Emotion

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

Daphne Y. Liu, Kirsten E. Gilbert, and Renee J. Thompson

Online First Publication, June 27, 2019. http://dx.doi.org/10.1037/emo0000627

American Psychological Association

Emotion

1528-3542/19/$12.00

http://dx.doi.org/10.1037/emo0000627

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

Daphne Y. Liu, Kirsten E. Gilbert, and Renee J. Thompson
Washington University in St. Louis

Elevated trait rumination is associated with and predicts onset of major depressive disorder, but not all people with elevated trait rumination develop major depressive disorder. We hypothesize that certain emotional processes weaken the rumination–depression link, protecting against increases in depression. In this prospective longitudinal study, we examined one such process, emotion differentiation—the ability to discern specific emotions. Because higher negative emotion differentiation (NED) facilitates down-regulating negative emotions and the content of rumination tends to be negative, 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 1 week of experience sampling, 65 community-dwelling adults (M = 38.4 years) repeatedly reported their emotions, from which we computed NED and PED. Participants completed self-report measures of rumination and depression at baseline and a measure of depression 6 months later. Regression analyses suggested that the combination of NED and PED, but not a unique contribution of either NED or PED, interacted with rumination to predict significant changes in depression, after controlling for mean emotion. Specifically, rumination predicted significant increases in depression when emotion differentiation was lower, but not higher. Findings demonstrate longitudinal benefits of emotion differentiation in adults and suggest emotion differentiation as a promising avenue for studying major depressive disorder.

Keywords: emotion differentiation, depression, rumination, experience sampling, longitudinal

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 was first proposed by Nolen-Hoeksema as a dispositional tendency to respond to depression, in which individuals "repetitively [focus] on the fact that one is depressed; on one's symptoms of depression; and on the causes, meaning, and consequences of depressive symptoms" (Nolen-Hoeksema, 1991, p. 569). Therefore, rumination is often referred to as *depressive rumination*.[1]

Rumination has been linked to various negative psychological outcomes, particularly depression (Nolen-Hoeksema, 1991; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Ruminative tendencies are positively associated with depressive symptoms and the development of major depressive disorder, both cross-sectionally and longitudinally (Treynor, Gonzalez, & Nolen-Hoeksema, 2003; Watkins, 2008). Theory and research suggest that rumination exacerbates negative thinking, interferes with problem solving, and prevents constructive behaviors (Nolen-Hoeksema et al., 2008). In particular, the brooding component of rumination—passive perseveration on one's depression and unachieved standards—has been theoretically conceptualized and empirically demonstrated to be the most maladaptive component of rumination and is consistently related to depression (Armey et al., 2009; Nolen-Hoeksema et al., 2008; Treynor et al., 2003).

Despite trait rumination being implicated in the etiology of major depressive disorder, people with high trait rumination do not always develop major depressive disorder. We hypothesize that certain psychological processes may interrupt the mechanisms underlying the rumination–depression link and weaken this association. We propose that high emotion differentiation is one such process. Emotion differentiation refers to one's ability to discern specific emotions (Barrett, Gross, Christensen, & Benvenuto, 2001). People high in emotion differentiation make more fine-

Daphne Y. Liu, Department of Psychological and Brain Sciences, Washington University in St. Louis; Kirsten E. Gilbert, Department of Psychiatry, Washington University in St. Louis; Renee J. Thompson, Department of Psychological and Brain Sciences, Washington University in St. Louis.

This research was supported by the Spencer T. Olin fellowship from Washington University in St. Louis to Daphne Y. Liu and by National Institute of Mental Health Grant K23 MH115074-01 to Kirsten E. Gilbert. We thank Tammy English, Mike Strube, Haijing Wu Hallenbeck, and Natasha Haradhvala Bailen for their feedback on a draft of the manuscript. We also thank Jordan Davis for her help with managing the study.

Correspondence concerning this article should be addressed to Daphne Y. Liu, Department of Psychological and Brain Sciences, Washington University in St. Louis, One Brookings Drive, Campus Box 1125, St. Louis, MO 63130. E-mail: daphne.liu@wustl.edu

[1] The current article focuses on rumination in the context of negative affect, not positive affect (i.e., positive rumination; Feldman, Joormann, & Johnson, 2008).

grained distinctions between emotions of different types and use different and specific emotion words to characterize how they feel (e.g., sad vs. frustrated). For high differentiators, by virtue of their high ability to distinguish specific emotions, changes of various specific emotions from moment to moment tend to be independent of other each (e.g., feel sadder but as frustrated). People low in emotion 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. For low differentiators, changes of various specific emotions from one occasion to another tend to be correlated with each other (e.g., feel sadder and more frustrated).

From the feelings-as-information prospective (Schwarz, 1990), emotion is a critical source of information. Higher emotion differentiation provides more fine-grained information about the situation, which may facilitate emotion regulation (Gross, 2015; Kashdan, Barrett, & McKnight, 2015). When people experience more (vs. less) differentiated intense negative emotions, they engage in more frequent emotion regulation strategies (Barrett et al., 2001). A keen awareness of specific emotions may also allow individuals to evaluate the link between a triggering event and emotional reaction at a metacognitive level, serving as valuable guidance for selecting appropriate and context-specific emotion regulation strategies (Gross, 2015). Moreover, identifying and labeling specific negative emotions serves a direct regulatory function to reduce negative emotion (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 emotion differentiation prevent individuals from becoming stuck in the ruminative cycle and may weaken the association between rumination and increases in depression.

