Fall 12-2018

Emotion Differentiation Moderates the Effects of Rumination on Depression: A Longitudinal Study

Yunjing Liu
Washington University in St. Louis

WASHINGTON UNIVERSITY IN ST. LOUIS

Department of Psychological and Brain Sciences

Emotion Differentiation Moderates the Effects of Rumination on Depression: A Longitudinal Study

by

Yunjing Liu

A thesis presented to

the Graduate School

of Washington University in

partial fulfillment for the degree

of Master of Arts

December 2018

St. Louis, MO

St. Louis, Missouri

Table of Contents

Acknowledgements iii

Abstract iv

Introduction 1

Method 4

Results 6

Discussion 8

Conclusion 12

References 13

Tables 18

Figures 22

Acknowledgments

I would like to first thank my research advisor, Dr. Renee J. Thompson, for her generous guidance and support for this research project and for my growth as a graduate student more generally. I am also grateful to Dr. Kirsten E. Gilbert who provided insight and expertise that contributed greatly to the project. I thank Jordan Davis for her generous help with managing the study and Haijing Wu Hallenbeck and Natasha Haradhvala Bailen for their feedback on earlier versions of the manuscript. Thanks also go to Drs. Tammy English and Mike Strube for agreeing to serve on my Master's Committee and sharing their thoughts and advice on this project. Finally, I acknowledge my gratitude for the funding received towards my Ph.D. from the Spencer T. Olin Fellowship, Washington University in St. Louis.

Yunjing Liu

Washington University in St. Louis

December 2018

ABSTRACT OF THE THESIS

Emotion Differentiation Moderates the Effects of Rumination on Depression:

A Longitudinal Study

by

Yunjing Liu

Master of Arts in Psychological and Brain Sciences

Washington University in St. Louis, 2018

Renee J. Thompson, Chair

Elevated trait rumination is associated with and predicts the onset of major depressive disorder (MDD), but not all people with elevated trait rumination develop MDD. We hypothesize that certain emotional processes weaken the rumination-depression link, protecting people against increases in depression. In the current prospective longitudinal study, we examined one such process, emotion differentiation—the ability to identify and label specific emotions. Because higher negative emotion differentiation (NED) has been associated with greater psychological well-being and people typically ruminate in the context of negative affect, we predicted that NED, but not positive emotion differentiation (PED), would moderate the rumination-depression association, such that rumination would only predict increases in depression when negative emotions are less, not more, differentiated. Over one week of experience sampling, 65 community-dwelling adults (Mean age=38.4 years) repeatedly reported their emotions—from which we computed intraclass correlation coefficients to represent NED and PED. Participants completed self-report measures of rumination and depression at baseline and a measure of depression six months later. Regression analyses suggested that both NED and PED interacted

with rumination to predict significant changes in depression. As expected, rumination predicted significant increases in depression when negative emotions were less, not more, differentiated. Results held after controlling for mean negative emotion intensity. Rumination did not predict depression at either low or high levels of PED. We are one of the first to show long-term benefits of emotion differentiation, particularly NED, in adults, highlighting its adaptive features and suggesting NED as a potential treatment target for depression.

Have you ever caught yourself dwelling on an embarrassing situation or an unpleasant interaction? This type of thinking is referred to as *rumination*, the process of repetitively focusing on the nature, causes, and consequences of one's problems and feelings (Nolen-Hoeksema, 1991). Rumination has been conceptualized as a trait and is linked to various negative psychological outcomes, particularly depression (Nolen-Hoeksema, 1991; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Ruminative tendencies, particularly those captured by its brooding facet, are positively associated with depressive symptoms and the development of major depressive disorder (MDD) both cross-sectionally and longitudinally (Treynor, Gonzalez, & Nolen-Hoeksema, 2003; Watkins, 2008).

Despite rumination being implicated in the etiology of MDD, people with high trait rumination do not always develop MDD. We hypothesize that certain psychological processes interrupt the mechanisms underlying the rumination-depression link and weaken this association. We propose that high emotion differentiation is one such process. Emotion differentiation (hereafter "differentiation") refers to one's ability to discern specific emotions (Barrett, Gross, Christensen, & Benvenuto, 2001). People high in differentiation make more fine-grained distinctions between emotions of different types and use different and specific emotion words to characterize how they feel (e.g., frustrated versus sad). People low in differentiation are less able to discern the nuances across different emotions and characterize their emotions using the same set of emotional words across multiple occasions.

