Induced rumination in everyday life: Advancing research approaches to study rumination

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ABSTRACT

Rumination has been proposed as an important cognitive risk factor for depressive states. Experimental studies in the laboratory have demonstrated negative effects of induced rumination on mood and cognition. However, it is not known whether respective effects can also be generalized to naturalistic contexts. Therefore, the present study transferred rumination inductions to daily life within a novel experimental ambulatory assessment approach. Forty young adults carried palmtop computers for 2 days with ten assessments of momentary ruminative self-focus and mood per day. On one of the 2 days (induction day), participants were subjected to 3-min rumination inductions at each assessment (cross-over design). Analyses revealed that the rumination inductions immediately increased momentary ruminative self-focus and deteriorated positive mood. Higher increases in ruminative self-focus after inductions were linked to stronger reductions in positive mood. Momentary preinduction ruminative self-focus and mood on the induction day did not differ from momentary ruminative self-focus and mood on the noninduction day, indicating a lack of significant longer-term effects over the day. This is the first study revealing immediate effects of induced rumination in daily life, thereby assuring external validity of previous laboratory findings. Future studies could extend this induction approach to further dysfunctional and functional attention foci.

1. Introduction

Specific forms of repetitive thought, such as rumination, have been identified as critical for mood-related problems (Watkins, 2008). According to the Response Styles Theory (RST; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), rumination has been described as a dysfunctional mode of self-focused attention that implies repetitively focusing on one's negative emotional state and on related causes and consequences. The RST supposes that rumination predicts, maintains, and exacerbates dysphoric and depressive states by activating negative associative memory networks, interfering with attention and instrumental behaviour, impairing problem solving, and by negatively impacting on social support networks.

To date, empirical findings on depressive rumination mainly fall into two categories. First, laboratory studies assessed the effects of experimentally induced rumination and consistently identified that under standardized conditions, rumination prolonged or intensified negative mood and impaired cognitive processes (Huffziger & Kuehner, 2009; Kuehner, Holzhauer, & Huffziger, 2007; Kuehner, Huffziger, & Liebsch, 2009; Lyubomirsky, Kasri, & Zehm, 2003; Philippot & Brutoux, 2008). These negative effects particularly emerged in more dysphoric participants or after negative mood induction in both clinical and nonclinical samples. Second, results from longitudinal observational studies have shown that trait rumination, assessed by questionnaires, predicted future depressive symptoms, particularly in nonclinical samples (Huffziger, Reinhard, & Kuehner, 2009; Kuehner & Weber, 1999; Nolen-Hoeksema, 2000).

In contrast to the broad range of laboratory and questionnaire studies, information on momentary rumination in daily life is still very limited. Such information is collected with research methods for studying daily life (Mehl & Conner, 2011), also called ambulatory assessment (AA; Fahrenberg, Myrtek, Pawlik, & Perrez, 2007). These methods measure the variables of interest directly in real life, ideally using electronic devices (Trull & Ebner-Priemer, 2009). There are first AA studies that have investigated naturally occurring rumination in everyday contexts. Siewert, Kubiak, Jonas,

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and Weber (2011) assessed anger-associated rumination and found that individuals with higher trait anger reported impaired social well-being after hostile ruminations. Looking at momentary rumination within the framework of the RST, Moberly and Watkins (2008) identified concurrent and prospective relations between ruminative self-focus and negative affect in daily life. Takano and Tanno (2011) found that momentary rumination was linked to particularly high negative affect when thoughts were perceived as uncontrollable and unpleasant.

Along the lines of a novel research approach, AA can also be used to realize experimental manipulations in everyday life. On the one hand, this enables researchers to establish specific manipulations that need naturalistic contexts, such as investigating the effects of scheduled smoking compared to uncontrolled smoking (Catley & Grobe, 2008). On the other hand, experimental AA designs make it possible to transfer laboratory paradigms such as specific affective or cognitive tasks to a real life context. Using adequate devices that directly provide respective experimental stimuli, researchers can thus examine whether experimental effects identified in the laboratory are generalizable to real life. Within an AA design, first studies have applied Stroop tests (Waters & Li, 2008), the Implicit Association Test (Waters, Miller, & Li, 2010), and cue-reaction paradigms with smoking stimuli (Wray, Godleski, & Tiffany, 2011). Importantly, these experimental AA procedures effectively combine the internal validity of experimental studies normally performed in the laboratory with the ecological validity of AA. Although such designs seem to be capable of vastly broadening the relevance of previous identified laboratory results, they have only rarely been used (for further exceptions see Chapman, Rosenthal, & Leung, 2009; Roelofs, Peters, Patijn, Schouten, & Vlaeyen, 2006).

