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Induced ruminative and mindful attention in everyday life: An experimental ambulatory assessment study

Silke Huffziger [a,*], Ulrich Ebner-Priemer [b], Christina Eisenbach [a], Susanne Koudela [b], Iris Reinhard [d], Vera Zamoscik [c], Peter Kirsch [c], Christine Kuehner [a]

[a] Research Group Longitudinal and Intervention Research, Department of Psychiatry and Psychotherapy, Central Institute of Mental Health, Medical Faculty Mannheim/Heidelberg University, J5, 68159 Mannheim, Germany
[b] Department of Sport and Sport Science and House of Competence, Karlsruhe Institute of Technology, Engler-Bunte-Ring 15, 76131 Karlsruhe, Germany
[c] Department of Clinical Psychology, Central Institute of Mental Health, Medical Faculty Mannheim/Heidelberg University, J5, 68159 Mannheim, Germany
[d] Department of Biostatistics, Central Institute of Mental Health, Medical Faculty Mannheim/Heidelberg University, J5, 68159 Mannheim, Germany

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ABSTRACT

Background and objectives: Rumination has been proposed as a risk factor for depression, while mindful attention might be protective. Differential effects of these attention foci have so far only been examined in the laboratory. Therefore, we conducted an experimental ambulatory assessment study using ruminative and mindful attention inductions in everyday life to examine their effects in a natural context.
Methods: Fifty young adults carried palmtops over three weekdays (rumination induction day, mindful attention induction day, noninduction day; randomized cross-over design). Ten times a day, participants rated ruminative self-focus and mood. On the induction days, they were additionally subjected to 3-min inductions of ruminative or mindful attention at each assessment.
Results: The two induction modes exhibited differential immediate effects on ruminative self-focus and mood. While induced rumination immediately deteriorated valence and calmness, induced mindful attention specifically enhanced calmness. Depressive symptoms did not moderate these effects. While overall longer term effects of the inductions were missing, the mindful attention day was associated with slightly increasing positive valence over the day.
Limitations: The results need to be replicated in high-risk and patient samples to demonstrate the clinical significance of identified effects.
Conclusions: Results confirm the emotional relevance of rumination and mindful attention in real world settings. Future work may test whether adaptive attention-focusing instructions delivered in daily life can support clinical interventions.

1. Introduction

Mindfulness and rumination, two different forms of attention focusing, appear to differentially modulate the experience of negative affect and have been proposed as important emotion regulation strategies (Aldao, Nolen-Hoeksema, & Schweitzer, 2010; Kohl, Rief, & Glombiewski, 2012). Mindfulness – a quality originating from eastern meditative practices – has been described as an adaptive form of attention focusing that can be defined as purposefully paying attention to the present moment in an open-hearted way (Kabat-Zinn, 2003). Importantly, a mindful mode of processing involves refraining from judging one's experiences as good or bad and accepting unpleasant thoughts and feelings as transient phenomena. Intervention programs have incorporated mindfulness trainings to teach a functional way of regulating one's emotions (e.g., Segal, Williams, & Teasdale, 2002). Related research has revealed that mindfulness trainings effectively reduce depression (Hofmann, Sawyer, Witt, & Oh, 2010), enhance well-being in healthy individuals (Chiesa & Serretti, 2009), and increase equanimity and inner calmness (Farb, Anderson, & Segal, 2012). Other studies have addressed mindfulness as a naturally occurring trait or state. For example, ambulatory assessment (AA) studies, conducted in real life (Mehl & Conner, 2011; Trull & Ebner-Priemer, 2009), revealed that state mindfulness was associated with low negative affect (Brown & Ryan, 2003), and that mind wandering – an indirect inverse measure of mindfulness – was a better predictor of

* Corresponding author. Tel.: +49 621 1703 6058; fax: +49 621 1703 1205.
E-mail address: silke.huffziger@zi-mannheim.de (S. Huffziger).

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future unhappiness than the momentary activity (Killingsworth & Gilbert, 2010).

In contrast to mindfulness, depressive rumination is supposed to represent a dysfunctional mode of self-focused attention. According to the Response Styles Theory (RST, Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), rumination is defined as repetitively focusing on one's symptoms of distress, and their possible causes and consequences. Rumination is supposed to prolong and exacerbate depressed moods, which has been confirmed in experimental studies with dysphoric and depressed individuals (e.g., Kuehner, Holzhauer, & Huffziger, 2007; Kuehner, Huffziger, & Liebsch, 2009). Longitudinal studies revealed that trait rumination predicted higher future depressive symptom levels, particularly in nonclinical samples (Huffziger, Reinhard, & Kuehner, 2009; Nolen-Hoeksema, 2000). Furthermore, some studies observed reduced trait rumination after mindfulness interventions (Jain et al., 2007; Shahar, Britton, Sbarra, Figueredo, & Bootzin, 2010; Van Aalderen et al., 2012).