From the feelings-as-information prospective (Schwarz, 1990), emotion is a critical source of information. Higher differentiation of one's emotions provides more fine-grained information about the situation, which may inform more effective emotion regulation (Gross, 2015). When people experience more (versus less) differentiated intense negative emotions, they

engage in more frequent emotion regulation strategies (Barrett et al., 2001) and less alcohol consumption (Kashdan, Ferssizidis, Collins, & Muraven, 2010). Additionally, keen awareness of specific emotions may allow individuals to evaluate the link between a triggering event and emotional reaction at a meta-cognitive level, serving as valuable guidance for selecting appropriate and context-specific emotion regulation strategies (Gross, 2015). Moreover, identifying and labeling specific emotions serves a direct regulatory function to reduce negative affect (Kircanski, Lieberman, & Craske, 2012). High differentiators may find it easier to clearly label how they feel, resulting in less intense negative emotions. Taken together, we posit these adaptive qualities of high negative emotion differentiation (NED) prevent individuals from becoming stuck in the ruminative cycle and therefore weaken the association between rumination and increases in depression.

Differentiation is often examined separately by valence, and low negative NED is associated with various negative psychological outcomes, including MDD (Anand, Chen, Lindquist, & Daughters, 2017; Demiralp et al., 2012; Kashdan et al., 2010; Pond et al., 2012; Zaki, Coifman, Rafaeli, Berenson, & Downey, 2013). Among individuals with borderline personality disorder (BPD) and low (but not high) NED, trait rumination is associated with nonsuicidal self-injury (NSSI) urges and acts (Zaki et al., 2013), demonstrating that the negative effect of rumination is specific to low NED. Starr, Hershenberg, Li, and Shaw (2017) also found rumination examined at both the momentary and daily level to be more strongly associated with within-person variations of depressive symptoms when NED was low versus high in college and veteran samples. Research is still needed to examine longer-term implications of NED on depression.

Compared to NED, positive emotion differentiation (PED) has received less research attention and demonstrated less consistent implications for well-being. Of the 34 published empirical studies examining differentiation, only 18 assessed PED and wellbeing, among which eight studies had null findings, six demonstrated maladaptive features of low PED, and two demonstrated adaptive features of low PED. High PED, for example, predicts less avoidance or impulsive coping in response to stress (Tugade, Fredrickson, & Barrett, 2004) and protects against impulses for maladaptive behaviors related to BPD pathology (Dixon-Gordon, Chapman, Weiss, & Rosenthal, 2014). On the other hand, low PED has been shown to strengthen the salutary effect of savoring positive experiences on depressive symptoms (Starr et al., 2017), possibly because experiencing positive emotions in an undifferentiated, global manner could enhance positive emotional experiences (Dixon-Gordon et al., 2014; Starr et al., 2017). Based on these equivocal findings, it is important that researchers continue to elucidate the associations between PED and wellbeing, including examining their associations over time.

Building from this literature, we examine whether differentiation moderated the association between trait rumination and prospective increases in depression in an adult sample. We extend research by Starr et al. (2017) by using a community sample and focusing on individual differences in trait rumination and depressive symptoms. In addition, this is the first study to examine how differentiation is associated with prospective changes in depression over a period of months. We assessed differentiation using a well-accepted performance-based measure, experience sampling (ESM) (Kashdan, Barrett, & McKnight, 2015). Given evidence showing greater negative implications associated with undifferentiated negative than positive emotions, including MDD (e.g., Demiralp et al., 2012), and because people usually ruminate in negative affective states (Nolen-Hoeksema et al., 2008), we expected NED to play a more crucial role in

intervening ruminative processes than PED. We hypothesized that rumination would only predict increases in depression when negative emotions are less, not more, differentiated. We did not expect PED would moderate the rumination-depression association considering less relevance of positive emotions to rumination and previous null findings of the association between PED and MDD (Demiralp et al., 2012). Because emotion intensity is related to differentiation and depression (Demiralp et al., 2012; Erbas et al., 2014), we examined whether any findings were better accounted for by emotion intensity for both negative and positive emotion.

Method

Participants and Procedure

Seventy-nine community adults participated in a longitudinal study that examined adults' emotional experiences. The current paper focuses on 65 participants (60% female) who completed the entire study, including the follow-up survey (i.e., 14 participants [17.7%] did not complete follow-up). These 65 participants were on average 38.4 years old (*SD*=14.5, range=20–71). They were native English speakers and had a racial/ethnic distribution as follows: 67.7% White (6.6% Hispanic), 18.5% Black, 7.7% biracial, 4.6% Asian, 1.3% Middle Eastern. Most participants had earned a Bachelor's degree or higher (76.9%) and were employed part- or full-time (89.3%), and half (50.8%) were married or living with a romantic partner.