Emotion differentiation is frequently examined separately for negative and positive emotion. Low negative emotion differentiation (NED) is associated with various negative psychological outcomes, including major depressive disorder (Anand, Chen, Lindquist, & Daughters, 2017; Demiralp et al., 2012; Kashdan, Ferssizidis, Collins, & Muraven, 2010; Pond et al., 2012; Zaki, Coifman, Rafaeli, Berenson, & Downey, 2013). Among individuals with borderline personality disorder 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 student and veteran samples. These findings indicate that individuals with low NED are more vulnerable to behavioral and psychological costs of rumination, possibly because they are less skillful at effectively down-regulating negative affect relative to those with high NED. Research is still needed to examine longer-term implications of NED on depression.

Compared with NED, positive emotion differentiation (PED) has received less empirical attention and demonstrated less consistent implications for well-being. Of the 34 published empirical studies examining emotion differentiation, 16 assessed PED and well-being, among which only six demonstrated adaptive features of high PED with the rest reporting null findings ($n = 8$) or demonstrating maladaptive features ($n = 2$) of high PED.[2] In terms of adaptive outcomes associated with PED, for example, high (vs. low) PED predicts less avoidance or impulsive coping in response to stress (Tugade, Fredrickson, & Barrett, 2004) and protects against impulses for maladaptive behaviors related to borderline personality disorder pathology (Dixon-Gordon, Chapman, Weiss, & Rosenthal, 2014). In terms of maladaptive outcomes associated with PED, high (vs. low) PED has also been associated with reduced salutary effect of savoring positive experiences on depressive symptoms (Starr et al., 2017), possibly because experiencing positive emotions in a differentiated manner could diminish and narrow positive emotional experiences (Dixon-Gordon et al., 2014; Starr et al., 2017). Given these equivocal findings, it is important that researchers continue to elucidate the associations between PED and well-being, including examining their associations over time.

Building from this literature, we examine whether emotion differentiation moderates 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 emotion differentiation is associated with prospective changes in depression over a period of months. We assessed emotion differentiation using a well-established method, experience sampling (ESM), that has high ecological validity (Kashdan et al., 2015).

The emotion differentiation literature has found greater and more consistent negative implications associated with undifferentiated negative than positive emotions, including major depressive disorder (e.g., Demiralp et al., 2012). Additionally, it appears that high NED facilitates down-regulation of negative emotion, whereas, when PED has a significant effect, preliminary evidence suggests that high PED regulates maladaptive behaviors reinforced by positive emotion (e.g., Tugade et al., 2004) or that it diminishes positive emotional experience (Starr et al., 2017). The content of rumination is often negative (Nolen-Hoeksema et al., 2008), posing a high demand for down-regulating negative emotion. Thus, we expect 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 differentiating positive emotions when individuals perseverate on negative affect and previous null findings of the association between PED and major depressive disorder (Demiralp et al., 2012). Because mean intensity of negative emotion is related to emotion differentiation and depression (Demiralp et al., 2012; Erbas, Ceulemans, Lee Pe, Koval, & Kuppens, 2014), we examined whether any significant findings were accounted for by mean intensity of negative or positive emotion.

[2] Because researchers have used different statistical models for studying PED, combining different statistical outcomes into a common effect size indicator is beyond the central aims of the current article.

Method

Participants and Procedure

Seventy-nine community adults participated in a study that examined the everyday emotional experiences of adults (Bailen, Wu, & Thompson, 2018; Gilbert, Tonge, & Thompson, 2019; Thompson & Boden, 2019). The current paper focuses on the 65 participants (60% female) who completed the entire study, including the 6-month follow-up survey (i.e., 14 participants [17.7%] did not complete follow-up). We used G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009) to conduct power analysis of number of participants needed for a medium-sized R^2 increase (i.e., $F^2 = 0.15$) based on our primary analyses. In light of our original hypotheses, we entered 0.05 for alpha error probability, 0.80 for power, 1 for number of tested predictors (i.e., NED/PED × Rumination interaction), and 5 for number of predictors (Time 1 [T1] depression, mean negative/positive emotion, T1 rumination, NED/PED, and the NED/PED × Rumination interaction). Results showed that we need 55 participants to detect a medium-sized of R^2 increase for multiple regression analyses; thus, the sample size of the study provided acceptable power to test our hypotheses. These 65 participants were on average 38.4 years old ($SD = 14.5$, range = 20–71). All were native English speakers and had a racial/ethnic distribution as follows: 67.7% White, 18.5% Black, 7.7% biracial, 4.6% Asian, and 1.5% Middle Eastern; 4.6% of the participants were Hispanic. 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 6-month follow-up survey (Time 2 [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-hr period to receive surveys on their iPhone or a provided iPod Touch 4 (Apple, Seattle, WA). 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 6 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 (i.e., frustrated, hostile, sluggish, sad, disappointed, dull, nervous) and positive emotions (i.e., 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 correlations (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 emotion differentiation. To aid interpretation, scores were subtracted from one so greater values represent higher emotion differentiation (e.g., Erbas et al., 2014; Tugade et al., 2004).[3]

Mean negative and positive emotion. We calculated a mean negative and positive emotion score for each participant by averaging the participant's ratings for the negative and positive emotions, respectively. Internal reliability was excellent for negative emotions ($\alpha = .93$) and positive emotions ($\alpha = .94$).

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 good at T1 ($\alpha = .88$) and excellent at T2 ($\alpha = .90$).

Rumination. We administered the five-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 four-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 acceptable ($\alpha = .76$).

