



# Mindful attention regulation and non-judgmental orientation in depression: A multi-method approach<sup>☆</sup>



Katharina Rohde<sup>a,\*</sup>, Dirk Adolph<sup>b</sup>, Detlef E. Dietrich<sup>c</sup>, Johannes Michalak<sup>a</sup>

<sup>a</sup> University of Hildesheim, Institute of Psychology, Department of Clinical Psychology, Marienburger Platz 22, 31131 Hildesheim, Germany

<sup>b</sup> Ruhr University Bochum, Faculty of Psychology, Work Unit Clinical Psychology, Universitätsstrasse 150, 44801 Bochum, Germany

<sup>c</sup> AMEOS Klinikum Hildesheim, Goslarsche Landstrasse 60, 31135 Hildesheim, Germany

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## ABSTRACT

The use of questionnaires to measure two facets of mindfulness, 'regulation of attention' and 'non-judgmental orientation,' has been criticized. Furthermore, the assumption that depressed individuals show deficits in both facets has not yet been proven. In an attempt to minimize several biases associated with mindfulness questionnaires, we asked 43 currently depressed and 36 never-depressed participants to observe their breathing. The 'regulation of attention' facet of mindfulness was measured by the number of times participants' focus drifted off of their breathing. The 'non-judgmental orientation' facet was assessed using skin conductance response (SCR) and corrugator activity measured by electromyography (EMG), as indicators associated with arousal and negative emotions following drifting, and also by a self-report questionnaire. Depressed patients showed deficits in both facets of mindfulness. Specifically, compared to never-depressed controls, depressed patients drifted focus from their breathing more often, had significantly higher self-reported self-criticism, and displayed an increase in corrugator activity after drifting from breathing.

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## 1. Introduction

Mindfulness has attracted attention in the domains of basic emotion research, clinical science, and social-cognitive-affective neuroscience (Goldin & Gross, 2010). Research using various methodological approaches has shown that mindfulness is associated with psychological well-being (Keng, Smoski, & Robins, 2011; Ortner, Kilner, & Zelazo, 2007). Indeed, training in mindfulness has been integrated into psychological treatment approaches for various psychological and physical disorders (Keng et al., 2011).

Bishop et al. (2004) proposed a two-component model of mindfulness. The first component involves the self-regulation of attention so that it is focused on experiencing the present moment. This facet of mindfulness is often described as a feeling of being fully alive and present in the moment and is therefore referred to as 'being modus'. Instead of engaging in rumination or elaborative

thoughts about one's own experiences, people practicing mindfulness directly experience of the present moment, which allows for an increased perception of experiences in the here-and-now. Henceforth, this component of mindfulness will be referred to as 'Regulation of Attention'. The second component of mindfulness, 'Non-judgmental Orientation' (Baer, 2003), begins with the decision to adopt an attitude of curiosity and openness toward the objects of the present moment experience and an attitude of acceptance toward each moment of one's own experience, regardless of valence or desirability. Here, acceptance is defined as being experientially open to the reality of the present moment (Roemer & Orsillo, 2002). This orientation is also of central importance in formal mindfulness exercises (e.g., breathing meditation) to redirect the mind. Indeed, the majority of mindfulness teachers and therapists stress the importance of refocusing on the present moment in a gentle and non-judgmental way after the mind has wandered (Kabat-Zinn, 1990; Segal, Williams, & Teasdale, 2013).

In recent years, mindfulness training has been used especially for the treatment of depression. For example, Mindfulness-Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002, 2013), an intensive eight week program that teaches mindfulness skills, helps patients break vicious cycles of dysphoric mood and negative ruminative thinking and can significantly reduce the risk of relapse

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\* Corresponding author at: Institute of Psychology, Department of Clinical Psychology, Marienburger Platz 22, 31131 Hildesheim, Germany.  
Tel.: +49 05121 883 10964.

E-mail addresses: [rohdek@uni-hildesheim.de](mailto:rohdek@uni-hildesheim.de), [Katharina.Rohde@yahoo.de](mailto:Katharina.Rohde@yahoo.de) (K. Rohde).

(Piet & Hougaard, 2011) and depressive symptoms (Hofmann, Sawyer, Witt, & Oh, 2010).

Although clinical evidence supporting the role of mindfulness in the treatment of depression is encouraging, there has been no comprehensive empirical examination of the basic theoretical assumptions of these approaches. Specifically, there are no studies that directly assess whether deficits in mindfulness are present in clinically depressed individuals. Furthermore, while there are a few studies that have linked mindfulness and depression in non-clinical populations, these studies almost exclusively used questionnaires to assess mindfulness (e.g., Lykens & Baer, 2009; Stroehle, Nachtigall, Michalak, & Heidenreich, 2010). However, using questionnaires to assess mindfulness has been criticized for several reasons (Grossman, 2008, 2011; Grossman & Van Dam, 2011). In addition to the general problems related to the use of questionnaires, such as social desirability bias, acquiescence, and varying response styles (Cohen, Swerdlik, & Sturman, 2013), particular problems arise when using questionnaires to assess mindfulness. One of the critical issues is the differences in respondents' semantic understanding of scale items, which is dependent on personal mindfulness practice. The same item may be understood differently by people who have a good understanding of mindfulness practices and those who do not (Belzer et al., 2013). Accordingly, Baer, Smith, Hopkins, Krietemeyer, and Toney (2006) found different factor structures of their Five Facet Mindfulness Questionnaire (FFMQ) depending on the mindfulness experience of the participants in the sample. Another critical issue is the potential for significant discrepancies between self-ratings of mindfulness and actual mindfulness. It is thus important to develop alternative approaches that reduce at least some of the biases found in questionnaires.