This study consisted of two laboratory sessions (T1), a week of ESM, and a six-month follow-up survey (T2). The two baseline laboratory sessions were scheduled before and after the ESM period. At baseline, participants completed self-report questionnaires and an ESM tutorial, including a practice survey. Participants chose their preferred 12-hour period to receive surveys on their iPhone or a provided iPod Touch 4. Each day, participants received eight prompts, each occurring randomly within a 90-min time window. Participants completed a mean of 73% of all

surveys (*SD*=22%; range=20-100%). Participants were debriefed and financially compensated at the second baseline laboratory session. Approximately six months later, participants (N=65) completed self-report measures online and received financial compensation. The research protocol was approved by the university institutional review board at Washington University in St. Louis.

Measures

Emotion differentiation. At each ESM prompt, participants reported their current feelings ("I feel [emotion] right now") on a five-point scale (0=*not at all*, 4=*extremely*). Negative (*frustrated*, *hostile*, *sluggish*, *sad*, *disappointed*, *dull*, *nervous*) and positive emotions (*happy*, *calm*, *excited*, *relaxed*, *enthusiastic*, *content*) that represent the affective circumplex (e.g., Barrett & Russell, 1999) were included. NED and PED were calculated by computing the average intraclass correlation (ICC) with consistency between negative and positive emotions, respectively, followed by Fisher's r-to-z transformation. Higher ICC represents greater resemblance of ratings of distinct emotions across occasions and, therefore, lower differentiation. To aid interpretation, scores were subtracted from one so greater values represent higher differentiation (e.g., Erbas et al., 2014; Tugade et al., 2004).[1]

Emotion intensity. At each survey, using a 5-point scale (0=*not at all*, 4=*extremely*) participants rated the extent to which they currently felt seven negative emotions (i.e., *frustrated*, *hostile*, *sluggish*, *sad*, *disappointed*, *dull*, *nervous*) and six positive emotions (i.e., *happy*, *calm*, *excited*, *relaxed*, *enthusiastic*, *content*). Emotions were chosen to reflect various levels of arousal

[1] Two participants' ICCs for positive emotion were negative, reflecting measurement error. We changed them zero as recommended by Cohen, Cohen, West, and Aiken (2003) before performing transformation (see Boden, Thompson, Dizén, Berenbaum, & Baker, 2013, for similar procedures). We ran the regression models for PED excluding these two participants. Results remained unchanged; the PED-rumination term continued to be significant, *b*=-2.45, *p*=0.03.

of the affective circumplex (e.g., Barrett & Russell, 1999). We calculated a negative and positive emotion intensity score for each participant by averaging the participant's ratings for the negative and positive emotions, respectively. Internal reliability was Cronbach's alpha of 0.93 for negative emotions and 0.94 for positive emotions.

Depressive symptoms. Depressive symptoms at T1 and T2 were measured by the 20-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), which assesses depressive symptoms over the preceding week. The CES-D was developed to assess depressive symptoms of community samples and has adequate reliability and validity (Eaton, Smith, Ybarra, Muntaner, & Tien, 2004). Internal reliability was Cronbach's alpha of 0.88 at T1 and 0.90 at T2.

Rumination. We administered the 5-item Brooding subscale of the original 22-item Ruminative Responses Scale (Nolen-Hoeksema & Morrow, 1991; Treynor et al., 2003) to measure trait rumination. Participants reported how frequently they engaged in ruminative thoughts and behaviors in response to negative emotions using a 4-point scale (1=*never*; 4=*always*). The Brooding subscale is free of depression content and has demonstrated excellent psychometric properties (Treynor et al., 2003). Internal reliability was Cronbach's alpha of 0.76.

Results

Preliminary Analyses

We first examined demographic and clinical differences between participants who did and did not complete the follow-up. These groups did not differ in gender, $\chi^2(1)=0.47$, $p=0.49$, age, $t(77)=-0.61$, $p=0.55$, race, $\chi^2(4)=2.65$, $p=0.62$, and level of education, $\chi^2(5)=7.02$, $p=0.22$. They reported comparable levels of rumination, $t(77)=0.14$, $p=0.89$, and T1 depression, $t(15.6)=-0.39$, $p=0.70$. We also presented descriptive statistics and zero-order correlations of differentiation, rumination, and depression variables. Based on the clinical cut-offs of CES-D

(i.e., a score of 16 or higher; Radloff, 1977), 29.2% and 38.5% of the sample reported depressive symptoms that indicate risk for clinical depression at T1 and T2, respectively.

Zero-order Pearson correlations (see Table 1) revealed that NED and PED were significantly positively associated. Rumination was significantly inversely associated with NED and PED. T1 depression was significantly inversely associated with NED, but not PED. Neither NED nor PED was significantly correlated with T2 depression. Lastly, rumination was significantly positively correlated with depression at both T1 and T2.

