

Research Reports

Is Rumination a Risk and a Protective Factor?

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Abstract

High trait positive affect (PA) protects against depressive symptoms through cognitive responses such as rumination. However, how rumination in response to positive emotions (positive rumination) protects against depressive symptoms while rumination in response to negative emotions (brooding) predicts depressive symptoms is poorly understood. We hypothesized that (a) positive rumination and brooding represent a shared cognitive process of affect amplification on distinct affective content and (b) less brooding and greater positive rumination would distinctly mediate greater trait PA in predicting fewer depressive symptoms. Our prospective design among 321 adults first compared three confirmatory factor analysis models of the relationship between brooding and positive rumination. We then utilized structural equation modeling to examine whether brooding and positive rumination mediated the relationship between trait PA and depressive symptoms, controlling for baseline depressive symptoms, trait negative affect (NA), and the distinct effects of each mediator. Results supported a conceptualization of brooding and positive rumination as distinct but related constructs, represented as a common process of affect amplification to explain how rumination may amplify resilience or risk in predicting depressive symptoms ($\chi = 195.07$, $\Delta\chi = 8.78$, $p < .001$, CFI = .91, RMSEA = .07). Furthermore, positive rumination and brooding were distinctly predicted by trait PA, suggesting that trait PA exerts distinct effects on protective and risk forms of rumination. Less brooding mediated the relationship between greater trait PA and fewer depressive symptoms ($\beta = -.04$, $p = .012$), but positive rumination did not ($\beta = .02$, $p = .517$). Rumination may represent a protective and a risk factor, which may better enable individuals who brood to redirect their rumination on positive content and thereby reduce their risk of depressive symptoms.

Keywords: affect, broaden-and-build, depression, resiliency, rumination

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Research has increasingly acknowledged the importance of examining high trait positive affectivity (PA) as a protective pathway against depressive symptoms by broadening attention to notice the positive aspects of events and building recovery from the negative aspects of events (Clark & Watson, 1991; Kotov, Gámez, Schmidt, & Watson, 2010; Naragon-Gainey, Gallagher, & Brown, 2013). In particular, PA is proposed to build resiliency by increasing access to adaptive cognitive responses to promote PA and reducing use of maladaptive cognitive responses to diminish negative affectivity (NA; Fredrickson, 2001, 2004). Ruminative responses are supported predictors of depressive symptoms that are hypothesized to mediate the relationship between trait PA and depressive symptoms (Arger, Sánchez, Simonson, & Mezulis, 2012; Ito, Takenaka, Tomita, & Agari, 2006). Literature presently considers rumination in response to negative content (i.e., brooding) as a risk factor for depressive symptoms (Mezulis, Simonson, McCauley, & Vander Stoep, 2011; Roelofs, Huibers, Peeters, Arntz, & van Os, 2008), and growing evidence supports rumination in response to

positive content (i.e., positive rumination) as a protective factor against depressive symptoms (Feldman, Joormann, & Johnson, 2008; Harding, Hudson, & Mezulis, 2014). Despite the designation of positive rumination and brooding as forms of rumination, however, rumination is often categorically labeled as a harmful cognitive response that diminishes resiliency and predicts a range of poor health outcomes, especially depressive symptoms (Harvey, Watkins, Mansell, & Shafran, 2009; Ottaviani et al., 2016). In the pursuit of resiliency, reconsidering rumination as both a protective and a risk factor may allow greater flexibility in conceptualizing cognitive tendencies and inform interventions that shift cognitive focus from NA to PA content, rather than discouraging rumination altogether.

Trait PA and Rumination Predict Depressive Symptoms

Trait PA is a core dimension of temperament that describes an individual's tendency to experience frequent and intense activity, pleasure, and positive anticipation of the future (Rothbart, 2007). All individuals exhibit some degree of trait PA that remains relatively stable across time and situations. High trait PA is a protective factor against depressive symptoms and related non-suicidal self-injury, with low trait PA conversely representing a risk factor for these conditions (Naragon-Gainey, Watson, & Markon, 2009; Watson, Gamez, & Simms, 2005). High trait PA is a unique resiliency factor against depressive symptoms over and above the predictive value of trait NA (Brown, Chorpita, & Barlow, 1998; Clark & Watson, 1991), which describes an individual's tendency to experience intense and frequent NA (Evans & Rothbart, 2007). Furthermore, high trait PA demonstrates an "undoing effect" by buffering against the detrimental effects of high trait NA in predicting depressive symptoms (Riskind, Kleiman, & Schafer, 2013). In addition to distinctly predicting depressive symptoms, trait PA inhibits the risk conferred by trait NA and may exert similar effects on the risk conferred by cognitive tendencies such as brooding.

