were used to assess correlations between variables. To test the association of the mindfulness subscales with psychological outcomes, a number of separate multivariable regression analysis were conducted. The analyses were conducted in two steps: demographic variables (age, gender, education, income) and prior meditation history entered on the first step, and the mindfulness subscales were added on the second step using a stepwise inclusion strategy. Proportion of explained variance and change of this proportion at each step are presented. Further analyses were conducted to examine the potential moderating effect of the different mindfulness subscales on the impact of perceived stress on psychological outcomes such as anxiety, depression, PSOM, perceived health, and general

quality of life. This was done with regression analyses where standardized perceived stress score, total standardized mindfulness score, and the interaction score for perceived stress and mindfulness were entered as independent variables, and depression, anxiety, PSOM, or perceived health, was entered as a dependent variable. To illustrate the moderating effects, two figures were constructed with adjusted means of depression, and perceived health for groups based on level of perceived stress (tertiles; low, moderate, and high), and scores on the mindfulness subscale (high vs. low based on median). Adjusted means and 95% CIs were calculated using a general linear model; age and gender were entered as covariates in the model. Given the high number of analysis the alpha level for significance was set at .01.

Results

Descriptive analyses

Demographic differences in mindfulness and the five mindfulness subscales are presented in Table 2. There were no gender differences in total mindfulness scores. However, men and women differed on subscale scores. Women had higher scores on the subscales that measured ability to observe and describe sensations, emotion, and cognitions, whereas men scored higher on the subscales measuring acting with awareness, non-judgment, and non-reactivity. The only age difference in mindfulness was found for the acting with awareness subscale: the oldest age group of people 50 or older scored significantly higher than the age group 30–39 years. Higher education was related to higher scores on total mindfulness score, as well as the observing, describing, and acting with awareness subscales. Income was positively related to the total mindfulness score. Among the subscales, income was positively related to describe and non-judgment of inner experiences. People who reported regularly meditating scored significantly higher on the subscales measuring ability to observe sensations, emotions, and cognitions, and the subscale measuring non-reactivity to inner experiences.

Associations of mindfulness with psychological variables and perceived health

Correlations of mindfulness subscales with the psychological variables are presented in Table 3. In Table 4, the results from separate regression analyses examining the association of mindfulness subscales with psychological outcomes and perceived health are presented. Total level of mindfulness had a strong inverse relation to depression ($R^2 = .32$, $\beta = -0.57$, $p < .001$) and anxiety ($R^2 = .37$, $\beta = -0.61$, $p < .001$), and was positively related to PSOM ($R^2 = .32$, $\beta = 0.56$, $p < .001$) and perceived health ($R^2 = .16$, $\beta = .42$, $p < .001$). Acting with awareness and non-reactivity had the strongest associations with all dependent variables. Non-judgment of inner experiences was only associated with anxiety, and describing were related to PSOM.

The effect of mindfulness as a moderator of stress

Regression analyses testing for the moderating role of the different subscales of mindfulness on the association between perceived stress and psychological outcomes showed that the interaction term for the describing subscale and perceived stress (Describing \times Perceived stress) accounted for a significant proportion of the variance in depression ($\Delta_2^R = .01$, $\Delta_{F(1,311)} = 7.35$, $p < .01$). The interaction term for the acting with awareness and perceived stress (Act with awareness \times Perceived stress) accounted for a significant proportion of the variance in depression ($\Delta_2^R = .04$, $\Delta_{F(1,311)} = 26.16$, $p < .001$). The interaction term for the non-judging of inner experiences and perceived stress (Non-judging of inner experiences \times Perceived stress) accounted for a significant proportion of the variance in depression ($\Delta_2^R = .02$, $\Delta_{F(1,311)} = 8.89$, $p < .01$) and perceived health ($\Delta_2^R = .02$, $\Delta_{F(1,310)} = 9.11$, $p < .01$). The interaction term for non-reactivity to inner experiences (Non-reactivity to inner experiences \times Perceived

stress) accounted for a significant proportion of the variance in depression ($\Delta_2^R=.02$, $\Delta_{F(1,311)} = 9.11$, $p < .01$). None of the mindfulness scales moderated the effect of stress on PSOM and anxiety, and the subscale observing did not moderate any of the associations between perceived stress and the outcomes. The moderating effects for acting with awareness on depression is illustrated in Figures 1a and the moderating effects of non-judging of inner experiences on perceived health is illustrated in Figure 1b.