Primary Analyses

To test our hypothesis that rumination would be more strongly associated with increases in depression when NED is lower (not higher), we conducted two hierarchical linear regression analyses predicting T2 depression. One analysis examined NED, and the other examined PED (see Table 2 for full results). All predictors were standardized and centered.

For the model examining NED, there were no significant main effects of rumination or NED. As hypothesized, the rumination by NED interaction significantly predicted T2 depression, b=-2.62, p=0.01, 95% CI [-4.64, -0.59]. We used unstandardized beta weights and +/-1.0 standard deviation (SD) values of NED to predict T2 depression (see Figure 1). Simple slope analyses suggested that rumination significantly predicted increases in depression when NED was low, b=3.23, p=0.03, 95% CI [0.26, 6.20], but not high, b=-2.01, p=0.24, 95% CI [-5.38, 1.36]. A subsequent Johnson-Neyman test suggested that rumination and T2 depression was significantly positively associated when NED was 0.83 SDs below the mean, significantly negatively associated when NED was 2.45 SDs above the mean, and not related when NED was between 0.83 SDs below the mean and 2.45 SDs above the mean. To rule out the possibility that the findings were better explained by mean negative emotion, we ran a model including negative

emotion intensity as a covariate. Results showed that the rumination by NED interaction was still significant, b=-2.75, p=0.007, 95% CI [-4.71, -0.79], and the nature of the interaction were relatively unaffected.

For the model including PED, neither rumination nor PED was a significant predictor of T2 depression. Contrary to our hypothesis, PED significantly interacted with rumination to predict T2 depression, b=-2.56, p=0.02, 95% CI [-4.75, -0.37]. However, simple slopes analyses revealed that rumination did not significantly predict T2 depression at either low PED, b=2.31, p=0.12, 95% CI [-0.63, 5.24], or high PED, b=-2.82, p=0.12, 95% CI [-6.38, 0.74]. A subsequent Johnson-Neyman test suggested that rumination and T2 depression was significantly positively associated when PED was 1.61 SDs below the mean, significantly negatively associated when PED was 2.03 SDs above the mean, and not related when PED was between 1.61 SDs below the mean and 2.03 SDs above the mean. As with NED, including positive emotion intensity as a covariate did not affect the results (b=-2.65, p=0.02, 95% CI [-4.83, -0.46] for the rumination by PED interaction after controlling for positive emotion intensity).

Discussion

Trait rumination has long been associated with subsequent increases in depression (Nolen-Hoeksema et al., 2008). We examined whether high differentiation weakened this relation over six months. As hypothesized, rumination predicted significant prospective increases in depression when negative emotions were less, but not more, differentiated, and this finding was not better explained by negative emotion intensity. Contrary to our hypothesis, the interactive effect of rumination and PED was also significant, showing similar result patterns. This is one of the first studies examining implications of differentiation extending beyond a few

weeks, providing initial support that differentiation is associated with long-term psychological outcomes.

Findings with NED are consistent with growing evidence that NED serves as a resilience factor. Previous findings show that high NED weakens associations between various risk factors (e.g., intense negative emotions, rumination) and negative outcomes (e.g., alcohol consumption, aggression, NSSI; Kashdan et al., 2010; Pond et al., 2012; Zaki et al., 2013) among underage social drinkers, undergraduate students, and adults with BPD. Recent work by Starr et al. (2017) demonstrated that daily and momentary rumination were more strongly associated with within-person changes in daily and momentary depressive symptoms, respectively, when NED was low versus high among college students and veterans. Our design differs from Starr et al.'s (2017) design in that we assessed trait rumination and focused on between-person differences. These results together provide support that NED is a consistent moderator of the rumination-depression link for both state-like assessment within persons and trait-like examination across individuals. Importantly, we also extended the literature by using a community sample with a wide age range and demonstrating the longer-term interactive effect of rumination and NED predicting depression over six months. This moderation pattern that emerged across research groups provides compelling evidence that NED creates a sort of immunity to negative outcomes (e.g., depression) when facing risk factors (e.g., high rumination).

We speculate that this moderation occurred because high NED aids in interrupting the ruminative cycle via emotion regulation. Rumination often worsens mood, which further increases rumination, forming a vicious cycle that increases risk for depression (Moberly & Watkins, 2008; Nolen-Hoeksema et al., 2008). Higher NED allows for more fine-grained inferences about one’s emotions and better emotion labeling, thereby facilitating effective and

context-specific emotion regulation, consistent with existing evidence that NED is related to healthier emotion regulation (Barrett et al., 2001; Kashdan et al., 2015). These benefits protect individuals from getting stuck in rumination and subsequently developing depression.