A recent body of research has compared effects of short periods of ruminative and mindful attention that have been experimentally induced in the laboratory (e.g., using instructions to adopt a specific attention focus). These studies demonstrated that ruminative and mindful attention exhibited differential effects on cognitive and emotional variables (for a summary see Keng, Smoski, & Robins, 2011). Specifically, in contrast to induced rumination, induced mindful attention exhibited positive mood effects (Huffziger & Kuehner, 2009; Sauer & Baer, 2011; Singer & Dobson, 2007; for nonsignificant effects see Rood, Roelofs, Bögels, & Arntz, 2012), reduced dysfunctional attitudes (Kuehner et al., 2009), and increased the willingness to tolerate distress (Sauer & Baer, 2011). Furthermore, induced mindfulness appears to particularly increase positive affect (Erisman & Roemer, 2010), to successfully reduce prompted state rumination (Hilt & Pollak, 2012), and to have beneficial effects on approach behavior in spider fear (Hooper, Davies, Davies, & McHugh, 2011). Importantly, these laboratory studies provide insight into specific causal effects of rumination and mindfulness under standardized controlled conditions and confirm the internal validity of these two modes of attention focusing.

However, laboratory contexts do not resemble everyday life, thus the ecological validity of identified effects remains unclear. On the one hand, everyday life contexts might provide more distractions which could restrict participants' concentration on the experimental inductions and therefore dampen the identified effects. On the other hand, attention inductions could stimulate stronger effects in everyday life than in artificial environments; since due to the occurrence of real stressors, specific attention focusing in natural contexts might entail more realistic, personally relevant consequences. To better understand the cognitive and emotional responses to ruminative and mindful attention focusing in real life, experimental AA studies that combine the internal validity of laboratory studies with the external validity of AA studies are warranted. Few studies have applied such designs so far (e.g., Chapman, Rosenthal, & Leung, 2009; Roelofs, Peters, Patijn, Schouten, & Vlaeyen, 2006), but not within the context of self-focused attention and depression. For example, Chapman et al. (2009) manipulated emotion suppression in the daily lives of participants with high and low Borderline Personality Disorder features, and Roelofs et al. (2006) manipulated attention to pain in chronic pain patients. However, the results of both studies were in contrast to expectations and laboratory findings, with emotion suppression being linked to higher positive emotions and attention manipulations not influencing pain intensity in daily life. This indicates that it might not be straightforward to transfer laboratory results to natural contexts.

By using an experimental AA approach, we recently transferred the internationally applied rumination induction paradigm by Nolen-Hoeksema (1991) to daily life and found that repeated rumination inductions during the day immediately increased ruminative self-focus and impaired momentary mood (Huffziger, Ebner-Priemer, Koudela, Reinhard, & Kuehner, 2012), thereby demonstrating the generalizability of laboratory results on induced rumination. The present study aims to extend this approach by investigating possible *differential effects* of induced rumination and mindful attention foci in daily life in a new sample, where we transferred a study protocol for both rumination and mindfulness inductions that has previously been validated in the laboratory (Huffziger & Kuehner, 2009; Kuehner et al., 2009).

The present study has three aims. First, we investigated possible differential immediate effects of the two induction modes of rumination and mindful attention. We expected that rumination inductions would immediately increase ruminative self-focus and decrease mood, while mindful attention inductions would have immediate positive effects on these outcomes, that is, decrease ruminative self-focus and increase positive mood (valence, calmness). Second, we assessed whether depression levels would moderate these immediate effects, assuming that both induction modes would have stronger effects in more depressed individuals (Keng et al., 2011; Nolen-Hoeksema et al., 2008). And third, we investigated whether repeated rumination and mindful attention inductions would also influence *more distant* affective and cognitive states during the following hours on the respective induction day.

2. Methods

2.1. Participants

Participants were 50 undergraduates from the University of Mannheim, Germany. The sample comprised 20 men and 30 women aged 19–31 ($M = 22.9$, $SD = 3.3$) who were recruited by an electronic mailing list. Participants were consecutively included if they could adhere to the study protocol, without further exclusion criteria. The mean score for depressive symptoms on the Beck Depression Inventory-II was 7.8 ($SD = 6.7$, Range 0–26; nondepressed $n = 30$, minimal depression $n = 10$, mild depression $n = 6$, moderate depression $n = 4$ according to criteria by Hautzinger, Keller, & Kuehner, 2006). Participants gave written informed consent and were paid 40 € for participation. The study was conducted in accordance with the declaration of Helsinki and approved by the local ethics committee of the University of Heidelberg.

2.2. Ambulatory assessment (AA)

AA took place on three consecutive weekdays using PDAs (Palm Tungsten E2, Palm Inc.). There were ten assessments over a 12-h sampling period per day, starting at 8 a.m. Assessments were signaled by a beep, with an interval length between assessments of 80 min. Participants could delay assessments by up to 15 min, therefore intervals actually varied between 65 and 95 min. Of the three assessment days, one day included repeated rumination inductions (rumination day = rum-day), one day repeated mindful attention inductions (mindful attention day = mf-day), and one day was a noninduction day (noninduction day). At each beep, participants rated the extent of momentary ruminative self-focus and mood. On the induction days, there was a subsequent 3-min induction of either rumination (rum-day) or mindful attention (mf-day) which was followed by a