As several of the subscales indicated a moderating effect of the association between perceived stress and depression, and analyses were done with all interactions between FFMQ subscales and stress entered simultaneously into the equation. This analysis showed that only the interaction term for the acting with awareness and perceived stress (Act with awareness \times Perceived stress) accounted for a significant proportion of the variance in depression ($\Delta_2^R=.04$, $\Delta_{F(1,311)} = 26.16$, $p < .001$).

Discussion

There is a growing interest in the use of mindfulness-based treatments and an increasing number of studies report on the positive effects of therapies and interventions based on mindfulness (Chiesa & Serretti, 2009). However, the mechanisms through which mindfulness skills might decrease stress and increase well-being is not yet well understood, and the evidence of specific effects of mindfulness-based interventions as compared to alternative treatments has not yet been clearly demonstrated in research studies (Chiesa & Serretti, 2009). This study makes an important contribution to the understanding of how different aspects of mindfulness are related to experiences of stress, anxiety, depression, and PSOM. In this study, we examined the association of mindfulness with a number of psychological variables, and perceived health.

Mindfulness and some of its facets were strongly related to depression, anxiety, PSOM, and perceived health. These results replicate some findings from previous studies of dispositional mindfulness (Brown & Ryan, 2003; Carlson & Brown, 2005) and extend the findings on mindfulness by showing cross-cultural reliability of a five-factor model among a general population sample in Sweden and by providing preliminary evidence of construct validity in relation to other aspects of psychological functioning. The current study also adds to the literature on mindfulness by revealing that some facets of mindfulness show a stronger association with psychological and health outcomes than others. In particular, *acting with awareness* and *non-reactivity to inner experiences* were most consistently related to psychological outcomes and perceived health. *Nonjudgment of inner experiences* was negatively related to anxiety. The ability to *describe* sensations, thoughts, and feelings was related to PSOM, suggesting that this facet of mindfulness might work in a unique way in relation to well-being.

There are several possible pathways through which mindfulness might influence psychological functioning (Brown *et al.*, 2007). Being mindful may lead to a view of thoughts and feelings as being transient, allowing the individual to view cognitions as 'just thoughts' and affects as 'just feelings'. This perspective may lead to less automatic thought patterns and rumination and can lead to more effective affect regulation and reduced reactivity to unpleasant states. Mindfulness also involves an acceptance of being with what is, as opposed to having the need to alter present unpleasant states and striving towards future, more pleasant goals. This focus on being content with the present situation without constantly striving towards future possible states might in itself generate a greater sense of well-being and happiness that is not conditional on experience.

In this study, we regard mindfulness and its facets as trait or dispositional characteristics. We tested whether mindfulness might buffer against the negative effects of stress by serving as a moderator of the relationship between stress and psychological well-being and perceived health. As outlined in the introduction, we proposed that higher level of mindfulness might enhance awareness of even low levels of stress, and boost inner capacities of efficient coping. The results from this study give some support for this hypothesis. We found a moderating effect of several of the facets of mindfulness on the cross-sectional association between perceived stress and depression, and perceived health. The subscales of mindfulness that did function as moderators were *acting with awareness*, *non-reactivity of inner experiences*, and *non-judgment of inner experiences*. The fact that *observing* and *describing* were less influential suggests that it is not sufficient to be able to observe and describes sensations and experiences but you have to behave and react in a more mindful way to see beneficial influences of mindfulness. A previous study found an association between the *observing* subscale and psychological well-being among experienced meditators but not in nonmeditators, suggesting different influence of this aspect of mindfulness depending on meditation experience (Baer *et al.*, 2008). The same study also found differences in all mindfulness subscales between meditators and non-meditators, with meditators scoring higher, except for the *acting with awareness* scale. This could indicate that, at least among population samples, *acting with awareness* is more trait like than the other subscales. In the present data, *acting with awareness* was the mindfulness subscale that was most strongly related to all well-being outcomes, and it was also the most consistent moderator. However, several of the mindfulness subscales did show incremental validity over and above the *acting with awareness* scale, in particulate the *non-reactivity to inner experiences*.

The results give support for the idea that heightened mindful awareness may increase coping ability during stressful conditions. As suggested in the introduction, higher mindfulness might enable increased clarity of awareness and a greater access to one's knowledge and abilities, both intellectual and emotional, and thus, might positively influence coping and buffer against the negative influence of stress. The acting with awareness subscale might be the strongest indicator of this attentional aspect of mindfulness. Being more aware of internal states and the effects of responding to these internal states in different ways, might lead to more adequate behaviour, and an ability to act constructively and cope effectively even under stressful conditions. Future studies should employ longitudinal design and include measures of coping to enable to examine the causal links through which mindfulness might lead to increased well-being.

