

**Rumination About Obsessive Symptoms and Mood Maintains Obsessive-Compulsive
Symptoms and Depressed Mood: An Experimental Study**

Karina Wahl¹, Marcel van den Hout², Carlotta V. Heinzl¹, Martin Kollárik¹, Andrea Meyer¹,
Charles Benoy³, Götz Berberich⁴, Katharina Domschke^{5,6}, Andrew Gloster⁷, Gassan
Gradwohl⁸, Maria Hofecker⁸, Andreas Jähne⁹, Stefan Koch¹⁰, Anne Katrin Külz⁵, Franz
Moggi¹¹, Christine Poppe¹², Andreas Riedel^{5,6}, Michael Rufer¹³, Christian Stierle¹⁴, Ulrich
Voderholzer^{5, 10, 15}, Sebastian Walther¹¹, and Roselind Lieb¹

¹Department of Psychology, Division of Clinical Psychology and Epidemiology, University
of Basel

²Faculty of Social and Behavioural Sciences, Department of Clinical Psychology, Utrecht
University Utrecht University

³Center for Psychosomatics and Psychotherapy, University Psychiatric Clinics Basel

⁴Clinic for Psychosomatic Medicine, Windach

⁵ Department of Psychiatry and Psychotherapy, Medical Center – University of Freiburg,
Faculty of Medicine, University of Freiburg, Freiburg

⁶Center for Basics in NeuroModulation, Faculty of Medicine, University of Freiburg

⁷Department of Psychology, Division of Clinical Psychology and Intervention Science,
University of Basel

⁸Private practice for psychotherapy, Basel

⁹Oberberg Clinic Rhein-Jura, Bad Säckingen

¹⁰ Schoen Clinic Roseneck, Prien am Chiemsee

¹¹ Translational Research Center, University Hospital of Psychiatry and Psychotherapy,
University of Bern

¹² Center of Psychiatry, Appenzell

¹³ Department of Psychiatry, Psychotherapy and Psychosomatics, Psychiatric Hospital Zurich,
University of Zurich

¹⁴ IUBH Internationale Hochschule, Hannover

¹⁵ Department of Psychiatry and Psychotherapy, Ludwig Maximilian University Munich

Author Note

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Correspondence concerning this article should be addressed to Karina Wahl, University of Basel, Department of Psychology, Division of Clinical Psychology and Epidemiology, Missionsstr. 62a, 4055 Basel, Switzerland. Email: karina.wahl@unibas.ch

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Abstract

Rumination is common in individuals diagnosed with obsessive-compulsive disorder (OCD). We sought to clarify the causal role of rumination in the immediate and intermediate maintenance of obsessive-compulsive symptoms and depressed mood. One hundred forty-five individuals diagnosed with OCD were asked to read aloud their most distressing obsessive thought (OT). OT activation was followed by a thought-monitoring phase in which frequency of the OT was assessed. Participants were randomly allocated to one of three experimental conditions: rumination about obsessive-compulsive symptoms, rumination about mood, or distraction. Ratings of distress, urge to neutralize, and depressed mood and frequency ratings of the OTs were taken before and after the experimental manipulation. Obsessive-compulsive symptom severity and affect were assessed 2, 4, and 24 hr after the laboratory experiment using ecological momentary assessment. Compared to distraction, both types of rumination resulted in an immediate reduced decline of distress, urge to neutralize, depressed mood, and frequency of OTs, with medium to large effect sizes. Rumination about obsessive-compulsive symptoms did not have a stronger immediate effect than rumination about mood. Rumination about obsessive-compulsive symptoms increased obsessive-compulsive symptom severity and reduced positive affect compared to rumination about mood 24 hr later. Regarding negative affect, there was no difference in effect between the two types of rumination in the intermediate term. To conclude, rumination in OCD has an immediate and intermediate maintaining effect on obsessive-compulsive symptoms and mood and may require additional psychological interventions that supplement cognitive behavioral therapy.