Regarding PED, rumination did not significantly predict T2 depressive symptoms when PED was either low or high. Follow-up analyses suggested that the rumination-depression association was only significant when PED was at extremely low and high values, which raises the question of whether it is meaningful to interpret the significant findings at an applied level. Given that previous studies have shown equivocal evidence regarding PED and well-being, it is important for future researchers to examine when and how PED is uniquely linked to positive and negative outcomes. We used a rumination self-report measure designed to capture ruminative response to depressed moods (Nolen-Hoeksema, 1991), which may over-represent participants' rumination during negative affect when PED is not particularly relevant. Given that rumination can occur in many affective states, including positive states (Feldman, Joormann, & Johnson, 2008), it will be important to examine how different forms of rumination across contexts interact with differentiation to predict well-being (e.g., Starr et al., 2017).

To our knowledge, the current study is the first to examine associations between differentiation and prospective changes in depressive symptoms. Neither NED nor PED was associated with T2 depressive symptoms. This pattern of findings provide preliminary evidence that the utility of differentiation may be context-dependent. That is, differentiation is only associated with salutary long-term outcomes in certain circumstances, such as when one is prone to ruminate. We thus speculate that only in the context of high rumination does differentiation exert an influence on psychological well-being. Future experimental investigations could directly address this question.

In addition to longitudinal findings, NED, but not PED, was significantly correlated with T1 depressive symptoms, consistent with cross-sectional evidence that depression is more related to NED (Demiralp et al., 2012; Erbas et al., 2014; Starr et al., 2017). Related to the abovementioned context-dependent theory, perhaps when the need for emotion regulation is high (e.g., high rumination, negative affect), differentiation becomes particularly helpful because it facilitates emotion regulation (Barrett et al., 2001). Because these circumstances mostly demand down-regulation of negative emotions, NED exerts a greater impact.

We posit that differentiation, NED in particular, may be associated with concreteness of self-focused processing (Moberly & Watkins, 2006; Schaich, Watkins, & Ehring, 2013; Watkins, 2004), with lower NED representing less concrete, more abstract processing. Abstract self-focused processing has been shown to lead to poorer emotional and psychological outcomes compared to concrete self-focused processing (Moberly & Watkins, 2006; Schaich et al., 2013; Watkins, 2004). Similar to differentiation, trait rumination appears to be associated with adverse outcomes, only among those with abstract (not concrete) self-focus. Additionally, low NED and abstract thinking appear to function under the same mechanisms, including increasing negative emotion reactivity (Starr et al., 2017; Watkins, Moberly, & Moulds, 2008) and impeding problem solving (Watkins & Moulds, 2005). Hence, it is meaningful to examine whether NED is related to concreteness of processing to clarify the nature of the link between low NED and poor well-being.

Regarding clinical implications, results demonstrated differentiation might be an important potential intervention target in the prevention and treatment for depression. Given previous evidence on the salutary effects of training concrete thinking (Watkins et al., 2008), cultivating differentiation is likely to benefit psychological well-being. There is evidence on the

success of manipulating differentiation in the lab among college students (Cameron, Payne, & Doris, 2013) and enhancing differentiation through self-monitoring using ESM among patients with MDD (Widdershoven et al., 2019). Future research can benefit from directly examining the efficacy of enhancing differentiation on improving well-being, including clinical interventions for MDD.

There are limitations to the current study. First, we did not assess momentary rumination and depression during ESM, which would allow us to examine the momentary associations of rumination and NED on momentary depression. Second, although several reported clinical significant levels of depressive symptoms, we assessed depressive symptoms in a community sample using a self-report measure. Self-report measures are not the gold standard for diagnosing clinical depression than are diagnostic interviews (Bredemeier et al., 2010), so we cannot draw confident conclusions about the applicability of the current findings to clinical populations. Future research should follow individuals at risk for MDD and examine whether rumination and NED interact to predict occurrence of major depressive episodes using clinical interviews.

Conclusion

Taking the well-established association between rumination and depression one step further, we examined the moderating role of NED using a prospective longitudinal design. We found that rumination only predicted increases in depression over six months when negative emotions were less differentiated. Findings demonstrate high NED as a resilience factor for depressive symptoms and a potential intervention target for depression in adults.

References

Anand, D., Chen, Y., Lindquist, K. A., & Daughters, S. B. (2017). Emotion differentiation predicts likelihood of initial lapse following substance use treatment. *Drug and Alcohol Dependence, 180,* 439–444.