Although, the systematic study of mindfulness has only recently received attention in the westernized world, several recent reviews have given support for the use of mindfulness-based interventions to improve psychological adjustment to physical diseases. Results show improved well-being, reduction of psychological distress, and improvements in biological health indicators. Studies have also indicated beneficial effects of mindfulness training in healthy populations. The promise for mindfulness interventions to improve health, quality of life, and well-being is encouraging but should be further investigated in studies examining potential mechanisms through which mindfulness leads to these positive outcomes. A greater understanding of the specific elements of mindfulness that influence particular dimensions of psychological functioning would enable the development of more efficient interventions.

Limitations

While this study contributes to our understanding of the potential mechanisms of mindfulness, there are several limitations. First, the fact that we used a sample from Sweden reduces our ability to generalize our finding to other countries. Further, we have a

substantial group of non-responders, skewing our sample towards more highly educated women, which further reduces our ability to generalize our findings to the total population. Nonetheless, the study is based on a fairly large community-based sample and expands the study of dispositional mindfulness beyond samples drawn from North American populations. This study also suffers from the limitations associated with self-report, including common method variance and socially desirable responding. In particular, there is controversy regarding the use of self-report questionnaires in assessing mindfulness (Grossman, 2008). However, the measure of mindfulness we used showed good psychometric properties, including estimation of the recommended five-factor model in a CFA framework (Baer *et al.*, 2008). Future studies of the validity of measures of mindfulness should test of the influence of social desirability. As with any cross-sectional study, the design of this study limits our ability to make any conclusions regarding causality. Alternative models and explanation to our findings cannot be ruled out.

Conclusions

A key finding of this study is the indication that mindfulness seems to be differentially related to psychological factors at different levels of perceived stress. Among people exposed to less stress, level of mindfulness does not seem to be strongly related to depression and perceived health. But when people are experiencing higher levels of stress, mindfulness seems to serve as a buffer against the negative influence of stress on these outcomes. This gives support for using mindfulness training as a way of increasing well-being among people under stressful conditions, or of using mindfulness training to prevent poor outcomes following a major stressful event. Such training might strengthen people's ability to experience high levels of stress without suffering negative psychological and physical health consequences. Future treatment or prevention studies could be designed to experimentally test the influence of mindfulness training on changes in mindfulness and its subscales, and how those relate to changes in well-being for people experiencing stress.

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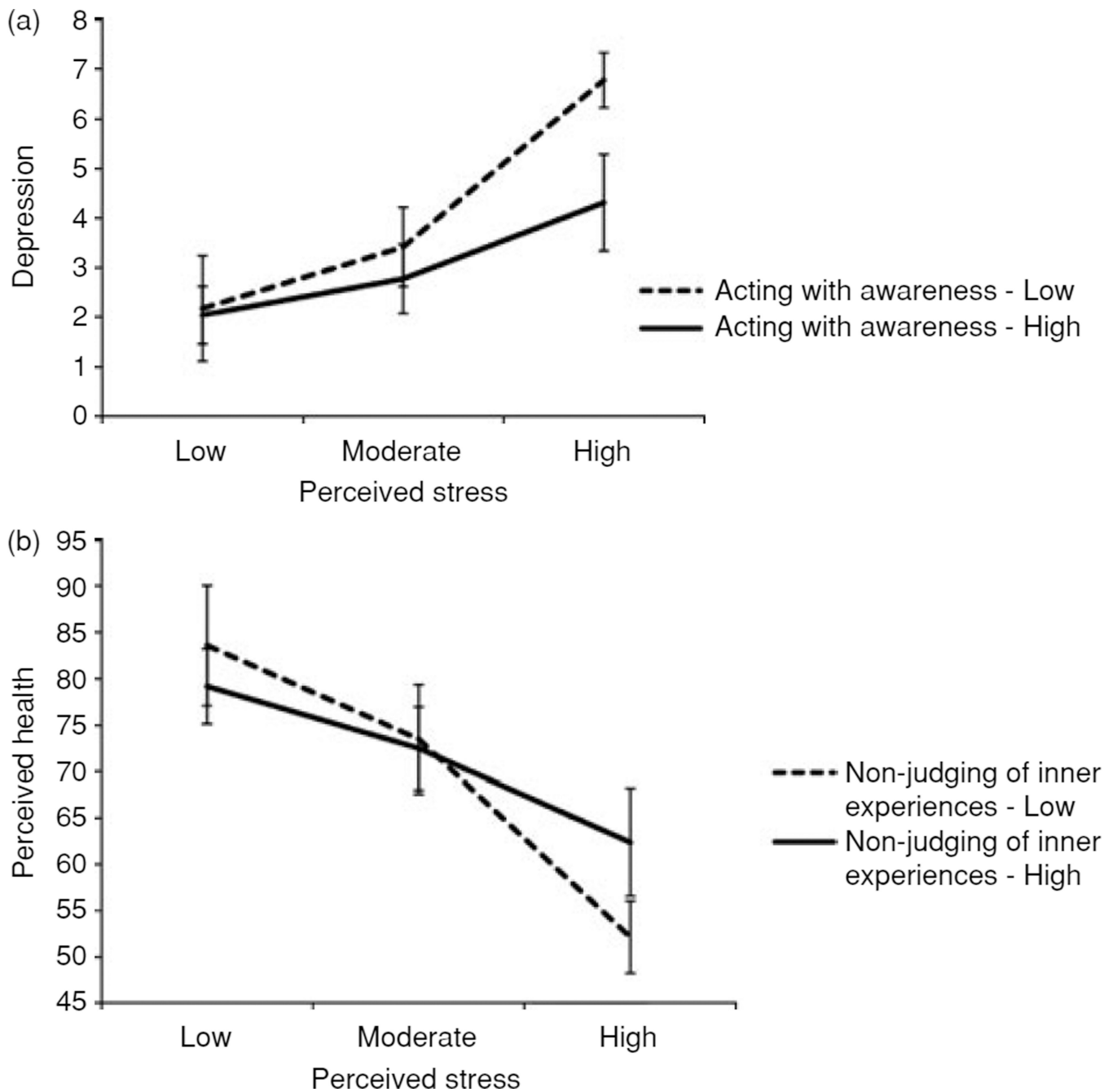