Burg and Michalak (2011) employed a task that is based on one of the most central mindfulness exercises (e.g., breathing meditation) to assess mindfulness without using questionnaires. During the Mindful-Breathing Exercise (MBE), participants were instructed to observe their breathing for approximately 18 min while auditory signals sounded occasionally at varying points of time. Participants were asked to indicate via mouse click whether they were able to stay focused on their breathing since the last signal. If not, they were instructed to refocus their attention, in a non-judgmental or self-critical manner, to their breathing. Participants were also instructed to indicate when their attention had drifted separately from the auditory signal. The main outcome measure of the task was calculated as the sum of all phases in which the participant's mind did not wander. This measure is henceforth called the MBE score. Burg and Michalak (2011) found that MBE scores provided a complementary assessment of the regulation of attention. Psychometric properties of the MBE score have been proven. To examine the construct validity of MBE scores, correlations between MBE score and the Kentucky Inventory of Mindfulness Skills factors (KIMS; Baer, Smith, & Allen, 2004; German version: Stroehle et al., 2010) were reported. Moderately positive correlations were observed between the MBE score and the factors *acting with awareness* ( $r(42) = .37, p < .01$ ) and *accepting without judgment* ( $r(42) = .33, p < .05$ ) of the KIMS. These results indicate that although the MBE is associated with mindfulness assessed by questionnaire, the MBE assesses a considerable proportion of unique variance. To further examine the construct validity of the MBE score, the discriminant relationship between the MBE score and fear of bodily sensations was analyzed using the Body Sensations Questionnaire, or BSQ (Chambless, Caputo, Bright, & Gallagher, 1984; German version: Ehlers & Margraf, 1993). The BSQ was included to assure that the MBE score did not measure dysfunctional body-directed attention. A negative relationship was observed between these measures ( $r(42) = -.31, p < .05$ ): participants who were more fearful

of bodily sensations were less mindful during the MBE. Moreover, negative correlations were found between the MBE score and variables related to depression, such as rumination and depressive symptoms (Burg & Michalak, 2011), self-esteem stability (Burg & Michalak, 2012), and reduced heart rate variability (Burg, Wolf, & Michalak, 2012). It should be noted that the MBE, however, does not eliminate all ambiguities related to self-report measures and thus is not totally free of biases. (See below for a more elaborated discussion.) Moreover, one important limitation of previous studies using the MBE was that no direct measure of the non-judgmental orientation component of mindfulness was assessed. Furthermore, the results were based on non-clinical student populations.

To address the latter limitations, we developed a multi-method approach to assess the 'non-judgmental orientation' facet to investigate deficits in mindfulness in a sample of clinically depressed patients. As described above, signals sounded during the course of the MBE, and participants were instructed to indicate whether they were mindful at that moment. To assess the non-judgmental orientation facet, the reactions toward the signals (i.e., when the participants recognized whether they were mindful) were captured. The MBE instructor told participants to return non-judgmentally to breathing whenever they recognized that their attention had drifted. We aimed to assess the degree of a non-judgmental orientation when participants recognized their attention had drifted. Because currently depressed individuals tend to be self-critical, we expected that they were more likely to experience negative emotions after realizing their attention had drifted. To assess this negative emotional reaction, which is elicited when drifting is not regarded with a sense of acceptance, it is useful to measure the response of the corrugator supercillii muscle by electromyography (EMG). The activation of this muscle has been shown to be associated with negative affect. (For an overview, see Bradley, Codispoti, Cuthbert, & Lang, 2001.) A number of studies have shown that facial electromyographical measurements can gauge emotional experiences in response to various types of stimuli or situational experiences (Brown & Schwarz, 1980; Fridlund, Schwartz, & Fowler 1984; Jackson, Malmstadt, Larson, & Davidson, 2000). Furthermore, researchers have found that negative emotions, such as sadness (Hess, Kappas, McHugo, Lanzetta, & Kleck, 1992) and anger (Cacioppo, Petty, Losch, & Kim, 1986; Dimberg, 1990; Ekman, 1992; Jaecke, 1996; Lang, Greenwald, Bradley, & Hamm, 1993; Witvliet & Vrana, 1995), are associated with increased activity of the corrugator. In the present study, increased corrugator activity is interpreted in the context of negative emotional experience; therefore, we chose M. corrugator supercillii EMG to assess the non-judgmental experience component of mindfulness during the MBE auditory signal experiment.

In addition to the response of the corrugator muscle, we assessed the SCRs elicited by the auditory signals during the MBE. Skin conductance is especially sensitive to the emotional arousal triggered by a target stimulus and is thus ideally suited to assess the intensity of emotional engagement (e.g., Bradley et al., 2001). Like the corrugator response, the skin conductance response varies with cognitive appraisal. Driscoll, Tranel, and Anderson (2009) found that the instruction to enhance one's emotion in response to either positive or negative stimuli led to larger skin conductance responses than the instruction to decrease one's emotion. In combination with the corrugator EMG response, we are therefore able to assess the physiological parameters of both the valence component (more or less negative) and the arousal component (more or less aroused) of participants' emotional response following the auditory signal tones within both the drifted and mindful episodes. We hypothesized that currently depressed patients would show stronger increases in corrugator activity and SCR than never-depressed controls following drifting

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