Keywords. unwanted intrusive thoughts, obsessive-compulsive disorder (OCD), rumination, experimental studies

General Scientific Summary

Results suggest that in individuals diagnosed with obsessive-compulsive disorder, ruminations about the symptoms and about mood maintained distress associated with an obsessive thought, frequency of the obsessive thought, urge to neutralize, and depressed mood. The impact of rumination was particularly strong for distress and depressed mood, and the causal effects of rumination about obsessive-compulsive symptoms were present 24 hr later.

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Repugnant, unacceptable intrusive thoughts, images, or impulses (obsessions) and impairing, repetitive responses (compulsions) characterize obsessive-compulsive disorder (OCD; American Psychiatric Association, 2013). Various manifestations of compulsions include behavioral (e.g., washing, checking) and mental (e.g., counting, thinking thoughts in a particular order) rituals (e.g., Williams et al., 2011). In addition to mental compulsions, which can be conceptualized as *OCD-inherent* rumination, *rumination about the obsessive-compulsive (OC) symptoms* is also typical in individuals diagnosed with OCD (Heinzel et al., 2020). To illustrate, the obsessive thought (OT) “I could have inadvertently run over a pedestrian while driving” might not only result in elaborate mental reconstructions of the last driving situation to make sure that nothing terrible had happened (mental compulsion) but also initiate ruminative thoughts about the causes, meanings, and consequences of the OT and the mental compulsions, such as “Why is it me who has these thoughts?”

For a variety of mental disorders, though not for OCD, there is sound empirical evidence from longitudinal and experimental studies that being trapped in rumination about one’s symptoms, their causes, and consequences is an aversive state that can result in the worsening and prolongation of these symptoms (for a review, see Watkins & Roberts, 2020). These results suggest that rumination is a transdiagnostic process (Ehring & Watkins, 2008).

No experimental studies have directly evaluated the potential causal role of disorder-specific rumination in the immediate and intermediate maintenance of OC symptoms, but two recently published experimental studies took an analogue approach. They considered unwanted intrusive thoughts (UITs) as analogues to OTs and investigated whether rumination about UITs had an immediate effect on a subsequent urge to neutralize and distress (Kollárik et al., 2020; Wahl et al., 2019). Wahl et al. (2019) distinguished rumination with a focus on UITs from rumination with a focus on current mood and related phenomena such as

motivation (in the original sense of the paradigm developed by Nolen-Hoeksema et al., 2008). They demonstrated that the urge to neutralize generally declined over time, but in contrast to rumination about mood or distraction, rumination about a UIT attenuated the decline, that is, had a maintaining effect on the UIT. Using a similar design, Kollárik et al. replicated the effect of rumination about UITs on urge to neutralize in an independent sample. However, while Wahl et al. (2019) did not demonstrate an effect of rumination about mood on this outcome, Kollárik et al. found that rumination about mood also attenuated the general decline in the urge to neutralize compared to distraction. In addition, and in contrast to Wahl et al. (2019), in Kollárik et al.'s study, rumination (both types) affected not only the urge to neutralize but also distress, and rumination about mood additionally affected depressed mood.

Different ideas about the underlying mechanisms of how rumination might affect OC symptoms have been proposed. Rumination might primarily prolong dysphoric mood in OCD. Since dysphoric mood increases the occurrences of OTs (Reynolds & Salkovskis, 1992) this mechanism might also eventually increase OC symptoms. In contrast to this affective pathway, rumination about OC symptoms could additionally reinforce the misinterpretation of the OT (Raines et al., 2017), and a higher conviction in the misinterpretation could subsequently result in the maintenance of distress and urge to act upon it (Wahl et al., 2019). Thus, rumination about OC symptoms—that possibly stimulates affective *and* cognitive pathways at the same time—might have an impact that goes beyond the effects of rumination with an exclusive focus on mood.