Figure 1.

(a) Mean depression score (range 0–18) and 95% CIs are presented to illustrate the moderating effect of the mindfulness subscale – acting with awareness – on the association between perceived stress and depression. (b) Mean perceived health score (range 0–100) and 95% CIs are presented to illustrate the moderating effect of the mindfulness subscale – non-judging of inner experiences – on the association between perceived stress and global health score.

Table 1

Age, gender, education, and income in the studies sample

Age	<i>N</i> (%)
18–29	68 (20.1)
30–39	77 (22.8)
40–49	87 (25.7)
Over 50	106 (31.4)
Gender	<i>N</i> (%)
Male	139 (41.0)
Female	200 (59.0)
Education	<i>N</i> (%)
High school	105 (32.0)
Some college	122 (37.2)
Bachelors degree or more	101 (30.8)
Income	<i>N</i> (%)
0–29,999 SEK	123 (36.9)
30,000–44,999 SEK	104 (31.2)
45,000 SEK or more	106 (31.8)

Table 2
Mindfulness and mindfulness subscales by age, gender, education and income, and differing experience of meditation

	N	%	Total mindfulness score (range: 39–195)		Observe subscale (range: 8–40)		Describe subscale (range: 8–40)		Acting with awareness (range: 8–40)		Non-judging of inner experiences (range: 8–40)		Non-reactivity to inner experiences (range: 7–35)	
			Mean (SD)	Sig.	Mean.	Sig.	Mean (SD)	Sig.	Mean (SD)	Sig.	Mean (SD)	Sig.	Mean (SD)	Sig.
<i>Gender</i>														
Male	139	41.0	130.5 (17.9)	ns	24.4 (6.0)	$p < .001$	26.3 (6.7)	$p < .001$	29.4 (6.0)	$p < .01$	28.9 (6.6)	$p < .05$	21.5 (4.5)	$p < .01$
Female	200	59.0	130.7 (19.2)		27.2 (5.6)		28.9 (7.0)		27.5 (6.4)		27.1 (7.0)		20.0 (4.6)	
<i>Age</i>														
18–29	68	20.1	126.7 (19.4)	ns	25.9 (5.6)	ns	25.9 (6.8)	ns	27.4 (5.6)	$p < .05^a$	26.2 (6.9)	ns	21.3 (4.6)	ns
30–39	77	22.8	128.5 (18.9)		25.5 (6.3)		28.3 (7.1)		27.1 (6.7)		27.7 (8.1)		19.8 (4.9)	
40–49	87	25.7	131.9 (18.4)		26.4 (6.2)		28.9 (6.7)		28.1 (6.5)		28.2 (6.5)		20.3 (4.5)	
Over 50	106	31.4	133.4 (17.9)		26.2 (5.8)		27.9 (7.2)		29.7 (6.0)		28.5 (6.3)		21.0 (4.4)	
<i>Education</i>														
High school	105	32.0	125.6 (17.6)	$p < 0.001^b$	25.3 (6.4)	$p < .05^c$	26.1 (7.2)	$p < .001^b$	26.9 (7.0)	$p < .05^d$	27.2 (7.2)	ns	20.0 (4.4)	ns
Some college	122	37.2	130.3 (18.8)		25.8 (6.1)		27.4 (6.5)		29.0 (5.8)		27.3 (6.9)		20.9 (5.0)	
Bachelors degree or more	101	30.8	137.8 (16.6)		27.4 (5.2)		30.8 (6.1)		29.1 (5.8)		29.3 (6.2)		21.2 (4.5)	
<i>Income</i>														
0–29,999 SEK	123	36.9	127.7 (16.9)	$p < 0.05^e$	26.3 (6.1)	ns	27.2 (6.6)	$p < 0.05$	27.5 (5.9)	ns	26.6 (7.2)	$p < 0.05$	20.1 (4.6)	ns
30,000–44,999 SEK	104	31.2	130.3 (19.6)		25.1 (6.0)		27.1 (7.5)		28.2 (6.2)		29.2 (6.5)		20.8 (5.1)	
45,000 SEK or more	106	31.8	135.0 (18.5)		26.9 (5.6)		29.6 (6.6)		29.2 (6.6)		28.3 (6.5)		21.0 (4.2)	
<i>Meditation experience</i>														
Meditate regularly	24	7.1	316.7 (22.6)	ns	29.1 (6.9)	$p < 0.05$	285.9 (6.9)	ns	29.3 (5.9)	ns	26.8 (7.1)	ns	22.6 (4.9)	$p < 0.05$
Do not meditate	316	92.9	130.2 (18.3)		25.9 (5.9)		27.8 (7.0)		28.2 (6.3)		27.9 (6.9)		20.5 (4.6)	