Barrett, L. F., Gross, J., Christensen, T. C., & Benvenuto, M. (2001). Knowing what you're feeling and knowing what to do about it: Mapping the relation between emotion differentiation and emotion regulation. *Cognition & Emotion*, *15*(6), 713–724.

Barrett, L. F., & Russell, J. A. (1999). The structure of current affect: Controversies and emerging consensus. *Current Directions in Psychological Science*, *8*(1), 10–14.

Boden, M. T., Thompson, R. J., Dizén, M., Berenbaum, H., & Baker, J. P. (2013). Are emotional clarity and emotion differentiation related? *Cognition and Emotion*, *27*(6), 961–978.

Bredemeier, K., Spielberg, J. M., Silton, R. L., Berenbaum, H., Heller, W., & Miller, G. A. (2010). Screening for depressive disorders using the Mood and Anxiety Symptoms Questionnaire Anhedonic Depression Scale: A receiver-operating characteristic analysis. *Psychological Assessment*, *22*(3), 702–710.

Cameron, C. D., Payne, B. K., & Doris, J. M. (2013). Morality in high definition: Emotion differentiation calibrates the influence of incidental disgust on moral judgments. *Journal of Experimental Social Psychology*, *49*(4), 719–725.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences.* (3rd ed.). Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.

Demiralp, E., Thompson, R. J., Mata, J., Jaeggi, S. M., Buschkuehl, M., Barrett, L. F., … Jonides, J. (2012). Feeling blue or turquoise? Emotional differentiation in major depressive disorder. *Psychological Science*, *23*(11), 1410–1416.

Dixon-Gordon, K. L., Chapman, A. L., Weiss, N. H., & Rosenthal, M. Z. (2014). A preliminary examination of the role of emotion differentiation in the relationship between borderline personality and urges for maladaptive behaviors. *Journal of Psychopathology and Behavioral Assessment*, *36*, 616–625.

Eaton, W. W., Smith, C., Ybarra, M., Muntaner, C., & Tien, A. (2004). Center for epidemiologic studies depression scale: Review and revision (CESD and CESD-R). In M. E. Maruish (Ed.), *The use of psychological testing for treatment planning and outcomes assessment: Instruments for adults* (pp. 363–377). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Erbas, Y., Ceulemans, E., Lee Pe, M., Koval, P., & Kuppens, P. (2014). Negative emotion differentiation: Its personality and well-being correlates and a comparison of different assessment methods. *Cognition and Emotion*, *28*(7), 1196–1213.

Feldman, G. C., Joormann, J., & Johnson, S. L. (2008). Responses to positive affect: A self-report measure of rumination and dampening. *Cognitive Therapy and Research*, *32*(4), 507–525.

Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry*, *26*(1), 1–26.

Kashdan, T. B., Barrett, L. F., & McKnight, P. E. (2015). Unpacking emotion differentiation: Transforming unpleasant experience by perceiving distinctions in negativity. *Current*

Directions in Psychological Science, *24*(1), 10–16.

Kashdan, T. B., Ferssizidis, P., Collins, R. L., & Muraven, M. (2010). Emotion differentiation as resilience against excessive alcohol use: An ecological momentary assessment in underage social drinkers. *Psychological Science*, *21*(9), 1341–1347.

Kircanski, K., Lieberman, M. D., & Craske, M. G. (2012). Feelings into words: Contributions of language to exposure therapy. *Psychological Science*, *23*(10), 1086–1091.

Moberly, N. J., & Watkins, E. R. (2006). Processing mode influences the relationship between trait rumination and emotional vulnerability. *Behavior Therapy*, *37*, 281–291.

Moberly, N. J., & Watkins, E. R. (2008). Ruminative self-focus and negative affect: An experience sampling study. *Journal of Abnormal Psychology*, *117*(2), 314–323.

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology*, *100*(4), 569–582.

Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta earthquake. *Journal of Personality and Social Psychology*, *61*(1), 115–121.

Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science*, *3*(5), 400–424.

Pond, R. S., Kashdan, T. B., DeWall, C. N., Savostyanova, A., Lambert, N. M., & Fincham, F. D. (2012). Emotion differentiation moderates aggressive tendencies in angry people: A daily diary analysis. *Emotion*, *12*(2), 326–337.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general

population. *Applied Psychological Measurement*, *1*(3), 385–401.

Schaich, A., Watkins, E. R., & Ehring, T. (2013). Can concreteness training buffer against the negative effects of rumination on PTSD? An experimental analogue study. *Journal of Behavior Therapy and Experimental Psychiatry*, *44*(4), 396–403.

Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook of Motivation and Cognition* (pp. 527–561). New York: Guilford Press.