The results from the two analogue studies (Kollárik et al., 2020; Wahl et al., 2019) suggest that rumination about OC symptoms and mood may play a causal role in the maintenance of OC symptoms and depressed mood. We aimed to clarify for the first time the causal role of rumination in the immediate and intermediate maintenance of OC symptoms and depressed mood in individuals with OCD, using a rigorous experimental design. Given the inconsistent findings about the differential effects of the focus of rumination in previous

studies, we kept the distinction and induced rumination with two different foci: rumination about OC symptoms and rumination about mood.

The main research question was whether rumination differs from distraction in the maintenance of OC symptoms and depressed mood. Given that this is the first experimental study to test this, we decided to first analyze the rumination groups together to maximize the chances of finding any effects of rumination compared to distraction. Considering the combined findings of the previous studies (Kollárik et al., 2020; Wahl et al., 2019), we hypothesized that individuals who ruminated would experience a smaller reduction in distress (Hypothesis 1a), urge to neutralize (Hypothesis 1b), and depressed mood (Hypothesis 1c) compared to individuals who were distracted. We also predicted that rumination would result in a smaller decrease in OT frequency compared to distraction (Hypothesis 2).

The second research question was whether rumination with a focus on OC symptoms has an effect beyond the effects of rumination with a focus on mood. We predicted that individuals who ruminated on OC symptoms would experience a smaller decrease in distress (Hypothesis 3a), urge to neutralize (Hypothesis 3b), depressed mood (Hypothesis 3c), and frequency of OTs (Hypothesis 4) than those who ruminated with an exclusive focus on mood.

Additionally, we investigated the intermediate effects of rumination in a 24-hr period following the laboratory experiment. Hypotheses, methods, statistical analyses, results and discussion of these effects are presented in an online supplement.

Method

Participants

Potential participants were recruited at eight in- and outpatient clinics specializing in treating OCD in Switzerland and Germany and from a self-help group (Swiss Society for OCD). One hundred forty-five participants diagnosed with OCD met the inclusion criteria (see online supplement) and were randomly allocated to one of the three experimental groups:

rumination about OC symptoms (RumOCD, $n = 48$), rumination about mood (RumMood, $n = 50$), and distraction ($n = 47$).

Measures

Standardized Questionnaires and Interviews

The Structured Clinical Interview for Mental Disorders (SCID; German version: Wittchen et al., 1997) was administered to assess diagnoses, the Yale–Brown Obsessive-Compulsive Scale (Y-BOCS; German version: Hand & Büttner-Westphal, 1991) and the Obsessive-Compulsive Inventory Revised (OCI-R; German version: Gönner et al., 2008) to measure OC symptom severity, the Beck’s Depression Inventory (BDI-II; German version: Hautzinger et al., 2006) to assess depressive symptoms, and the Positive Negative Affect Scale (PANAS; German version: Krohne et al., 1996) to assess positive and negative state affect.

Two subscales of the Response Style Questionnaire (RSQ; German version: Bürger & Kühner, 2007) were used to assess trait rumination: Symptom-Focused Rumination (eight items), representing rumination focused on symptoms of depression and its consequences, and Self-Focused Rumination (seven items), representing rumination focused on the self, including self-analysis, reflection, and dwelling on the past (Bürger & Kühner, 2007). The internal consistency was found to be good for symptom-focused rumination and acceptable for self-focused rumination (Bürger & Kühner, 2007).

Other Measures

Participants rated their current distress, urge to neutralize, and depressed mood using a 10-point Likert-type scale ranging from 0 (*not at all*) to 9 (*very much so*). The urge to neutralize was defined as the extent to which participants had the urge to engage in various behaviors to undo the obsessive thought, neutralize it, or reduce the associated distress.

The frequency of OTs during baseline and return to baseline was assessed with a counter app (Click-Counter; FunCoolApps, 2016) on a smartphone. Participants were

instructed to press the “+” button whenever an OT occurred. The display was covered to prevent participants from seeing the number.