Rumination is defined as "the process of thinking perseveratively about one's feelings and problems rather than in terms of the specific content of thoughts" (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Theoretical understanding of rumination is rooted in response styles theory (Nolen-Hoeksema, 1991), which discusses maladaptive cognitive responses to NA and NA-eliciting events that predict depressive symptoms and emphasizes rumination on negative affective content as a central depressogenic cognitive response. Rumination may be in reference to positive affective content, negative affective content, or be neutral in affective valence (Feldman et al., 2008; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Positive rumination refers to responding to positive events and mood states with perseverative cognitive focus on positive content, which represents an adaptive cognitive process that increases PA and predicts fewer depressive symptoms (Feldman et al., 2008). As a counterpart to positive rumination, brooding refers to responding to negative events and mood states with perseverative cognitive focus on negative content, which represents a maladaptive cognitive process that increases NA and predicts greater depressive symptoms (Nolen-Hoeksema, 1991; Treynor et al., 2003). Positive rumination is an adaptive form of rumination that amplifies PA (Gilbert, Nolen-Hoeksema, & Gruber, 2013), while brooding is a maladaptive form of rumination that amplifies NA (Moberly & Watkins, 2008).

Theory on Trait PA, Rumination, and Depressive Symptoms

Broaden-and-Build Theory of Positive Emotion

The broaden-and-build theory of positive emotion links trait and state PA to a wide range of behaviors and cognitions (Fredrickson, 2001, 2004). Specifically, this theory asserts that PA builds mental and physical

resources to widen the range of thoughts and behaviors in which an individual is willing to engage, which may improve resiliency against the development of depressive moods and behaviors. The broaden-and-build theory assumes that depressive symptoms deplete mental and physical resources and encourage rigid cognitive patterns that are maintained by NA (Peterson & Seligman, 1984). Based on this view of depressive symptoms, greater trait PA may increase resiliency against depressive symptoms by broadening attentional biases and increasing access to alternative cognitive responses. Over time, these cognitive patterns are proposed to alter the experience of both PA and NA. While not limited to depressive symptoms, the broaden-and-build theory predicts that greater PA increases the resources available to adaptively endure everyday challenges and appreciate positive events, which may protect against depressive symptoms over time.

The broaden-and-build theory proposes that greater PA broadens an individual's capacity to engage in adaptive cognitive responses to further increase PA (e.g., positive rumination) and evade maladaptive cognitive responses (e.g., brooding) to recover faster from NA. For example, a person who is positively ruminating during a professional training event may be more able to shift cognitive focus to notice a broader scope of details of the event that is eliciting their PA. Alternatively, if an individual is brooding in response to the same professional training event, they may have greater access to the alternative cognitive response of positive rumination and become more aware of positive aspects of the event, since PA broadens attention to notice more aspects of an event and increases access to alternative cognitive responses such as positive rumination. By promoting experiences of PA and recovery from NA, greater trait PA may predict both forms of rumination and through these cognitive pathways distinctly predict depressive symptoms. Since greater positive rumination predicts fewer depressive symptoms and greater brooding predicts greater depressive symptoms, the content of rumination may determine whether rumination confers protection against or risk toward depressive symptoms.

Appraisal Theories

As a framework to understand how positive rumination and brooding may impact PA and NA, appraisal theories assert that events are labeled as positive or negative based on cognitive interpretations of specific events and the resultant affect elicited by those events (Ellsworth & Scherer, 2003). Rumination represents one way events may be labeled as positive (through positive rumination) or negative (through brooding) and is an ongoing affective experience that shifts in valence and intensity based on how an event is interpreted (Ortony, Clore, & Collins, 1988; pp. 1-25). For example, an individual may interpret the event of attending a professional training as positive by engaging in positive rumination such as, "I feel so energized to learn today" or "I'm really enjoying learning this material." Alternatively, they also may brood in response to this event by endorsing thoughts such as, "I'm not competent enough in this area" or "I feel so frustrated that I have to sit inside all day." Such ruminative responses may exist within the same individual, who then labels the event as positive or negative depending on the affective content of the rumination. Consequently, all events have the potential to elicit PA and NA, with the valence of a given affective experience impacted by how the event is cognitively interpreted. Given that positive rumination and brooding both represent forms of rumination, the affective content of the rumination may determine whether rumination is adaptive (e.g., positive rumination) or maladaptive (e.g., brooding).

Taken together, cognitive-affective theories posit that the relationship between trait PA and depressive symptoms may be impacted by the cognitive processing of PA and NA. However, an empirical division remains between positive and negative cognitive-affective pathways to depressive symptoms in that many studies consider the trait NA-brooding-depressive symptoms pathway as distinct from the trait PA-positive rumination-

depressive symptoms pathway (Feldman et al., 2008; Mezulis et al., 2011; Roelofs et al., 2008). Dividing cognitive-affective pathways to depressive symptoms into positive and negative categories may mask important conceptual and statistical overlap between these pathways. First, the assumption that distinct affective pathways (i.e., PA and NA) predict distinct cognitive responses is untested and inconsistent with research demonstrating that PA and NA both considerably share variance in predicting depressive symptoms (Clark & Watson, 1991; Kotov et al., 2010; Naragon-Gainey et al., 2013; Wetter & Hankin, 2009). Second, positive rumination is demonstrated to be negatively correlated with depressive symptoms over and above brooding and negatively correlated with brooding across multiple studies of depressive symptoms (Feldman et al., 2008; Raes, Daems, Feldman, Johnson, & Van Gucht, 2010), which supports statistical overlap in protective and risk cognitive pathways despite proposed conceptual distinction. Third, whereas positive rumination and brooding have been proposed as distinct cognitive responses that may link affective pathways to depressive symptoms (Fredrickson, 2001, 2004; Treynor et al., 2003), both describe ruminative responses that are proposed to amplify affective content (Gilbert & Gruber, 2014; Weitzman, McHugh, & Otto, 2011) and through amplifying affect subsequently predict depressive symptoms (Feldman et al., 2008; Nolen-Hoeksema, 1991). Positive rumination and brooding may share a common process of affect amplification, but no known research has examined these cognitive responses jointly in the relationship between trait PA and depressive symptoms.