Starr, L. R., Hershenberg, R., Li, Y. I., & Shaw, Z. A. (2017). When feelings lack precision: Low positive and negative emotion differentiation and depressive symptoms in daily life. *Clinical Psychological Science*, *5*(4), 613–631.

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research*, *27*(3), 247–259.

Tugade, M. M., Fredrickson, B. L., & Barrett, L. F. (2004). Psychological resilience and positive emotional granularity: Examining the benefits of positive emotions on coping and health. *Journal of Personality*, *72*(6), 1161–1190.

Watkins, E. R. (2004). Adaptive and maladaptive ruminative self-focus during emotional processing. *Behaviour Research and Therapy*, *42*(9), 1037–1052.

Watkins, E. R. (2008). Constructive and unconstructive repetitive thought. *Psychological Bulletin*, *134*(2), 163–206.

Watkins, E. R., Moberly, N. J., & Moulds, M. L. (2008). Processing mode causally influences emotional reactivity: Distinct effects of abstract versus concrete construal on emotional

response. *Emotion*, *8*(3), 364–378.

Watkins, E. R., & Moulds, M. (2005). Distinct modes of ruminative self-focus: Impact of abstract versus concrete rumination on problem solving in depression. *Emotion*, *5*(3), 319–328.

Widdershoven, R. L. A., Wichers, M., Kuppens, P., Hartmann, J. A., Menne-Lothmann, C., Simons, C. J. P., & Bastiaansen, J. A. (2019). Effect of self-monitoring through experience sampling on emotion differentiation in depression. *Journal of Affective Disorders*, *244*, 71–77.

Zaki, L. F., Coifman, K. G., Rafaeli, E., Berenson, K. R., & Downey, G. (2013). Emotion differentiation as a protective factor against nonsuicidal self-injury in borderline personality disorder. *Behavior Therapy*, *44*(3), 529–540.

Table 1

Mean (M), standard deviation (SD), and zero-order correlations of study variables

Variable	M	SD	2	3	4	5
Negative emotion differentiation	0.32	0.30	0.57***	-0.46***	-0.31*	-0.08
Positive emotion differentiation	0.01	0.33	-	-0.34**	-0.19	-0.17
T1 Rumination	10.28	3.10		-	0.56***	0.38**
T1 Depressive symptoms	10.89	8.53			-	0.62***
T2 Depressive symptoms	13.45	9.80				-

Note. T1 = measured at baseline laboratory session one or two; T2 = measured at 6-month follow-up session.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 2

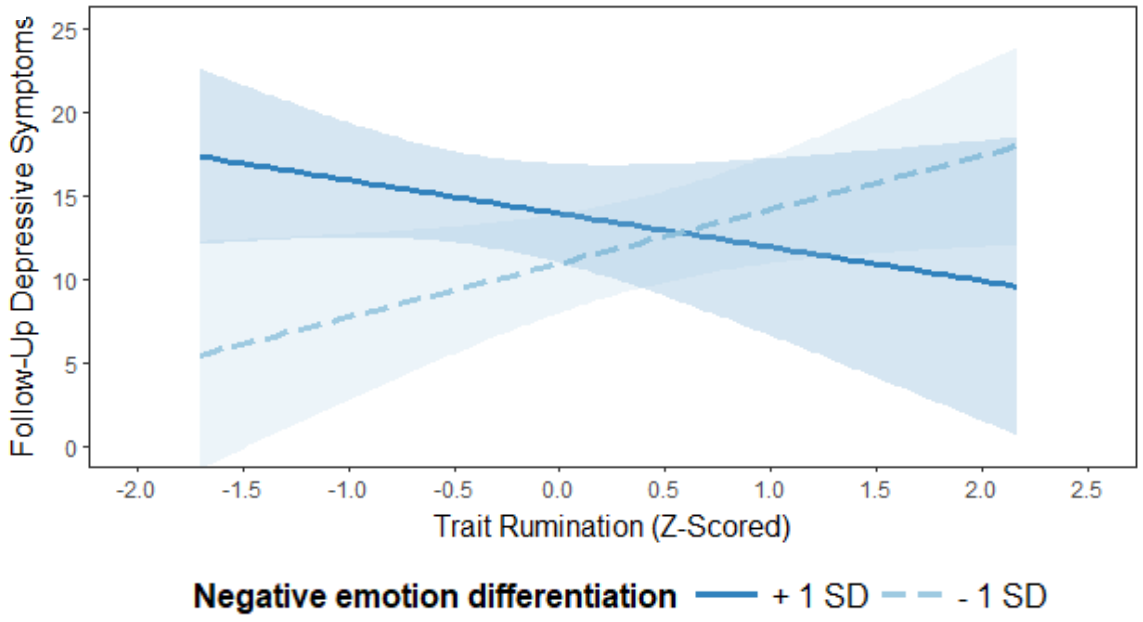
Hierarchical Regression Models of Emotion Differentiation and Rumination as Predictors of T2 Depressive Symptoms