Results

Preliminary Analyses

We first examined demographic and clinical differences between participants who did and did not complete the 6-month follow-up session. These groups did not differ in gender, $\chi^2(1) = 0.47$, $p = .49$; age, Welch's $t(19.2) = -0.61$, $p = .55$; race, $\chi^2(4) = 2.65$, $p = .62$; or level of education, $\chi^2(5) = 7.02$, $p = .22$. They reported comparable levels of rumination, Welch's $t(16.9) = 0.12$, $p = .90$; NED, Welch's $t(15.4) = 0.18$, $p = .86$; PED, Welch's $t(16.5) = -0.48$, $p = .64$; and T1 depression, Welch's $t(15.6) = -0.39$, $p = .70$.

We present descriptive statistics and zero-order correlations of emotion differentiation, rumination, and depression (see Table 1). On the basis of the clinical cut-offs of CES-D (≥16; 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 revealed that NED and PED were significantly positively associated. Participants were on average better at differentiating negative than positive emotions, $t(63) = 8.52$, $p < .001$, $d = 1.06$. Rumination was

[3] Two participants' ICCs for positive emotion were negative, reflecting measurement error. We changed them to zero as recommended by Cohen, Cohen, West, and Aiken (2003) before performing transformation (see Boden et al., 2013, for similar procedures). We ran the regression model for PED excluding these two participants. The significance of the results was not affected; the PED-rumination interaction term continued to be significant ($b = -2.64$, $p = .02$).

Table 1
Means, Standard Deviations, and Zero-Order Correlations of Study Variables

Variable	*M* (*SD*)	1	2	3	4	5	6	7	8	9
1. ESM NED	.32[a] (.30)	—	.57***	.87***	.36**	−.23	.16	−.46***	−.31*	−.08
2. ESM PED	.01[a] (.33)		—	.90	−.56***	−.16	.13	−.34**	−.19	−.17
3. ESM General emotion differentiation	.33 (.56)			—	−.15	−.21	.16	−.45***	−.27*	−.14
4. ESM Valence discrepancy of differentiation	.31 (.30)				—	−.06	.02	−.09	−.10	.11
5. ESM Mean NE	.49 (.41)					—	−.27*	.39**	.64***	.55**
6. ESM Mean PE	1.66 (.67)						—	−.21	−.44***	−.37**
7. T1 Rumination	10.28 (3.10)							—	.56***	.38**
8. T1 Depressive symptoms	10.89 (8.53)								—	.62***
9. T2 Depressive symptoms	13.45 (9.80)									—

Note. General emotion differentiation refers to the sum of negative and positive emotion differentiation (i.e., NED + PED). Valence discrepancy of differentiation refers to subtracting positive from negative emotion differentiation (i.e., NED − PED). ESM = measured through experience sampling method; NED = negative emotion differentiation; PED = positive emotion differentiation; NE = negative emotion; PE = positive emotion; T1 = Time 1, measured at baseline Laboratory Session 1 or 2; T2 = Time 2, measured at 6-month follow-up session.
[a] Means displayed are *z*-transformed, reverse-coded intraclass correlations.
* $p < .05$. ** $p < .01$. *** $p < .001$.

significantly inversely associated with NED and PED. T1 depression was significantly inversely associated with NED, but not PED. However, T2 depression was not significantly correlated with NED or PED. Last, rumination was significantly positively correlated with T1 and T2 depression.

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. In Step 1, we entered T1 depression, mean negative emotion (mean positive emotion), trait rumination, and NED (PED). In Step 2, we entered NED by rumination interaction (PED × Rumination interaction).

For the model examining NED (see Table 2, Model 1), there were no significant main effects of rumination or NED. As hypothesized, the rumination by NED interaction significantly predicted T2 depression ($b = -2.75$, $p = .007$, 95% CI [−4.71, −0.79]). Importantly, we included T1 depression in the model, so the interaction significantly predicted prospective change in depression. We also included mean negative emotion to rule out the possibility that our findings were better explained by mean negative emotion. We used unstandardized beta weights and ±1.0 standard deviation values of NED to predict T2 depression

Table 2
Hierarchical Regression Models of Emotion Differentiation and Rumination as Predictors of T2 Depressive Symptoms

	Model 1[a]					Model 2[a]					Model 3[b]				
Step/predictor	*b* (*SE*)	*t*	R^2	ΔR^2	*p*	*b* (*SE*)	*t*	R^2	ΔR^2	*p*	*b* (*SE*)	*t*	R^2	ΔR^2	*p*
Step 1			.44					.41					.47		
Intercept	13.5 (.94)	14.3			<.001	13.5 (.97)	13.9			<.001	13.5 (.93)	14.4			<.001
T1 Depressive symptoms	4.46 (1.37)	3.26			.002	5.33 (1.28)	4.16			<.001	3.98 (1.44)	2.77			.008
ESM Mean NE	2.48 (1.24)	2.00			.05						2.46 (1.23)	2.01			.05
ESM Mean PE						−1.15 (1.09)	−1.05			.30	−1.21 (1.04)	−1.16			.25
T1 Rumination	.95 (1.24)	.77			.44	.38 (1.23)	.31			.76	.88 (1.24)	.71			.48
ESM NED	1.61 (1.08)	1.50			.14						2.50 (1.23)	2.03			.05
ESM PED						−.44 (1.04)	−.42			.68	−1.52 (1.15)	−1.33			.19
Step 2			.51	.07	.007			.46	.05	.02			.55	.08	.01
Intercept	12.2 (1.00)	12.3			<.001	12.6 (1.00)	12.6			<.001	12.2 (.99)	12.4			<.001
T1 Depressive symptoms	4.52 (1.29)	3.49			<.001	5.34 (1.23)	4.34			<.001	3.90 (1.36)	2.87			.006
ESM Mean NE	2.68 (1.17)	2.28			.03						2.63 (1.16)	2.27			.03
ESM Mean PE						−1.31 (1.05)	−1.25			.22	−1.47 (.99)	−1.49			.14
T1 Rumination	.52 (1.18)	.44			.66	−.18 (1.21)	−.15			.88	.31 (1.19)	.26			.80
ESM NED	1.56 (1.02)	1.53			.13						2.38 (1.18)	2.02			.05
ESM PED						−.21 (1.00)	−.21			.84	−1.76 (1.44)	−1.22			.23
T1 Rumination × ESM NED	−2.75 (.98)	−2.81			.007						−1.55 (1.38)	−1.12			.27
T1 Rumination × ESM PED						−2.65 (1.09)	−2.43			.02	−1.76 (1.44)	−1.22			.23