Cognitive Responses May Mediate the Effect of Trait PA on Depressive Symptoms

Positive rumination and brooding are theoretically proposed to predict depressive symptoms through a perseverative cognitive process (i.e., rumination) that amplifies affect. Affect amplification refers to the process of directing attention to the affective content of events, which results in increasing the intensity of an individual's affective experience regardless of the valence of the affect (Weitzman et al., 2011). Affect amplification and rumination are not clearly distinguished in the literature, although rumination may be best characterized as one form of affect amplification. Although positive rumination is defined as exclusively pertaining to PA and brooding is defined as exclusively pertaining to NA, affect amplification additionally may diminish the opposing form of affect. For example, the broaden-and build theory and supporting research assert that adaptive cognitive responses like positive rumination that amplify PA may additionally buffer against the experience and persistence of NA (Fredrickson, 2001, 2004; Quoidbach, Berry, Hansenne, & Mikolajczak, 2010). As a result, greater trait PA may increase an individual's predisposition to engage in greater adaptive cognitive responses and fewer maladaptive responses. Positive rumination and brooding may exert dual effects on PA and NA as part of this affect amplification process, with positive rumination amplifying PA while diminishing NA and brooding amplifying NA while diminishing PA.

Cognitive processes in the relationship between trait affect (i.e., trait PA and trait NA) and depressive symptoms have been separately considered for PA and NA, but investigation of a shared affect amplification process is yet unexplored. Both cognitive responses may represent the same underlying cognitive process, which could support a more unified literature in understanding how trait affect predicts depressive symptoms through shared language. Research supports mediation relationships for brooding as a risk mechanism and positive rumination as a protective mechanism (Arger et al., 2012; Harding et al., 2014; Mezulis et al., 2011; Roelofs et al., 2008), but the shared variance between these two cognitive responses additionally may explain how protective and risk factors relate and are jointly transmitted in the relationships between trait affect and depressive symptoms. Affect amplification may offer a unifying cognitive process to describe overlapping but distinct cognitive mechanisms in predicting depressive symptoms.

Current Study

Our prospective study among adults examined whether positive rumination and brooding were best understood as types of rumination that share a common process of affect amplification. We additionally examined whether positive rumination and brooding exerted distinct mediation effects in the relationships between trait PA and trait NA in predicting depressive symptoms. In Part 1, we modeled nested relationships between positive rumination and brooding to determine whether they represented (a) distinct constructs, (b) distinct but related constructs, or (c) the same construct. We hypothesized that positive rumination and brooding would represent distinct but related constructs with the shared variance representing affect amplification. In Part 2, we then examined positive rumination and brooding as cognitive mechanisms through which trait PA predicted depressive symptoms across eight weeks, controlling for the effects of trait NA and depressive symptoms at Week 1. The best-fitting measurement model from Part 1 was included as the mediation model. We hypothesized that (a) greater trait PA would predict greater positive rumination and less brooding, (b) greater positive rumination and less brooding would distinctly predict fewer depressive symptoms, and (c) greater positive rumination and less brooding would distinctly mediate the relationship of greater trait PA predicting fewer depressive symptoms.

Method

Participants and Procedure

Participants were 321 (73.5% female) undergraduate students with an age range of 18-29 years ($M = 19.03$, $SD = 1.64$). Approximately 70.40% of participants were Caucasian American, 2.80% were African American, 16.5% were Asian American, 0.60% were Native American, 4.70% were Hispanic/Latino American, and 5.00% identified as another or multiple cultural backgrounds. Participants were recruited via presentations in undergraduate psychology courses, contacted via email with links to the online questionnaires, and compensated with research credit required for their coursework. Participants who completed the Week 1 questionnaire on trait affect, positive rumination, brooding, and depressive symptoms were invited to complete a second questionnaire of their depressive symptoms seven weeks later (Week 8). All variables were directly measured except affect amplification, which represents the shared variance between positive rumination and brooding. Data were derived from a larger collection that contributed published work that also utilized measures of trait affect and depressive symptoms (Harding et al., 2014; Hudson, Harding, & Mezulis, 2015).

