Mindfulness-based stress reduction (MBSR) enhances distress tolerance and resilience through changes in mindfulness

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ARTICLE INFO

ABSTRACT

Distress tolerance (DT) is associated with psychological health and has been shown to be predicted by mindfulness. Resilience, another protective capacity in the face of stress, is related to positive psychological outcomes, such as preventing development of PTSD. The current longitudinal online-study investigated whether Mindfulness-Based Stress Reduction (MBSR) can lead to an increase in DT and resilience, and whether these effects are mediated by facets of mindfulness. Forty nine participants were assessed, $N=20$ of these were studied before and after MBSR training, and compared to a matched control group of $N=29$. Changes in mindfulness were assessed using the Comprehensive Inventory of Mindfulness Experience (CHIME). In line with hypotheses, MBSR enhanced self-reported mindfulness, DT, and resilience. Results are consistent with assuming a mediation of these effects by the acceptance, decentering, and relativity facets of mindfulness.. Results indicate that MBSR might not only ameliorate existing psychopathologies, but may also serve as a preventative method to allow a more adaptive response to future stress.

1. Introduction

Mindfulness, a concept originally rooted in Buddhist tradition (Kabat-Zinn, 1990), refers to being aware of all internal and external experiences-may they be pleasant or unpleasant-and doing so in a non-judgmental, accepting, and self-empathetic manner (Bishop et al., 2004; Brown, Ryan & Creswell, 2007). Dispositional mindfulness has been shown to be associated with a variety of positive mental health outcomes, such as more benign stress appraisal (Weinstein, Brown, & Ryan, 2009), and better emotion regulation (Goodall, Trejnowska, & Darling, 2012).

Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990), a manualized eight week long group program that aims to develop and increase mindfulness, has shown promising results in improving mental and physical health in clinical and non-clinical populations for a variety of symptoms and disorders (e.g., Eberth & Sedlmeier, 2012; Keng, Smoski, & Robins, 2011; Vollestad, Nielsen, & Nielsen, 2012).

Yet, findings concerning the effect of MBSR on increasing self-reported mindfulness are heterogeneous, with some studies finding medium to large effects ($d=.7-.89$; Carmody & Baer, 2008;

Robins, Keng, Ekblad, & Brantley, 2011), while others find no effects or have mixed findings (e.g. Visted, Vollestad, Nielsen, & Nielsen, 2014). This disparity may partly be explained by the still diverging definitions of mindfulness (Bishop et al., 2004; Grossman, 2008), and the use of measures that vary conceptually between mindfulness as a one factor model versus a multi-facet construct (Chiesa, 2013).

With regard to mental health issues, increasing emphasis has been placed on protective capacities that foster well-being in the face of stress, such as distress tolerance (DT) and resilience.

DT is defined as the ability to withstand and tolerate aversive psychological states (Nock & Mendes, 2008; Simons & Gaher, 2005). It has been shown to protect against many psychopathologies, such as posttraumatic stress disorder (Fetzner, Peluso, & Asmundson, 2014), borderline personality (Bornovalova, Matusiewicz, & Rojas, 2011), and early drop-out of substance use treatments (Daughters et al., 2005).

Recent data suggest that mindfulness can improve DT. Liu, Wang, Chang, Chen and Si (2013) found that compared to participants listening to gentle music, participants receiving a 15 min mindfulness instruction had significantly lower pain ratings and immersion distress, when placing their hands into ice-cold water. Further, Sauer and Baer (2012) found that participants with borderline personality disorder showed increased persistence on a behavioral DT task after eight minutes of mindful self-focusing, compared to those ruminatively self-focusing. In a recent study,

Feldman, Dunn, Stemke, Bell and Greeson (2014) found that DT, operationalized as the ability to persist on a frustrating mirror tracing task, was predicted by mindfulness.

Conceptually related to DT is the construct of resilience (Leyro, Zvolensky, & Bernstein, 2010), which can be defined as the ability to bounce back and recover quickly from stress (Smith et al., 2008). Resilience is associated to better adjustment after trauma (Mealer et al., 2012), positive affect, and less prevalence of anxiety, depression and negative affect (see Hu, Zhang, & Wang, 2015 for an overview). Intriguingly, while the effects of mindfulness as a psychological treatment option have received tremendous interest, data on mindfulness and resilience are relatively scarce. Orzech, Shapiro, Brown and McKay (2009) showed that one month of intensive mindfulness training led to increases in self-compassion, which can be indicative of resilience.

No studies to date have, however, directly explored the effect of an extended mindfulness based intervention such as MBSR on DT and resilience. The fact that DT and resilience have shown to be protective capacities that are related to better mental health outcomes in the future, has particular significance for a preventative approach to mental health. Enhancing such capacities through MBSR could equip individuals with abilities that protectively strengthening psychological health, and hence reduce risk of developing psychopathologies in the future. This could extend the indication for MBSR over and above alleviating acute distress, to preventative applications.