Step and predictors	*b*	*SE*	*t*	R^2	ΔR^2	*p*
Model 1: Negative Emotion Differentiation						
Step 1 (df = 60)				0.40		
Intercept	13.51	0.97	13.96			<0.001
T1 Depressive symptoms	5.97	1.17	5.11			<0.001
T1 Rumination	1.01	1.27	0.80			0.43
ESM Negative emotion differentiation	1.53	1.10	1.40			0.17
Step 2 (df = 59)				0.47	0.06	0.01
Intercept	12.33	1.03	11.95			<0.001
T1 Depressive symptoms	6.14	1.11	5.48			<0.001
T1 Rumination	0.61	1.22	0.50			0.62
ESM Negative emotion differentiation	1.49	1.06	1.41			0.16
T1 Rumination x ESM Negative emotion differentiation	-2.61	1.01	-2.59			0.01
Model 2: Positive Emotion Differentiation						
Step 1 (df = 61)				0.39		

Intercept	13.44	0.97	13.88			<0.001
T1 Depressive symptoms	5.86	1.18	4.98			<0.001
T1 Rumination	0.29	1.23	0.24			0.81
ESM Positive emotion differentiation	-0.51	1.04	-0.50			0.62
Step 2 (df = 60)				0.44	0.05	0.02
Intercept	12.59	1.00	12.54			<0.001
T1 Depressive symptoms	5.95	1.14	5.23			<0.001
T1 Rumination	-0.26	1.21	-0.21			0.83
ESM Positive emotion differentiation	-0.30	1.01	-0.30			0.77
T1 Rumination x ESM Positive emotion differentiation	**-2.56**	**1.09**	**-2.34**			**0.02**

Note. T1 = measured at baseline laboratory session one or two; T2 = measured at 6-month follow-up session.

a.



b.

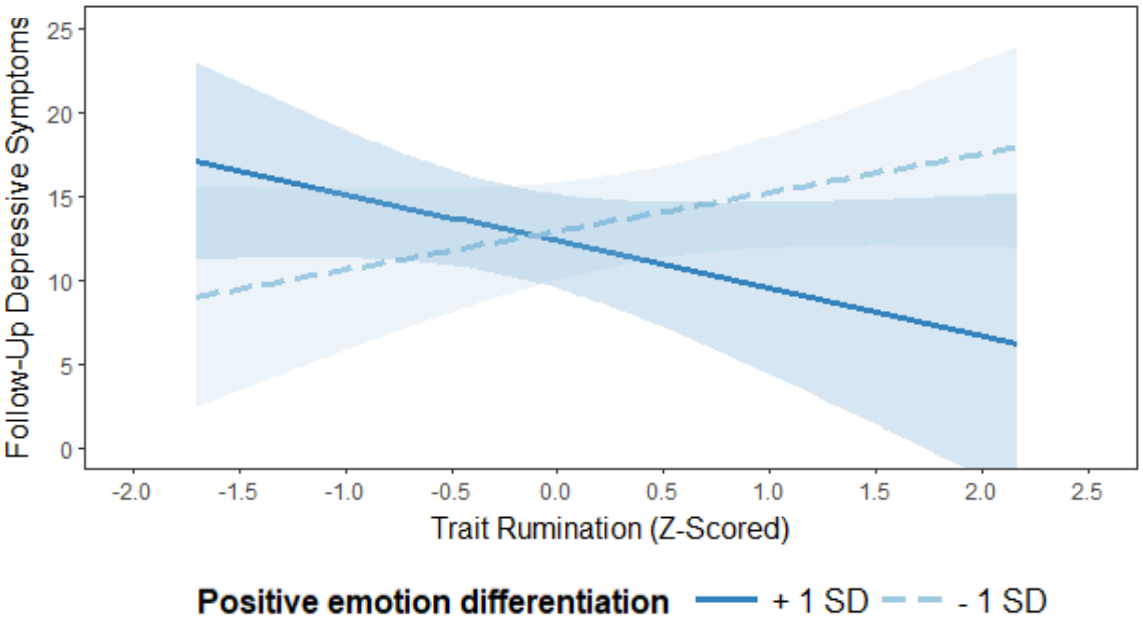


Figure 1. Follow-up depressive symptoms as a function of baseline trait rumination controlling baseline depression, as moderated by (a) negative and (b) positive emotion differentiation. Shaded regions delineate the 95% confidence bands for the simple slopes.