Measures

Depressive Symptoms

Depressive symptoms were measured at Week 1 as a covariate and seven weeks later as the dependent variable with the 20-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). Participants rated how they felt and behaved over the past week. Responses ranged from 0 (*rarely or none of the time*) to 3 (*most or all of the time*) for items such as, "I was bothered by things that usually don't bother me" and "I felt hopeful about the future." Higher scores indicated greater symptoms. Cronbach's α ranged from .85-.90 in previous studies (Radloff, 1977). In our study, $\alpha = .88$ at Week 1 and $\alpha = .86$ at Week 8.

Trait PA

Trait PA was measured at Week 1 with the 11-item PA subscale of the Adult Temperament Questionnaire (ATQ; Evans & Rothbart, 2007). Participants rated how well each statement described them. Responses ranged from 1 (*extremely untrue of you*) to 7 (*extremely true of you*) for items such as, “I rarely feel happy” and “When I don't feel unhappy, I usually feel happy instead of neutral.” Higher scores indicated greater trait PA. Cronbach's $\alpha = .84$ in a previous adult sample (Evans & Rothbart, 2007). In our study, $\alpha = .81$.

Trait NA

Trait NA was measured at Week 1 with the 51-item NA subscale of the Adult Temperament Questionnaire (ATQ; Evans & Rothbart, 2007). Participants rated how well each statement described them. Responses ranged from 1 (*extremely untrue of you*) to 7 (*extremely true of you*) for items such as, “I become easily frightened” and “I often get irritated when I'm trying to make an important phone call and get a busy signal.” Higher scores represented greater trait NA. Cronbach's α ranged from .76-.86 in a previous adult sample (Evans & Rothbart, 2007). In our study, $\alpha = .88$.

Brooding

Brooding was measured at Week 1 with the 5-item brooding subscale of the Ruminative Responses Scale (RRS; Nolen Hoeksema, 1991), which is part of a 22 item measure of ruminative responses to NA. Participants rated how often they generally thought or did each statement when they experienced NA. Responses ranged from 1 (*never*) to 4 (*always*) for items such as, “Think ‘What am I doing to deserve this?’” and “Think about a recent situation, wishing it had gone better.” Higher scores indicated greater brooding. Cronbach's α ranged from .72-.78 in previous studies (Olson & Kwon, 2008; Surrence, Miranda, Marroquín, & Chan, 2009; Treynor et al., 2003). In our study, $\alpha = .80$.

Positive Rumination

Positive rumination was measured at Week 1 with the 9 positive rumination items of the Response to PA Scale (RPA; Feldman et al., 2008), which is a 17 item scale on ruminative responses to PA. Participants rated how often they generally thought or did each statement when they experienced PA. Responses ranged from 1 (*almost never*) to 4 (*almost always*) for items such as, “When you are feeling happy, how often do you think about how happy you feel?” and “When you are feeling happy, how often do you think ‘I am living up to my potential’?” Higher scores indicated greater positive rumination. Cronbach's α ranged from .73-.76 in a previous study (Feldman et al., 2008). In our study, $\alpha = .83$.

Results

Data Analytic Plan

Data analyses were conducted with AMOS 21.0 in two parts. Part 1 conducted a Confirmatory Factor Analysis (CFA) of Week 1 measures of brooding (five items) and positive rumination (nine items) and sequentially tested three nested models (Figure 1): positive rumination and brooding modeled as distinct constructs (Model 1), distinct but related constructs (Model 2), and the same construct (Model 3). Model fit was evaluated through comparing chi square difference tests and model fit indices to determine which model demonstrated the best fit to the data (Byrne, 2010, pp. 53-95). Thereafter, Part 2 examined Week 1 trait PA in predicting Week 8

depressive symptoms as mediated by the best fitting model in Part 1 and controlling for Week 1 trait NA and depressive symptoms (Model 4).

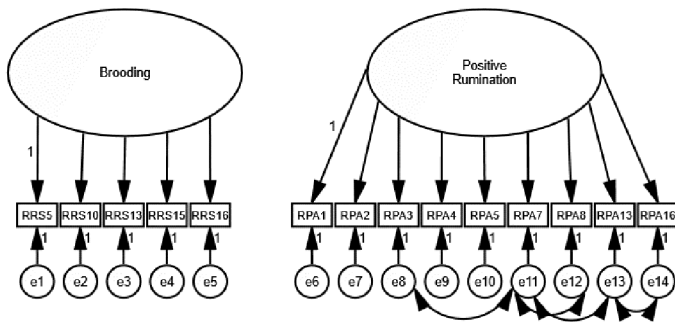


Figure 1a. Model 1 of brooding and positive rumination as distinct constructs.

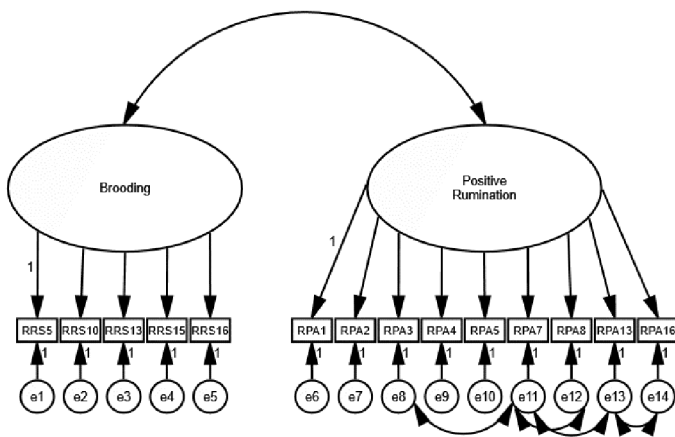


Figure 1b. Model 2 of brooding and positive rumination as distinct constructs with shared variance representing affect amplification.