Procedure

All participants provided informed consent prior to participation and were tested individually, seated at a table facing a computer. The procedure is depicted in Figure 1. Upon arrival (T0), participants completed standardized measures of state affect (PANAS), severity of OC symptoms (OCI-R), severity of depressive symptoms (BDI-II), and trait ruminative thinking (RSQ) using the online tool LimeSurvey (Questback, 2013). We then activated the OT.

Activation of the OT

As part of the study assessment prior to the experiment, an OT that would likely cause distress when spoken aloud was identified and written down by the experimenter on a sheet of paper. Participant and experimenter together elaborated on the feared consequences of the OT and the experimenter also recorded the consequences on the paper, resulting in a short written piece of one to three sentences. Participants were subsequently asked to read the written piece aloud and immediately after to rate their current distress, urge to neutralize, and depressed mood (T1).

Thought-Monitoring Instructions

OT activation was followed by a 5-min baseline period, in which participants were asked to think about whatever they wanted and to record the occurrence of the activated OT using a counter app. They were provided with a smartphone and instructed to record the occurrence of each OT by pressing the “+” key on the smartphone once for each occurrence in the next 5 min (instructions adapted from Marcks & Woods, 2005).

Immediately after this baseline monitoring, self-ratings of distress, urge to neutralize, and depressed mood were made again (T2). Participants were subsequently asked to follow

one of three sets of statements provided on the computer screen: (a) rumination about OC symptoms, (b) rumination about mood, or (c) distraction, depending on random allocation.

Experimental Manipulation

Twenty-eight statements were presented to each participant. We tried to keep the wording of the statements as similar as possible across the three groups. For the RumOCD group, the statements were a modified version of a widely used paradigm for mood rumination (e.g., Morrow & Nolen-Hoeksema, 1990). The statements were modified such that the original references to mood or mental state were replaced by obsessions and compulsions (e.g., “*Think about: what would happen if your current mental state persisted*” was replaced with “*Think about: what would happen if your obsessions and compulsions persisted*”) or obsessions and compulsions were added to the original statements (e.g., “*Think about: how passive or active you feel because of your obsessions and compulsions*”). In this way, references to the current mood state were obtained, but the main focus was on OC symptoms. For the RumMood group, the 28 original statements prompting rumination about the causes, consequences, and meaning of the current mood state and typically related depressive symptoms (e.g., “*Think about: how passive or active you feel*”) were used (Morrow & Nolen-Hoeksema, 1990). RumMood and RumOCD had an identical number of statements referring to mood/symptoms, consequences, and meanings of the mood/symptoms. The original distraction statements developed by Nolen-Hoeksema and colleagues (Morrow & Nolen-Hoeksema, 1990), focusing on neutral images (e.g., “*Think about: the shadow of a stop sign*”) were used for the distraction group.

The statements for all groups were presented as PowerPoint slides and participants had 8 min in which to view the set. They were told to concentrate on each statement for as long as they wanted and were encouraged to move through the slides in their own time. They could navigate back and forth through the set using the mouse. Self-ratings of distress, urge to neutralize, and depressed mood and the PANAS were administered at the end of the

experimental manipulation (T3) and participants were subsequently asked to monitor their thoughts for a second 5-min period (return to baseline), following the thought-monitoring instructions as before. At the end of this phase (T4), participants completed the self-ratings again, and the manipulation checks were completed. Participants were fully debriefed and received pro rata monetary compensation for their time after the follow-up period.

Statistical Analyses

A priori power calculations (see online supplement) demonstrated that our study was sufficiently powered to replicate the previous immediate effects of rumination on the main outcome variables.