^a *Post hoc* analysis showed that differences were only significant between age groups 30–39 and 50 years and older.

^b *Post hoc* analysis showed that differences were only significant for bachelors degree or higher.

^c *Post hoc* analysis showed that difference were only significant between those with high school and bachelors degree.

^d *Post hoc* analysis showed that difference were only significant for high school.

^e *Post hoc* analysis showed that differences were only significant between those with an income or 45,000 SEK or more and 0–29,999 SEK.

Table 3

Correlations between subscales and perceived stress, depression, anxiety, PSOM, and perceived health

	Mindfulness subscale			
	Observing	Describing	Acting with awareness	Non-judging of inner experiences
Perceived stress	-.003	-.29**	-.58**	-.51**
Depression	-.13*	-.36**	-.50**	-.42**
Anxiety	.06	-.28**	-.62**	-.59**
Positive states of mind	.24**	.40**	.42**	.28**
Global health score	.04	.30**	.45**	.36**
				Non-reactivity to inner experiences
				-.38**
				-.30**
				-.40**
				.36**
				.29**

* $P < .05$;

** $P < .001$.

Table 4
Regression analyses of mindfulness subscales predicting depression, anxiety, PSOM, and perceived health

Depression	Explained variance, R^2	R^2 change	df	t	Standardized beta
Step 1: Demographics	.08				
Step 2: Mindfulness scales			312		
Acting with awareness	.29	.21**		-9.06	-0.44**
Non-reactivity to inner experiences	.34	.05**		-5.00	-0.24**
Describing	-	-		-	-
Non-judgment of inner experiences	-	-		-	-
Observing	-	-		-	-
<i>Anxiety</i>					
Step 1: Demographics	.07				
Step 2: Mindfulness scales			309		
Acting with awareness	.39	.32**		-8.38	-0.40**
Non-reactivity to inner experiences	.47	.08**		-6.44	-0.26**
Non-judgment of inner experiences	.52	.05**		-5.96	-0.28**
Observing	-	-		-	-
Describing	-	-		-	-
<i>Positive states of mind</i>					
Step 1: Demographics	.05				
Step 2: Mindfulness scales			309		
Act with awareness	.20	.15**		6.44	0.33**
Non-reactivity to inner experiences	.29	.09**		5.02	0.25**
Describe	.33	.04**		4.07	0.22**
Observe	-	-		-	-
Non-judging of inner experiences	-	-		-	-
<i>Perceived health</i>					
Step 1: Demographics	.07				
Step 2: Mindfulness scales			311		

Depression	Explained variance, R^2	R^2 change	df	t	Standardized beta
Act with awareness	.21	.14**		7.06	0.37**
Non-reactivity to inner experiences	.25	.04**		4.12	0.21**
Observing	-	-		-	-
Describing	-	-		-	-
Non-judging of inner experiences	-	-		-	-

* $p < .01$;

** $p < .001$.