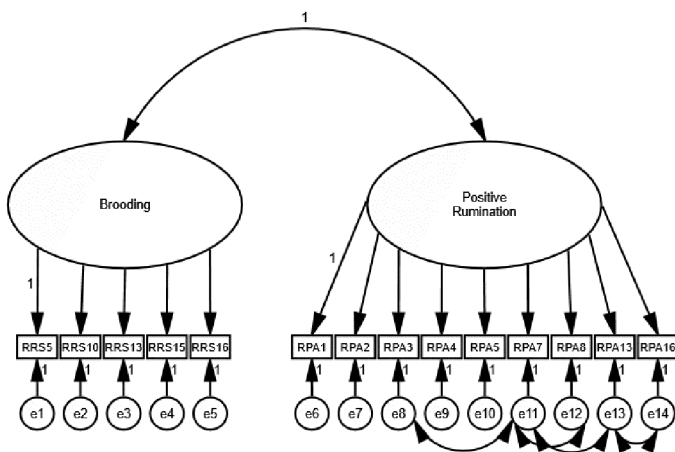


Figure 1c. Model 3 of brooding and positive rumination as the same construct of affect amplification.

Data met all parametric assumptions (Kline, 2005) and were missing completely at random (MCAR) for both weeks as indicated by a non-significant Little's MCAR test (Week 1 $\chi^2[3808] = 3699.08, p = .895$; Week 8 $\chi^2[139] = 162.98, p = .080$). Missing data were handled through multiple imputation in the Statistical Package for the Social Sciences (SPSS) 21.0 for participants who completed at least 80% of each measure (Eekhout et al., 2014). Missing data analyses in SPSS 21.0 indicated that 0.61% of data were missing at Week 1 and 0.33% of data were missing at Week 8 for a combined 0.56% of missingness across weeks. Variable correlations and descriptives are presented in Table 1.

Table 1

Variable Correlations and Descriptives.

Variable	1	2	3	4	5	<i>M</i>	<i>SD</i>
1. Week 1 Depressive Symptoms						14.41	9.09
2. Week 1 NA	.55**					4.00	0.65
3. Week 1 PA	-.47**	-.41**				5.09	0.88
4. Week 1 Brooding	.44**	.51**	-.30**			9.70	2.98
5. Week 1 Positive Rumination	-.05	.03	.27**	.17**		21.87	4.70
6. Week 8 Depressive Symptoms	.49**	.40**	-.33**	.35**	.02	12.84	9.93

* $p < .05$. ** $p < .01$.

Affect amplification as defined by Weitzman et al. (2011) implicates rumination as a form of affect amplification, and response styles theory (Nolen-Hoeksema, 1991) similarly defines rumination as a category of cognitive responses that increase the intensity of the affective content on which an individual perseverates. Based on these conceptualizations of rumination as amplifying affective content, we tested affect amplification through confirmatory factor analyses by labeling the shared variance of positive rumination and brooding as affect amplification, since conceptually positive rumination and brooding are proposed to differ in the valence of their affective content, not the perseverative and intensifying nature of their cognitive process. Rumination as a concept is proposed to amplify affect, regardless of the valence of the affect. We proposed that the distinct variances of positive rumination and brooding would represent positive affective content and negative affective content, respectively, which is consistent with how literature describes them as distinct forms of rumination.

Part 1: CFA

CFA in AMOS 21.0 compared three Structural Equation Modeling (SEM) models to determine whether positive rumination and brooding were best conceptualized as two distinct factors (Model 1), two related factors (Model 2), or a single factor (Model 3). We first examined chi square values between models, which indicated that Model 2 best fit the data (i.e., closest to 0) and fit the data significantly better than models 1 or 3 (i.e., the chi square difference tests comparing Models 2 vs. 1 and Models 3 vs. 2 were statistically significant in favor of Model 2). We then examined the Comparative Fit Index (CFI) for each model, which also indicated that Model 2 best fit the data but was below the recommended cutoff for superior model fit (i.e., CFI of .95 or above indicates superior model fit; Byrne, 2010). Similarly, the Root Mean Square Error of Approximation (RMSEA) supported mediocre model fit and was above the recommended cutoff of .05 for below to support superior model fit (<.05 is superior model fit, .05-.10 indicates mediocre model fit, Byrne, 2010). However, Model 2 demonstrated slightly better model fit compared to Model 1 and demonstrated considerably better fit compared to Model 3. Lastly, Model 2 best fit the data based on the Akaike information criterion (AIC) and Bayesian Information

Criterion (BIC), which demonstrated slightly lower values than Model 1 and considerably lower values than Model 3 (lower values indicate better fit). Model 2 fit significantly better than Model 1, whereas constraining the latent factors to equality in Model 3 led to a significant loss of fit relative to Model 2. Across model fit indices, Model 2 was supported as the best fitting model to the data.