To test the effects of the experimental manipulation on the respective outcome variables, we investigated the changes from T2 to T3 with planned contrasts, since these are the crucial time points immediately before and after the experimental manipulation. We specified two orthogonal contrasts: For Hypotheses 1(a–c) and 2, we specified contrasts that compared the changes in the combined RumOCD/RumMood group with changes in the distraction group. For Hypotheses 3(a–c) and 4, we specified orthogonal contrasts that compared RumOCD with RumMood. Thus, we had eight analyses with two orthogonal contrasts each, ensuring that the family-wise error rate did not rise above .05 for each analysis. Results are reported as they appear in the hypotheses, not per analysis. Since symptom-focused rumination (RSQ: symptoms) and medication differed between groups, all planned contrasts were rerun with RSQ: symptoms or medication as a covariate, including their respective interaction with time, that is, the changes from T2 to T3, in supplementary analyses. Results did not differ from the analyses without covariates and for brevity, only the simpler models without covariates are reported. For effect sizes, we report partial eta-squared, η_p^2 . Following Cohen (1988), η_p^2 of .01 is considered small, .06 medium, and .14 large. Level of significance was set at $p < .05$.

Results

Participant characteristics and results of the manipulation checks are presented in the online supplement.

Immediate Effects of the Experimental Manipulation

Means and standard deviations of the experimental data, F statistics for the planned contrasts, and p and η_p^2 values are shown in Table 1. For consistency with previous studies (Kollárik et al., 2020; Wahl et al., 2019), we report means and standard deviations including T1 and T4 and show T1 and T4 in Figure 2.

RumOCD and RumMood Combined Versus Distraction

Distress (Hypothesis 1a), urge to neutralize (Hypothesis 1b), and depressed mood (Hypothesis 1c), declined to a smaller degree from T2 to T3 for RumOCD and RumMood combined compared to distraction (Figure 2A). Effect sizes were large for distress and depressed mood, and of medium size for urge to neutralize. Additionally, frequency of OTs (Hypothesis 2) declined to a smaller degree in RumOCD and RumMood combined compared to distraction, with a small to medium effect size.

RumOCD Versus RumMood

We did not find a smaller decrease in distress (Hypothesis 3a), urge to neutralize (Hypothesis 3b), depressed mood (Hypothesis 3c; Figure 2B), or frequency of OTs (Hypothesis 4) for RumOCD compared to RumMood.

Summary of the Intermediate Effects of the Experimental Manipulation

Neither for OC severity, nor negative affect, nor positive affect did we find differences in the combined linear change of RumOCD and RumMood from T5 to T7 compared to distraction. The linear trend of RumOCD differed from the linear trend of RumMood for OC severity and positive affect. For negative affect, we did not find a significant difference between the linear trends of RumOCD and RumMood (for all results: Supplemental Table 2, Supplemental Figure 2A and B).

Discussion

Rumination in OCD had an immediate maintaining effect on OC symptoms and depressed mood. In particular, rumination (both types combined) resulted in a smaller decrease in distress, urge to neutralize, and depressed mood than distraction. These findings replicate results in individuals without any known mental disorders (Kollárik et al., 2020; Wahl et al., 2019) and show that the effects of rumination can also be demonstrated in individuals with OCD. Effect sizes in individuals with OCD were comparable to or larger than those in undergraduates (Kollárik et al., 2020; Wahl et al., 2019) when we recalculated the undergraduate data using our contrasts, with the exception of urge to neutralize, which was smaller than in the Kollárik et al. (2020) study. The effect of rumination (both types combined) was also reflected in OT frequency. Individuals with OCD who ruminated showed a reduced decline in OT frequency compared to those who were distracted. This is the first time that the effects of rumination were reflected in OT frequency ratings, and these results substantiate the subjective ratings of OC symptoms. Overall, the replication of the effects of rumination attests to the robustness of the findings.

Contrary to expectations, rumination about OC symptoms did not have an immediate effect beyond the effects of rumination about mood on any of the investigated outcome variables. Hypotheses 3 and 4 were not supported. This is consistent with the idea that both types of rumination appear to exert their immediate effects with a predominantly affective underlying mechanism.