The present pilot study therefore aimed to investigate whether MBSR could enhance DT and resilience, and hence build capacities that allow for a more adaptive response to future stress. In order to improve our understanding by which processes MBSR actually works, a further explorative aim of the present study was to investigate which aspects of mindfulness mediate potential improvements in DT and resilience.

We hypothesized that compared to a control group (CG), (1) MBSR would enhance mindfulness, (2) MBSR would enhance DT and resilience, and (3) that outcomes may be mediated by particular mindfulness facets.

2. Method

2.1. Sample and procedure

Data were collected online following Internet testing guidelines by Reips (2002) to increase data quality. MBSR participants were recruited through contacting MBSR trainers and the German, Austrian and Swiss MBSR associations. MBSR participants filled in questionnaires online before and after their MBSR course. CG assessment was the same, with 8 weeks in-between online questionnaire completions. Main research questions were masked to both groups. Data sets from T1 and T2 were matched anonymously. Participants were not compensated for participation.

Two hundred and 35 participants filled in the online questionnaires at T1, and $N=86$ at T2. Of those, $N=46$ MBSR and $N=84$ CG participants completed them at T1, $N=22$ MBSR and $N=36$ CG participants at T2. After applying exclusion criteria, the remaining MBSR sample consisted of $N=20$ participants ($M_{age}=44.5$ years, $SD=7.72$), and the CG of $N=29$ participants ($M_{age}=44.34$ years, $SD=12.99$). Exclusion criteria were aversive opinion about mindfulness practice and no intention to treat in the CG, mood and performance altering medication onset, start of psychotherapy, and an exam period during the course of the experimental period.

MBSR participants received a standard, typically 8 week long MBSR group program, conducted by certified teachers. The CG was a non-clinical sample without intervention (69% female, 55% reporting a university degree as highest education), with similar demographic characteristics as the non-clinical MBSR group (85% female, 70% reporting a university degree as highest education). A brief psychological symptoms assessment revealed no difference between MBSR and CG participants.

2.2. Measures

The *Comprehensive Inventory of Mindfulness Experience* (CHIME; Bergomi, Tschacher & Kupper, 2014) consists of 37 items. It contains aspects already included by existing measures of mindfulness and extends those to a final of eight facets: (1) awareness towards inner experiences (Inner Awareness), (2) awareness towards outer experiences (Outer Awareness), (3) Acting with Awareness, being present (awareness), (4) accepting, non-judgmental and compassionate orientation (acceptance), (5) non-reactive and decentered orientation (decentering), (6) openness to experience (openness), (7) relativity of thoughts (relativity), and (8) insightful understanding (understanding). in prior studies, the CHIME has shown incremental validity over and above the widely used Five Facet Mindfulness Questionnaire (FFMQ, Baer et al., 2008) with good change sensitivity, internal consistency, and good test-retest reliability (Bergomi et al., 2014) in all subscales In the current study Cronbach's Alpha was $\alpha=.90$.

The *Distress Tolerance Scale* (DTS; Simons & Gaher, 2005) consists of 15 items with higher scores representing better DT. There are four subscales: (1) ability to tolerate emotional distress, (2) appraisal of distress, (3) absorption by negative emotions, and (4) regulation to alleviate distress. The scale has demonstrated high internal consistency and good test-retest reliability (Simons & Gaher, 2005). For the present study, the original English scale was translated by an English-German translator, and was subsequently retranslated by an English-German bilingual researcher. Afterwards, the original and translated scales were re-examined by both, and semantic coherence and conceptual equivalence were checked. In the current study, Cronbach's Alpha was $\alpha=.93$.

The *Brief Resilience Scale* (BRS; Smith et al., 2008) measures the ability to bounce back from stress. It consists of 6 items. The BRS has demonstrated good internal consistency and good test-retest reliability (Smith et al., 2008; Windle, Bennett, & Noyes, 2011). The same translation procedure was applied as described above. In this study, the scale was internally consistent with Cronbach's Alpha coefficient of $=.84$.

2.3. Statistical analysis

We computed change scores, by deducting T1 scores from T2 scores. Negative change scores thus represent lower scores at T2. Independent t-tests were utilized to examine differences in the main outcome measures between MBSR and CG. For effect sizes, Hedges's g was calculated (Cumming, 2012; Lakens, 2013), which is a more conservative unbiased version of Cohen's d, correcting for differences in small and dissimilar samples sizes. To examine mediations of CHIME subscales, between MBSR and changes in outcomes, bootstrapping analyzes were run in SPSS, using the PROCESS macro developed by Hayes (2013). Bootstrapping makes no assumptions about the normality distribution of study variables, nor about the relationship between predictor and outcomes (Hayes, 2013). Simulations have shown that bootstrapping as a mediation modeling method has highest power and best Type I error control among the existing mediation approaches, and can be used with more confidence also for smaller sample sizes (Hayes, 2013; Shrout & Bolger, 2002).