Improving Model Fit: Modification Indices

Due to the marginal but comparatively best fit of Model 2, modification indices were examined for all three models to determine the potential for theory-consistent model fit improvement. Modification indices displayed the greatest improvements in model fit if the residual terms of four pairs of items within the RPA were allowed to covary. Two pairs of items between the RRS and RPA were also indicated as modification indices, but these covariances did not represent items that were conceptually related or theoretically consistent. Consequently, only modification indices allowing residual term covariances between RPA items were added to all three models (Table 2). The inclusion of modification indices improved the fit of all models, with Model 2 demonstrating superior fit compared to Model 1 (Figure 2).

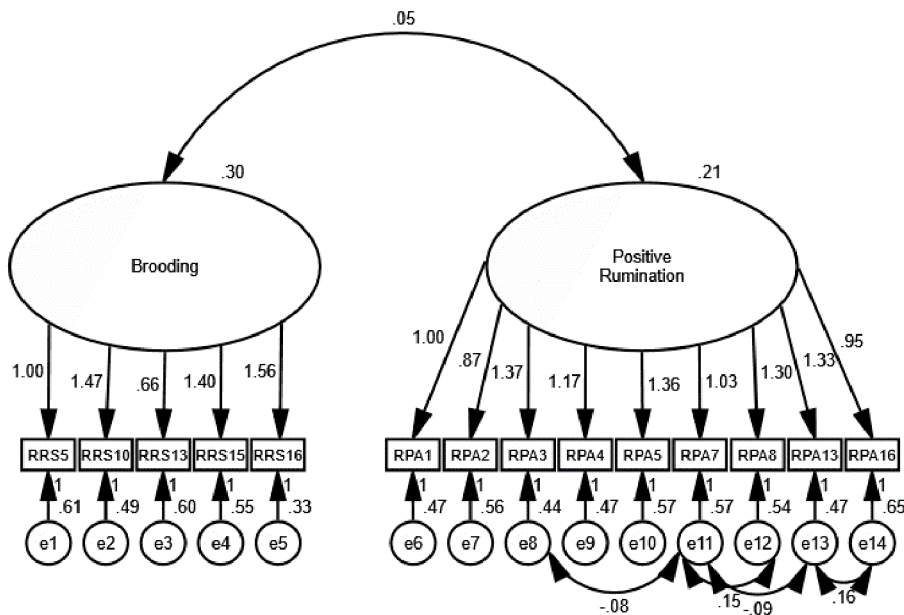


Figure 2. Model 2 loadings of brooding and positive rumination (with modification indices) representing the distinct but related processes of negative amplification and positive amplification.

Part 2: Mediation Analyses

After establishing Model 2 as the best fitting conceptualization of positive rumination and brooding in Part 1, Part 2 examined PA, NA, positive rumination, and brooding in the prediction of depressive symptoms seven weeks later through an SEM mediation model. The indirect effects of each mediator were calculated and the contributions of the opposite mediator were controlled in analyses. Week 1 trait NA and depressive symptoms were controlled and all variables were simultaneously entered into one SEM. Phantom variables were modeled to accommodate multiple predictor and mediator variables in the same model, which allowed the calculation of distinct indirect effects for each mediator (Macho & Ledermann, 2011).

We examined mediation relationships through a bias-corrected bootstrapping approach (Shrout & Bolger, 2002) to test for the significance of SEM indirect effects in Model 4. Based on this approach, we generated 1,000 bootstrap samples with 95% bias-corrected confidence intervals and bootstrap estimates of indirect, direct, and total effects. The relationships between trait PA and depressive symptoms were determined to be mediated by positive rumination and brooding if (a) the direct effect value decreased compared to the total effect value, (b) the indirect effect was statistically significant, and (c) the confidence intervals for the indirect effect did not contain zero (Hayes, 2013; Shrout & Bolger, 2002). Our hypotheses proposed four separate mediation relationships, with Week 1 trait PA predicting Week 8 depressive symptoms as mediated by Week 1 positive rumination and brooding and controlling for Week 1 trait NA and depressive symptoms. Model 4 fit to the data supported interpretation of the structural model and subsequent mediation analyses (Table 2).

Table 2

Model Comparisons

Model	χ^2	df	Models	$\Delta\chi^2$	Δdf	CFI	RMSEA	AIC/BIC
Model 1	203.85*	77				.902	.072	259.85/365.45
Model 2	195.07*	76	1 vs. 2	-8.78*	-1	.908	.070	253.07/362.44
Model 3	422.26*	77	1 vs. 3	218.41*	0	.732	.118	478.26/583.86
Model 1 with MI	140.72*	73				.947	.054	204.72/325.41
Model 2 with MI	131.35*	72	1 vs. 2	-9.37*	-1	.954	.051	197.35/321.81
Model 3 with MI	355.98*	73	1 vs. 3	215.26*	0	.780	.110	419.98/540.97
Model 4 with MI	250.81*	123				.928	.057	342.00/986.92

Note. Cutoff for 1 df = 3.841. MI = Modification indices added between positive rumination items.