The distinction between rumination focused on mood and on OC symptoms was necessary to investigate potentially specific effects, but in real life, this distinction might be artificial. Individuals with OCD are likely to experience ruminations about OC symptoms and mood simultaneously in any one rumination episode, together with mental compulsions. Natural ruminative episodes in individuals with OCD can be excessively long (Abramowitz, 2002). Thus, we think the effects we obtained under laboratory conditions after 8 min of instructed ruminations with a particular focus are possibly an underestimation of the effects of

rumination in real-life situations. Future studies using ecological momentary assessments to investigate the time-lagged effects of rumination about OC symptoms and mood in everyday situations would be the logical next step to test the ecological validity of our findings.

The immediate effects of rumination on depressed mood were particularly strong, replicating robust findings of several previous experimental studies (e.g., Donaldson & Lam, 2004). The prolongation of depressed mood after rumination might help explain why 60%–80% of individuals with OCD experience a major depressive disorder in their lifetime (Adam et al., 2012) and why, in most cases, OCD precedes major depressive disorder (Zitterl et al., 2000).

Furthermore, individuals with OCD who experience frequent, and persistent ruminations might benefit from additional therapeutic strategies that supplement cognitive behavioral therapy (CBT), such as techniques that help individuals change the typically abstract mode of rumination into a more experiential and concrete mode, in line with suggestions by Watkins (2018), or practicing an observing, nonjudgmental, and accepting stand toward the occurrence of OC symptoms (Külz et al., 2019), or interpretation modification training (Hirsch et al., 2020).

Finally, our study raises interesting questions about the supposedly maladaptive function of distraction. In this study, distraction had short-term and intermediate adaptive effects. Results are consistent with a recent study that demonstrated that distraction does not prevent successful exposure and response prevention (Senn & Radomsky, 2018). In particular, moderate levels of distraction seemed beneficial in terms of self-efficacy and treatment acceptability (Senn & Radomsky, 2018).

This study is not without limitations. While the counter app method's psychometric properties were recently established (Wahl et al., 2020), it is unclear whether the method can account for lengthy chains of OTs, for which it might underestimate the experience of OTs. Randomization resulted in group differences regarding medication and trait rumination. To

estimate whether these possible confounders influenced results, we included them as covariates. Since none of the analyses differed from the analyses without covariates, it seems unlikely that the results can be accounted for by group differences in trait rumination or medication. We discussed two underlying mechanisms that seem plausible, but it should be noted that neither of these ideas was tested directly. Finally, we did not differentiate between different subtypes of OCD. This might be important in future studies to establish whether there is an interaction between the subtype of OCD and the type of rumination.

To conclude, rumination had an immediate causal effect on OC symptoms and depressed mood and additionally, an intermediate causal effect on OC symptoms and positive affect (see online supplement). Findings are consistent with the theory that rumination is a transdiagnostic process with possibly similar symptom-maintaining consequences across mental disorders (Ehring & Watkins, 2008). Given the robustness, broadness, and persistence of these effects in OCD, it seems warranted to supplement traditional CBT techniques for treating individuals with OCD—and in particular those tailored to the experience of mainly mental compulsions (e.g., Whittal et al., 2010)—with specific techniques to target unhelpful rumination if this is experienced frequently.

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Table 1

Means, Standard Deviations, F Statistics for Contrasts and Effect Sizes for Distress, Urge to Neutralize, Depressed Mood, and OT Frequency