Note. ESM = measured through experience sampling method; NE = negative emotion; PE = positive emotion; NED = negative emotion differentiation; PED = positive emotion differentiation; T1 = Time 1, measured at baseline Laboratory Session 1 or 2; T2 = Time 2, measured at 6-month follow-up session.
[a] Models 1 and 2 comprise primarily analyses testing our hypotheses for NED and PED, respectively. [b] Model 3 comprises post hoc analyses examining combined and unique contribution of NED and PED in the same model.

(see Figure 1). Simple slope analyses showed that rumination significantly predicted increases in depression when NED was low ($b = 3.27$, $p = .03$, 95% CI [0.41, 6.14]), but not high ($b = -2.23$, $p = .18$, 95% CI [−5.49, 1.03]). A subsequent Johnson-Neyman test showed that rumination and T2 depression was significantly positively associated when NED was 0.77 standard deviation below the mean, significantly negatively associated when NED was 1.86 standard deviations above the mean, and not related when NED was between 0.77 standard deviations below the mean and 1.86 standard deviations above the mean.

For the model including PED (see Table 2, Model 2), neither rumination nor PED was a significant predictor of T2 depression. Contrary to our hypothesis, PED significantly interacted with rumination to predict T2 depression ($b = -2.65$, $p = .02$, 95% CI [−4.83, −0.46]). As in the NED model, these models controlled for T1 depression and mean positive emotion. However, simple slopes analyses revealed that rumination did not significantly predict T2 depression at either low PED ($b = 2.47$, $p = .10$, 95% CI [−0.46, 5.40]), or high PED ($b = -2.82$, $p = .12$, 95% CI [−6.37, 0.72]; see Figure 1). A subsequent Johnson-Neyman test showed that rumination and T2 depression were significantly positively associated when PED was 1.39 standard deviations below the mean, significantly negatively associated when PED was 1.86 standard deviations above the mean, and not related when PED was between 1.39 standard deviations below the mean and 1.86 standard deviations above the mean.

Post-Hoc Analyses

Given that NED and PED were positively correlated, it is possible that findings for one emotion differentiation term (e.g.,

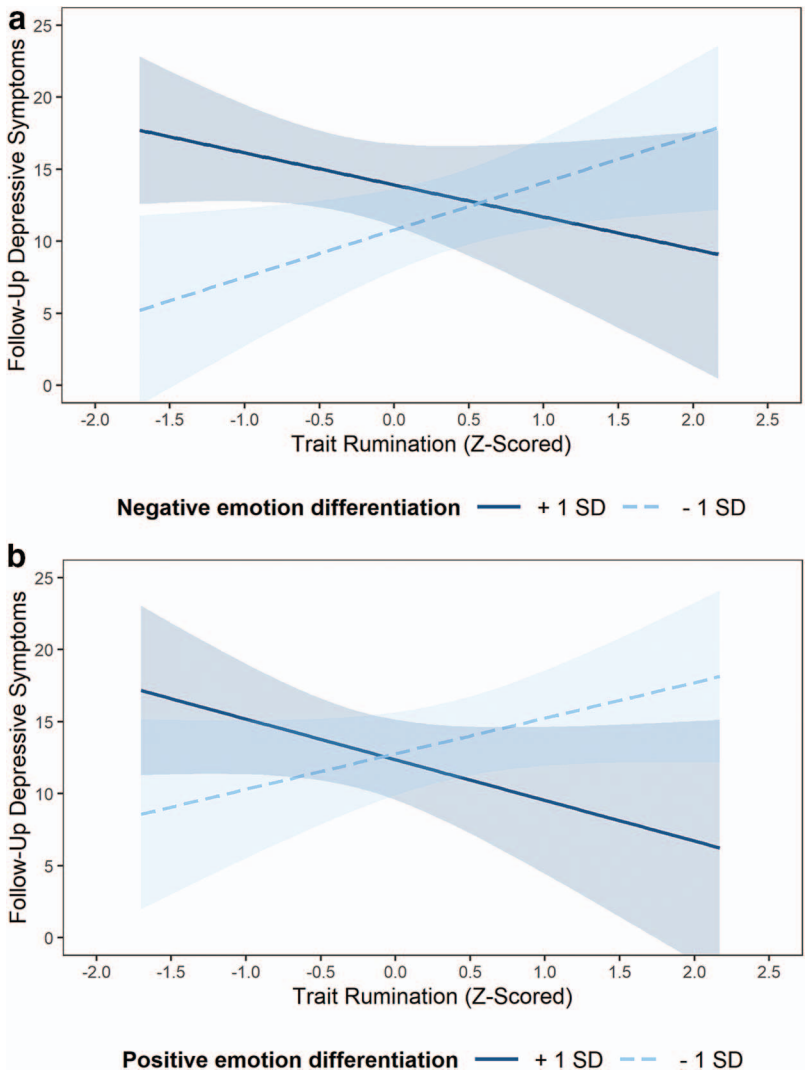

Figure 1. Follow-up depressive symptoms as a function of baseline trait rumination controlling baseline depression and mean negative or positive emotion, as moderated by (a) negative and (b) positive emotion differentiation. Shaded regions delineate the 95% confidence bands for the simple slopes. See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