* $p < .001$.

In support of our hypotheses, greater trait PA predicted fewer depressive symptoms distinctly from trait NA. Findings additionally supported significant predictive relationships between trait PA and depressive symptoms, since (a) trait PA and depressive symptoms statistically correlated, (b) trait PA temporally preceded depressive symptoms, and (c) third variable explanations were mitigated through the covariates of trait NA and depressive symptoms at Week 1 (Field, 2009, pp. 173-174). Also consistent with hypotheses, greater trait PA predicted greater positive rumination and less brooding. Partially consistent with hypotheses, less brooding predicted fewer depressive symptoms, but positive rumination did not significantly predict depressive symptoms in either direction.

Positive rumination did not significantly mediate the relationships between trait PA and depressive symptoms based on the criteria that (a) the direct effect did not significantly decrease in value compared to the total effect value, (b) the indirect effects were non-significant, and (c) the confidence intervals of the indirect effects contained zero (Table 3). However, brooding mediated the relationship between trait PA and depressive symptoms such that greater trait PA predicted fewer depressive symptoms through less brooding. In support of mediation, the effect of trait PA on depressive symptoms decreased by 18.54% when brooding was in the model (Figure 3).

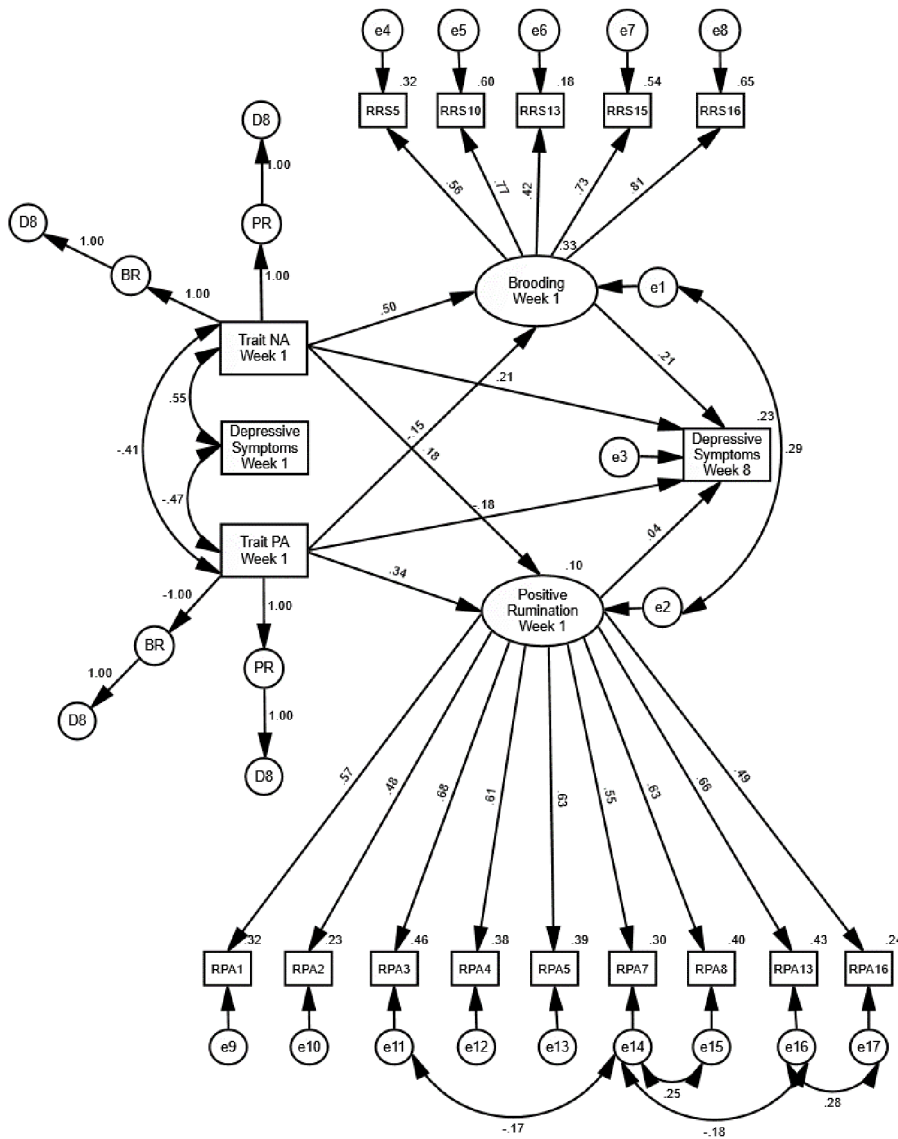


Figure 3. Model 4 of brooding and positive rumination mediating the relationship between trait affect and depressive symptoms with Model 2 as the mediator.