Variable	Experimental group			Contrast	F	df	p	η_p^2
	RumOCD	RumMood	Distraction					
	<i>n</i> = 48 <i>M</i> (<i>SD</i>)	<i>n</i> = 46 <i>M</i> (<i>SD</i>)	<i>n</i> = 45 <i>M</i> (<i>SD</i>)					
Distress								
T1	6.25 (2.22)	6.65 (2.01)	6.29 (2.30)	1	19.90	1,136	< .001	.13
T2	5.85 (2.48)	5.67 (2.21)	5.56 (2.71)	2	0.51	1,136	.478	.004
T3	6.04 (2.51)	5.63 (2.52)	4.36 (2.69)					
T4	5.46 (2.67)	5.17 (2.69)	4.13 (2.76)					
Urge to neutralize								
T1	5.50 (2.95)	6.00 (2.36)	5.78 (2.43)	1	8.38	1,136	.004	.06
T2	5.56 (2.58)	5.02 (2.56)	5.31 (2.62)	2	0.43	1,136	.514	< .01
T3	5.52 (2.82)	4.70 (2.62)	4.02 (2.41)					
T4	5.17 (2.62)	4.54 (2.75)	3.93 (2.61)					
Depressed Mood								
T1	4.60 (2.72)	5.09 (2.53)	4.89 (2.52)	1	17.29	1,136	< .001	.11
T2	4.29 (2.71)	4.65 (2.73)	4.33 (2.64)	2	2.40	1,136	.123	.02
T3	5.17 (3.03)	5.07 (2.81)	3.89 (2.70)					
T4	4.38 (2.99)	4.67 (2.82)	3.33 (2.67)					
OT frequency ^a								
Baseline	20.81 (24.53)	12.98 (12.40)	23.78 (43.46)	1	4.86	1,127	.029	.04
Return to baseline	17.79 (23.28)	15.26 (14.36)	14.40 (22.19)	2	1.22	1,127	.272	.01

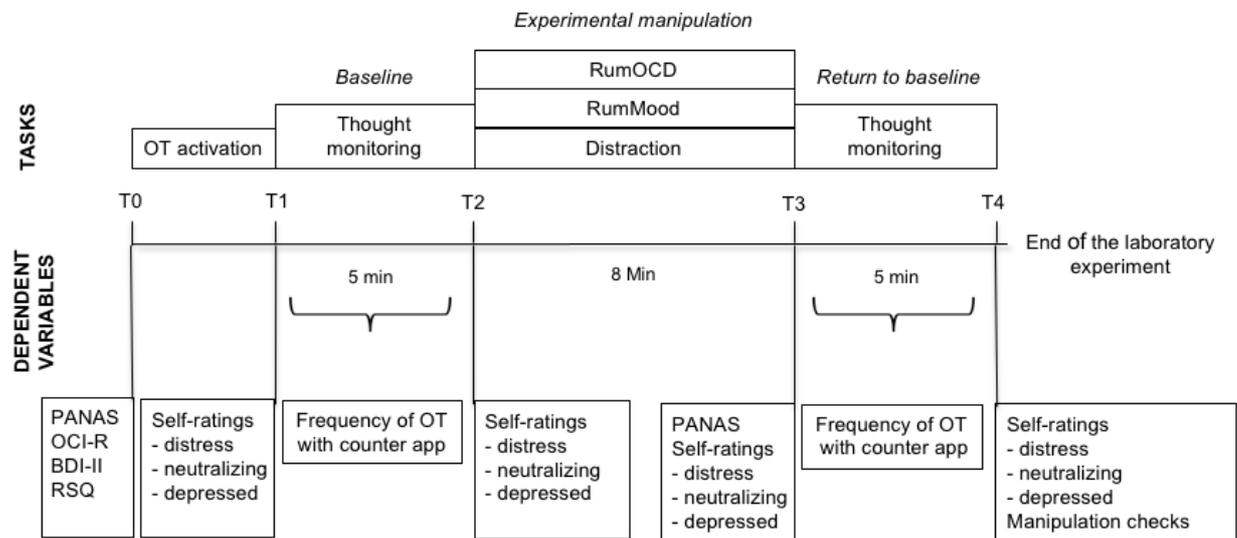
Note. Contrast 1 = RumOCD and RumMood combined vs. distraction; Contrast 2 = RumOCD vs. RumMood. OT = Obsessive thought; RumMood

= rumination about mood; RumOCD = rumination about OC symptoms; T1 = before baseline; T2 = after baseline; T3 = after experimental manipulation; T4 = after return to baseline.