PED) could be driven by its shared variance with the other (e.g., NED). To test this, we conducted an additional hierarchical regression model including both rumination by NED and rumination by PED interactions (see Table 2, Model 3 for full model description). Results showed that neither interaction was significant. Importantly, the interaction terms are collinear (variance inflation factors: rumination by NED interaction = 2.09; rumination by PED interaction = 2.13) and the addition of both interactions significantly improved the model ($\Delta R^2 = 0.08$, $p < .001$). These findings suggest that their combined contribution is significant.

In light of the preceding findings, and because NED and PED are positively correlated and individually showed similar pattern of findings, we suspected that it may not be meaningful to treat NED and PED separately. As such, for each participant, we computed a sum score of NED and PED (i.e., NED + PED) to examine their combined effect into a single construct, what we refer to as *general differentiation.* Further, to examine whether it is meaningful to distinguish NED and PED, we computed a difference score of NED and PED (i.e., NED − PED) for each participant to index the extent to which the participant is more greatly differentiating negative than positive emotions (i.e., *valence discrepancy of differentiation*).[4] We conducted a hierarchical linear regression model including general differentiation and valence discrepancy of differentiation and their moderation with rumination in predicting longitudinal depressive symptoms (see Table 3 for the full model and results). Results showed that general differentiation significantly interacted with rumination to predict T2 depression ($b = -2.94$, $p = .004$, 95% CI [−4.90, −0.98]), whereas valence discrepancy of differentiation did not interact with rumination to predict T2 depression ($b = 0.01$, $p = .99$, 95% CI [−2.43, 2.45]). Simple slope analyses showed that rumination significantly predicted increases in depression when general differentiation was low ($b = 3.26$, $p = .03$, 95% CI [0.42, 6.11]), but not high ($b = -2.62$, $p = .12$, 95% CI [−5.90, 0.66]; see Figure 2). A Johnson-Neyman test showed that rumination and T2 depression were significantly positively associated when general differentiation was 0.79 standard deviations below the mean, significantly negatively associated when general differentiation was 1.46 standard deviations above the mean, and not related when general differentiation was between 0.79 standard deviations below the mean and 1.46 standard deviations above the mean.

These results suggest that general differentiation significantly moderated the association between rumination and increases in depression. Additionally, valence discrepancy of differentiation did not emerge as a significant moderator. Therefore, it is more appropriate to interpret the results in terms of the umbrella construct of general differentiation.

Discussion

Trait rumination has consistently been associated with subsequent increases in depression (Nolen-Hoeksema et al., 2008). We examined whether high emotion differentiation weakened this association over 6 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 mean negative emotion. However, the interactive effect of rumination and PED was also significant, showing similar result patterns to the interactive effect of rumination and NED, which was in contrast to our hypothesis. Follow-up analyses provided evidence that interpreting NED or PED findings alone paints an incomplete picture. Instead, it is the combination of NED and PED, or general differentiation, that is most important in understanding how emotion differentiation is associated with long-term psychological outcomes.

Our findings are consistent with growing evidence that emotion differentiation serves as a resilience factor. Previous findings show that high NED (and sometimes high PED) weakens associations between various risk factors (e.g., intense negative emotions, rumination, borderline personality disorder pathology) and negative outcomes (e.g., alcohol consumption, aggression, NSSI, urges for maladaptive behaviors) among a variety of samples, including underage social drinkers, undergraduate students, adults with borderline personality disorder, and veterans (Dixon-Gordon et al., 2014; Kashdan et al., 2010; Pond et al., 2012; Zaki et al., 2013). This moderation pattern provides compelling evidence that emotion differentiation creates a sort of resilience against negative outcomes (e.g., depression) when facing risk factors (e.g., high rumination).

We proposed separate hypotheses for NED and PED based on the existing literature. However, given the positive correlation between NED and PED and how they similarly interacted with rumination to predict changes in depression, we examined the combined and unique contributions of NED and PED. We found that the combined contribution of NED and PED, or general differentiation, significantly moderated the association between rumination and changes in depression. In contrast, differentiating emotions of one valence more than the other did not predict changes in depressive symptoms. We discuss our theorization of potential mechanisms underlying these findings in the following text.

Given the role of negative affect in depressive rumination and the implication of NED in down-regulating negative emotion in relation to depression, we were surprised to find that this moderation was not specific to NED. However, we computed emotion differentiation scores using data across a week of ESM. That is, we did not assess momentary emotion differentiation. Consequently, our NED and PED scores may both represent participants' general, trait-like, rather than their momentary, ability to differentiate emotions. People's ability to differentiate emotions may vary momentarily, and momentary emotion differentiation is uniquely associated with momentary psychological processes (e.g., Tomko et al., 2015). It is possible that trait-like emotion differentiation has a general adaptive value and protects against increases in depression. Had we assessed state emotion differentiation, rumination, and depressed mood, we might have found that differentiating negative (rather than positive) emotions plays a more critical role in disrupting rumination and improving emotion in the moment. This speculation should be tested in future research.