Within the RST context, numerous laboratory studies applied an internationally used rumination induction paradigm that asks participants to focus their attention on a series of ruminative statements (Nolen-Hoeksema et al., 2008). However, it has never been checked whether findings obtained with this task in artificial laboratory contexts also emerge in real life. That is, we do not know whether rumination manipulations are able to affect mood and cognitions under real life conditions. Furthermore, previous laboratory studies only investigated immediate effects of single phases of induced rumination and have not reported any longer-term effects. Nevertheless, it is possible that rumination inductions do not only influence immediate responses directly following an induction, but also more distant affective and cognitive states during the following hours. Such longer-term or cumulative effects might particularly occur when applying repeated inductions, which also more closely resemble "natural rumination" than single phase inductions in the laboratory.

Therefore, for the first time, the present study implemented repeated rumination inductions within AA. We used the standard laboratory rumination task with a shorter duration and less statements. Our experimental AA study had three major aims. First, we examined immediate effects of repeated rumination inductions and expected that – in line with previous laboratory results – rumination inductions would immediately increase momentary ruminative self-focus and deteriorate momentary mood (Nolen-Hoeksema et al., 2008). A second aim was to examine whether depressive symptom levels would moderate immediate effects of the rumination inductions. Consistent with previous laboratory studies, we expected that higher depressive symptom levels would enhance the immediate induction effects. Our third aim was to investigate whether rumination inductions would also exhibit longer-term effects on subsequent measures of ruminative self-focus and mood.

2. Method

2.1. Participants

Participants were 20 men and 20 women aged 18–27 ($M = 22.7$, $SD = 2.1$). They represented a subsample of a representative community sample of 120 young adults, who had originally been recruited from the general population of Mannheim, Germany, to take part in a larger study on response styles (Kuehner & Huffziger, 2010). Of the present sample, 22.5% were high-school students, 35% were university students, 32.5% were working full- or part-time, and 10% were not working due to several reasons. The mean score for depressive symptoms on the Beck Depression Inventory (BDI-II) was 6.6 ($SD = 6.6$). Participants gave written informed consent and were paid 40 € for participation. The study was conducted in accordance with the declaration of Helsinki and had been approved by the local ethics committee of the University of Heidelberg.

2.2. Ambulatory assessment (AA)

The AA was conducted with personal digital assistants (PDAs, Palm Tungsten E2, Palm Inc.). It took place on two consecutive weekend days with ten assessments over a 12-h sampling period per day. Participants chose an individual starting time (8, 9 or 10 a.m.). Each assessment was signalled by a beep and programmed to occur 80 min after the previous one. Participants were not informed about sampling times or intervals. As assessments could be delayed by up to 15 min, the time intervals between assessments varied between 65 and 95 min, resulting in hardly predictable sampling points. The procedure was implemented using IzyBuilder software (IzyData Ltd., Fribourg, CH).

At each beep, participants were requested to rate the extent of momentary ruminative self-focus and mood. On one of the 2 days (induction day), 3 min rumination inductions were presented after the initial ratings at each of the ten assessments. After termination of the inductions, there was a second rating of momentary ruminative self-focus and mood to assess respective changes associated with the inductions (postinduction ratings). Stratifying for gender, participants were randomly assigned to either begin with the induction or the noninduction day (cross-over design).

2.2.1. Measures

To measure *momentary ruminative self-focus* we used the two items "At the moment, I am thinking about my feelings" and "At the moment, I am thinking about my problems", for which a mean score was calculated (Moberly & Watkins, 2008). Items were rated on a scale from 0 (not at all) to 7 (very much). Based on a three-level random effects model with items at level 1, assessments at level 2, and persons at level 3 calculated with HLM 7 (SSI Inc.), we retrieved a within-person reliability coefficient of .54 for the preinduction scores.

To measure *momentary mood*, we applied a short scale with six bipolar items explicitly recommended for use in AA research (Wilhelm & Schoebi, 2007). The scale comprises three 2-item factors "valence", "calmness", and "energetic arousal", of which valence and calmness were in the focus of the present analyses. Participants were asked to rate how they feel at the present moment by means of the following items: "content-discontent" (valence), "agitated-calm" (calmness), "unwell-well" (valence) and "relaxed-tense" (calmness). Item scores ranged from 0 to 6. Higher scores indicated more positive valence or more calmness. In the present sample, we retrieved within-person reliability coefficients of .66 for preinduction valence and .56 for preinduction calmness.