^a Nine participants were excluded because of technical problems with the counter app.

Figure 1

Experimental Procedure

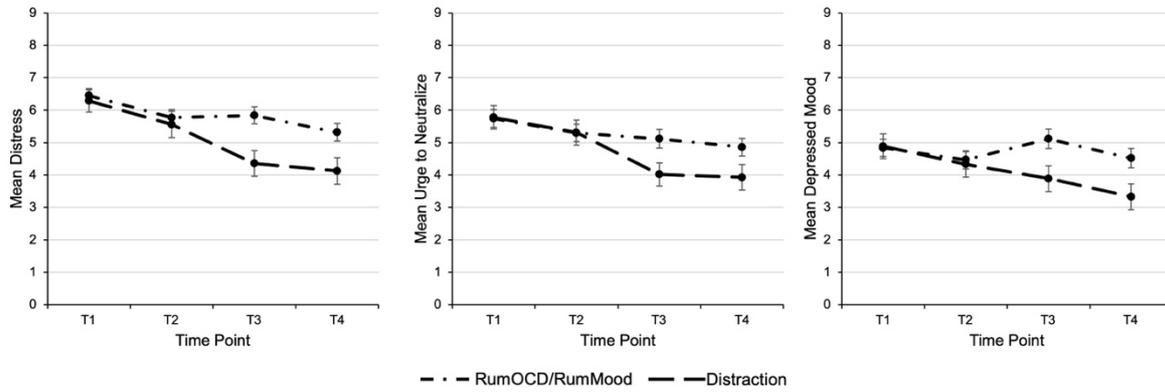


Note. BDI-II = Beck Depression Inventory, Revised; counter app = mobile application to count obsessive thoughts (OTs) on a smartphone; OCI-R = Obsessive-Compulsive Inventory, Revised; PANAS = Positive and Negative Affect Scale; RSQ = Response Style Questionnaire; RumMood = rumination about mood; RumOCD = Rumination about OC symptoms. Adapted with permission (Wahl et al., 2019, p. 7).

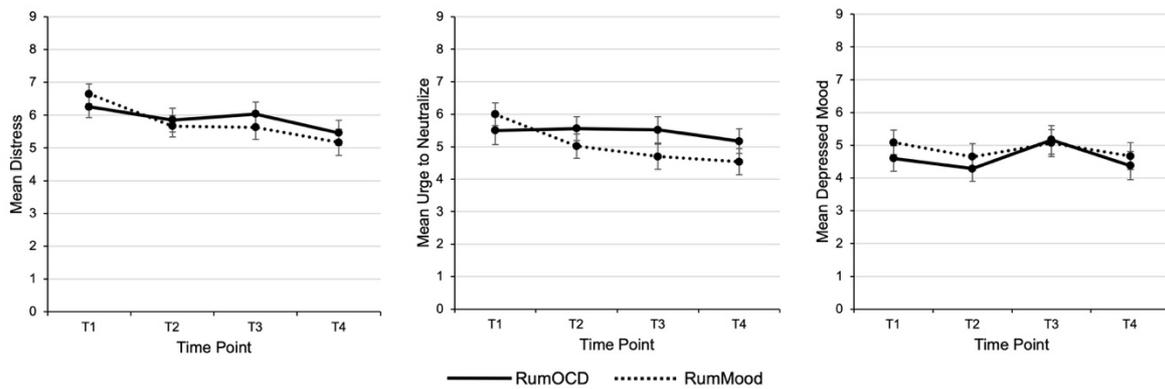
Figure 2

Mean Ratings of Distress, Urge to Neutralize, and Depressed Mood from T1 to T4

A



B



Note. Bars represent standard errors. Panel A: Combined rumination conditions versus distraction. Panel B: Comparison of rumination conditions. RumMood = Rumination about mood; RumOCD = rumination about obsessive-compulsive symptoms; T1 = before baseline; T2 = before experimental manipulation; T3 = after experimental manipulation; T4 = after return to baseline.