[4] Positive valence discrepancy values indicate NED being greater than PED, negative values indicate PED being greater than NED, and zero indicates NED being equal to PED. We subtracted PED from NED because we hypothesized that NED plays a larger role in the rumination-depression association than PED. However, subtracting NED from PED also represents their discrepancy. The correlation between NED minus PED and PED minus PED is −1.

Table 3
Hierarchical Regression Model of General Emotion Differentiation and Rumination as Predictors of T2 Depressive Symptoms

Step/predictor	*b* (*SE*)	*t*	R^2	ΔR^2	*p*
Step 1			.47		
Intercept	13.5 (.93)	14.43			<.001
T1 Depressive symptoms	3.98 (1.44)	2.77			.008
ESM Mean NE	2.46 (1.23)	2.01			.05
ESM Mean PE	−1.21 (1.04)	−1.16			.25
T1 Rumination	.88 (1.24)	.71			.48
ESM General emotion differentiation	1.08 (1.08)	1.00			.32
ESM Valence discrepancy of differentiation	1.91 (.97)	1.98			.05
Step 2			.55	.08	.01
Intercept	12.21 (.99)	12.36			<.001
T1 Depressive symptoms	3.90 (1.36)	2.87			.006
ESM Mean NE	2.63 (1.16)	2.27			.03
ESM Mean PE	−1.47 (.99)	−1.49			.14
T1 Rumination	.32 (1.18)	.27			.79
ESM General emotion differentiation	1.34 (1.02)	1.31			.20
ESM Valence discrepancy of differentiation	1.66 (.94)	1.78			.08
T1 Rumination × ESM General emotion differentiation	−2.94 (.98)	−3.01			.004
T1 Rumination × ESM Valence discrepancy of differentiation	.01 (1.22)	.01			.99

Note. General emotion differentiation refers to the sum of negative and positive emotion differentiation. Valence discrepancy of differentiation refers to subtracting positive from negative emotion differentiation. ESM = measured through experience sampling method; NE = negative emotion; PE = positive emotion; T1 = measured at baseline Laboratory Session 1 or 2; T2 = measured at 6-month follow-up session.

Starr et al. (2017) demonstrated that daily and momentary rumination were more strongly associated with within-person changes in daily and momentary depressive symptoms when NED was low (vs. high) in college student and veteran samples. The present study extends this research by assessing trait rumination, focusing on between-person differences in a community sample representing a wide age range, and examining longitudinal changes of depressive symptoms. We also assessed effects of NED, PED, and general differentiation. Taken together, these results provide support for the idea that emotion differentiation is a consistent moderator of the rumination-depression link for both state-like assessment within persons and trait-like examination across individuals.

In the current study, NED was positively associated with PED. Effect sizes of the association between NED and PED in the literature have ranged from small (Barrett et al., 2001; Dixon-Gordon et al., 2014; Erbas, Ceulemans, Koval, & Kuppens, 2015; Erbas, Sels, Ceulemans, & Kuppens, 2016; Lennarz, Lichtwarck-Aschoff, Timmerman, & Granic, 2018; Sheets, Bujarski, Leventhal, & Ray, 2015; Starr et al., 2017) to moderate (Boden, Thompson, Dizén, Berenbaum, & Baker, 2013; Emery, Simons, Clarke, & Gaher, 2014; Erbas et al., 2015, 2016; Starr et al., 2017)

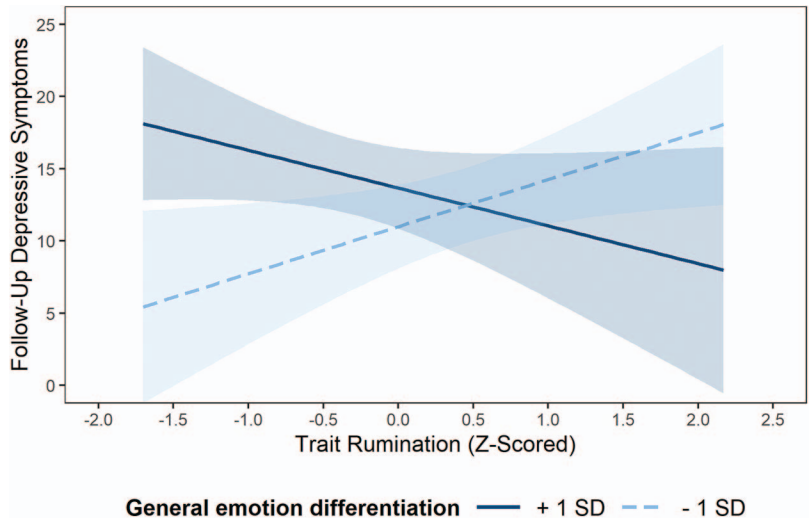

Figure 2. Follow-up depressive symptoms as a function of baseline trait rumination controlling baseline depression and mean negative and positive emotion, as moderated by general emotion differentiation. Shaded regions delineate the 95% confidence bands for the simple slopes. See the online article for the color version of this figure.

to large (Selby et al., 2014). The weighted effect size of the Pearson correlations between NED and PED reported in these 13 studies was 0.31. In this context, the association between NED and PED observed in the present study was on the higher end of this range. Despite frequent positive correlations between NED and PED, most existing research has examined NED and PED separately without considering their combined contribution, and many studies only computed NED but not PED. It is therefore unclear whether many findings for NED can be extended to PED or general differentiation. Future research should parse apart when NED, PED, and/or general differentiation are associated with various well-being indices across contexts.

We posit two nonexclusive mechanisms that may underlie the moderating effect of general differentiation. First, high ability to differentiate specific emotions might aid 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 emotion differentiation allows for more fine-grained inferences about one's emotions and better emotion labeling, thereby facilitating effective and context-specific emotion regulation. These benefits protect individuals from getting stuck in rumination and subsequently developing depression. Future experimental research can examine the link between emotion differentiation and emotion regulation by manipulating emotion differentiation (e.g., Cameron, Payne, & Doris, 2013) and measuring how effective participants are in regulating their negative emotion in response to, for example, sadness-inducing emotional stimuli.

Second, we posit that emotion differentiation may be associated with concreteness of self-focused processing (Moberly & Watkins, 2006; Schaich, Watkins, & Ehring, 2013; Watkins, 2004), with lower emotion differentiation representing less concrete, more abstract processing. Abstract self-focused processing has been shown to lead to poorer emotional and psychological outcomes compared with concrete self-focused processing (Moberly & Watkins, 2006; Schaich et al., 2013; Watkins, 2004). Similar to emotion 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 emotion differentiation is related to concreteness of processing to clarify the nature of the link between low emotion differentiation and poor well-being.

Regarding clinical implications, results demonstrated emotion differentiation might be an important potential intervention target in the prevention and treatment for depression. Future researchers should directly test whether people major depressive episodes more remit more quickly among those with high versus low emotion differentiation. Given previous evidence of the salutary effects of training concrete thinking (Watkins et al., 2008), cultivating emotion differentiation is likely to benefit psychological well-being. There is evidence of the success of manipulating emotion differentiation in the lab among college students (Cameron et al., 2013) and enhancing emotion differentiation through self-monitoring using ESM among patients with major depressive disorder (Widdershoven et al., 2019). Future research should directly examine the efficacy of enhancing emotion differentiation on improving well-being among clinical samples, such as those with major depressive disorder.

We note several limitations. First, due to the correlational nature of the current study, we can only speculate the mechanisms through which emotion differentiation predicts prospective changes in depression. Second, positive emotions appear to be more similar to each other than were negative emotions, possibly because English language has fewer positive than negative emotion words (Averill, 1957). This may be partially why our participants tended to have higher NED than PED (see Erbas et al., 2016 for similar results). Participants' general low levels of PED (i.e., floor effect) may explain why rumination did not predict changes in depression when PED was either low or high defined as one standard deviation above and below the mean. Third, 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. Last, although several participants exhibited clinically significant levels of depressive symptoms, we assessed depressive symptoms in a community sample using a self-report measure. The use of clinical cutoffs on self-report measures to indicate the presence of a major depressive episode is associated with elevated false positive and false negative errors compared with diagnostic clinical interviews (see Bredemeier et al., 2010, for a discussion). Thus, we cannot draw confident conclusions about the applicability of the current findings to clinically depressed populations. Future research should follow individuals at risk for major depressive disorder and examine whether rumination and emotion differentiation interact to predict occurrence of major depressive episodes indexed via clinical interviews.

Conclusion

Further elucidating the well-established association between rumination and depression, we examined the moderating role of emotion differentiation using a prospective longitudinal design. Trait rumination only predicted increases in depression over six months for low, but not high, emotion differentiation. A closer examination suggested that results are best explained by the combined contribution of NED and PED, or general differentiation. Findings demonstrate high emotion differentiation as a resilience factor for depressive symptoms and a promising avenue for research on major depressive disorder.

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. http://dx.doi.org/10.1016/j.drugalcdep.2017.09.007

Armey, M. F., Fresco, D. M., Moore, M. T., Mennin, D. S., Turk, C. L., Heimberg, R. G., . . . Alloy, L. B. (2009). Brooding and pondering: Isolating the active ingredients of depressive rumination with exploratory factor analysis and structural equation modeling. *Assessment, 16,* 315–327. http://dx.doi.org/10.1177/1073191109340388

Averill, J. R. (1957). A semantic atlas of emotional concepts. *Catalog of Selected Documents in Psychology, 5,* 330.

Bailen, N. H., Wu, H., & Thompson, R. J. (2018). Meta-emotions in daily life: Associations with emotional awareness and depression. *Emotion*. Advance online publication. http://dx.doi.org/10.1037/emo0000488

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 and Emotion, 15,* 713–724. http://dx.doi.org/10.1080/02699930143000239

Barrett, L. F., & Russell, J. A. (1999). The structure of current affect: Controversies and emerging consensus. *Current Directions in Psychological Science, 8,* 10–14. http://dx.doi.org/10.1111/1467-8721.00003

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,* 961–978. http://dx.doi.org/10.1080/02699931.2012.751899

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,* 702–710. http://dx.doi.org/10.1037/a0019915

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,* 719–725. http://dx.doi.org/10.1016/j.jesp.2013.02.014

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

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,* 1410–1416. http://dx.doi.org/10.1177/0956797612444903

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. http://dx.doi.org/10.1007/s10862-014-9423-4

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.

Emery, N. N., Simons, J. S., Clarke, C. J., & Gaher, R. M. (2014). Emotion differentiation and alcohol-related problems: The mediating role of urgency. *Addictive Behaviors, 39,* 1459–1463. http://dx.doi.org/10.1016/j.addbeh.2014.05.004

Erbas, Y., Ceulemans, E., Koval, P., & Kuppens, P. (2015). The role of valence focus and appraisal overlap in emotion differentiation. *Emotion, 15,* 373–382. http://dx.doi.org/10.1037/emo0000039

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,* 1196–1213. http://dx.doi.org/10.1080/02699931.2013.875890

Erbas, Y., Sels, L., Ceulemans, E., & Kuppens, P. (2016). Feeling me, feeling you: The relation between emotion differentiation and empathic accuracy. *Social Psychological & Personality Science, 7,* 240–247. http://dx.doi.org/10.1177/1948550616633504

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41,* 1149–1160. http://dx.doi.org/10.3758/BRM.41.4.1149

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,* 507–525. http://dx.doi.org/10.1007/s10608-006-9083-0

Gilbert, K. E., Tonge, N. A., & Thompson, R. J. (2019). Associations between depression, anxious arousal and manifestations of psychological inflexibility. *Journal of Behavior Therapy and Experimental Psychiatry, 62,* 88–96. http://dx.doi.org/10.1016/j.jbtep.2018.09.006

Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry, 26,* 1–26. http://dx.doi.org/10.1080/1047840X.2014.940781

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,* 10–16. http://dx.doi.org/10.1177/0963721414550708

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,* 1341–1347. http://dx.doi.org/10.1177/0956797610379863

Kircanski, K., Lieberman, M. D., & Craske, M. G. (2012). Feelings into words: Contributions of language to exposure therapy. *Psychological Science, 23,* 1086–1091. http://dx.doi.org/10.1177/0956797612443830

Lennarz, H. K., Lichtwarck-Aschoff, A., Timmerman, M. E., & Granic, I. (2018). Emotion differentiation and its relation with emotional well-being in adolescents. *Cognition and Emotion, 32,* 651–657. http://dx.doi.org/10.1080/02699931.2017.1338177

Moberly, N. J., & Watkins, E. R. (2006). Processing mode influences the relationship between trait rumination and emotional vulnerability. *Behavior Therapy, 37,* 281–291. http://dx.doi.org/10.1016/j.beth.2006.02.003

Moberly, N. J., & Watkins, E. R. (2008). Ruminative self-focus and negative affect: An experience sampling study. *Journal of Abnormal Psychology, 117,* 314–323. http://dx.doi.org/10.1037/0021-843X.117.2.314

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology, 100,* 569–582. http://dx.doi.org/10.1037/0021-843X.100.4.569

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,* 115–121. http://dx.doi.org/10.1037/0022-3514.61.1.115

Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking Rumination. *Perspectives on Psychological Science, 3,* 400–424. http://dx.doi.org/10.1111/j.1745-6924.2008.00088.x

Pond, R. S., Jr., 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,* 326–337. http://dx.doi.org/10.1037/a0025762

Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1,* 385–401. http://dx.doi.org/10.1177/014662167700100306

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,* 396–403. http://dx.doi.org/10.1016/j.jbtep.2013.03.006

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, NY: Guilford Press.

Selby, E. A., Wonderlich, S. A., Crosby, R. D., Engel, S. G., Panza, E., Mitchell, J. E., . . . Le Grange, D. (2014). Nothing tastes as good as thin feels: Low positive emotion differentiation and weight-loss activities in anorexia nervosa. *Clinical Psychological Science, 2,* 514–531. http://dx.doi.org/10.1177/2167702613512794

Sheets, E. S., Bujarski, S., Leventhal, A. M., & Ray, L. A. (2015). Emotion differentiation and intensity during acute tobacco abstinence: A comparison of heavy and light smokers. *Addictive Behaviors, 47,* 70–73. http://dx.doi.org/10.1016/j.addbeh.2015.03.024

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,* 613–631. http://dx.doi.org/10.1177/2167702617694657

Thompson, R. J., & Boden, M. T. (2019). State emotional clarity and attention to emotion: A naturalistic examination of their associations with each other, affect, and context. *Cognition and Emotion,* 1–9. http://dx.doi.org/10.1080/02699931.2019.1572597

Tomko, R. L., Lane, S. P., Pronove, L. M., Treloar, H. R., Brown, W. C., Solhan, M. B., . . . Trull, T. J. (2015). Undifferentiated negative affect and impulsivity in borderline personality and depressive disorders: A momentary perspective. *Journal of Abnormal Psychology, 124,* 740–753. http://dx.doi.org/10.1037/abn0000064

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research, 27,* 247–259. http://dx.doi.org/10.1023/A:1023910315561

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,* 1161–1190. http://dx.doi.org/10.1111/j.1467-6494.2004.00294.x

Watkins, E. (2004). Adaptive and maladaptive ruminative self-focus during emotional processing. *Behaviour Research and Therapy, 42,* 1037–1052. http://dx.doi.org/10.1016/j.brat.2004.01.009

Watkins, E. R. (2008). Constructive and unconstructive repetitive thought. *Psychological Bulletin, 134,* 163–206. http://dx.doi.org/10.1037/0033-2909.134.2.163

Watkins, E., 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,* 364–378. http://dx.doi.org/10.1037/1528-3542.8.3.364

Watkins, E., & Moulds, M. (2005). Distinct modes of ruminative self-focus: Impact of abstract versus concrete rumination on problem solving in depression. *Emotion, 5,* 319–328. http://dx.doi.org/10.1037/1528-3542.5.3.319

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. http://dx.doi.org/10.1016/j.jad.2018.10.092

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,* 529–540. http://dx.doi.org/10.1016/j.beth.2013.04.008

Received June 5, 2018
Revision received April 16, 2019
Accepted April 22, 2019 ■