Table 3

Model 4 Bootstrap Analysis of Positive Rumination and Brooding Mediating the Relationships Between Trait Affect and Depressive Symptoms

Model Pathway	Standardized				<i>p</i>
	β	SE	95% CI		
			Lower	Upper	
Combined					
<i>c</i> Trait PA→Depressive	-.20	.06	-.31	-.09	.002
<i>c'</i> Trait PA→Depressive	-.18	.06	-.30	-.05	.003
Brooding					
α Trait PA→Brooding	-.15	.06	-.27	-.04	.014
β Brooding→Depressive	.21	.07	.07	.36	.005
Trait PA→Depressive $\alpha \times \beta$ (<i>c - c'</i>)	-.04	.15	-.09	-.01	.012
Trait PA→Depressive <i>c'</i>	-.04 ^a				
Positive Rumination					
α Trait PA→Positive Rumination	.34	.07	.20	.47	.002
β Positive Rumination→Depressive	.04	.06	-.09	.16	.566
Trait PA→Depressive $\alpha \times \beta$ (<i>c - c'</i>)	.02	.14	-.03	.07	.517
Trait PA→Depressive <i>c'</i>	-.21 ^b				

^a-.04 = (*c* - [*c - c'*]) = (-.20 - [-.20 + .04]).

^b-.21 = (*c* - [*c - c'*]) = (-.20 - [-.20 + .21]).

Discussion

The current study examined whether positive rumination and brooding were best understood as types of rumination that share a common process of affect amplification but are distinguished by the valence of the affective content of the rumination. We then examined whether positive rumination and brooding mediated trait PA in predicting depressive symptoms. While less brooding did protect against depressive symptoms, positive rumination did not significantly predict depressive symptoms despite being predicted by trait PA. The joint examination of positive rumination and brooding represents a novel endeavor to integrate rumination as a form of affect amplification rather than inaccurately dividing rumination in response to PA (i.e., positive rumination) from rumination in response to NA (i.e., brooding). In further support that positive rumination and brooding represent a partially shared cognitive process on PA and NA, a recent study demonstrated that rumination in response to an imagined future goal increased an individual's emotional reactivity to that event by amplifying their experience of PA and NA (Gilbert & Gruber, 2014). Rumination was supported as a form of affect amplification of PA and NA.

Trait Affect, Cognitive Responses, and Depressive Symptoms

Findings demonstrated that greater trait PA distinctly predicted fewer depressive symptoms controlling for the effects of trait NA and depressive symptoms at Week 1, which was consistent with existing literature on the relationships between trait PA and depressive symptoms (Clark & Watson, 1991; Kotov et al., 2010; Naragon-Gainey et al., 2013). Greater trait PA also distinctly predicted greater positive rumination and less brooding, and less brooding distinctly mediated greater trait PA in providing resiliency against depressive symptoms. Findings

support brooding as a significant mediator of the relationship between trait PA and depressive symptoms, with trait PA potentially undoing the effects of trait NA through predicting less brooding and subsequently fewer depressive symptoms. Greater trait PA distinctly predicted greater engagement in positive rumination and less engagement in brooding, meaning that trait PA impacted the affect amplification of PA and NA.

Contrary to our predictions, greater positive rumination did not predict fewer depressive symptoms. Despite studies supporting a significant relationship between positive rumination and depressive symptoms (Feldman et al., 2008; Harding et al., 2014), multiple studies similarly demonstrated no effect between positive rumination and depressive symptoms (Gilbert et al., 2013; Raes, Smets, Nelis, & Schoofs, 2012). One research group recently acknowledged this literature discrepancy and specifically investigated the effect of positive rumination on anhedonic depressive symptoms (Nelis, Holmes, & Raes, 2015). They demonstrated that greater positive rumination predicted fewer anhedonic symptoms, despite a lack of overall significance predicting depressive symptoms or depressive symptoms predicting positive rumination. This finding suggested that the impact of positive rumination may be specific to anhedonia, with greater positive rumination predicting fewer anhedonic depressive symptoms but not predicting the excess of negative affect and associated symptoms that comprise depressive disorders. Further research is needed to disentangle the effects of positive rumination in the prediction of mood disorder symptoms.

The lack of a significant relationship between positive rumination and depressive symptoms also may be partially explained by a methodological over-emphasis on excess NA rather than a lack of PA when measuring depressive symptoms. For example, the CES-D that we utilized to measure depressive symptoms contains four items on PA that are reverse-scored, but it contains no items specific to anhedonia. Consequently, whether a study finds that greater positive rumination predicts fewer depressive symptoms may depend on the emphasis of anhedonia within the depressive symptoms measure. This over-emphasis on excessive NA and under-emphasis on limited PA in measuring depressive symptoms reflects existing literature on cognitive-affective models of depressive symptoms that similarly focus on NA but neglect integrating the role of PA in jointly predicting depressive symptoms (Beck, 1967; Nolen-Hoeksema, 1991). Consequently, the lack of a significant relationship between positive rumination and depressive symptoms may reflect a measurement inaccuracy that is rooted in a theoretical inaccuracy regarding how depressive symptoms are conceptualized.

Theoretical Implications

Depressive symptoms literature presently separates theories on symptom development and maintenance into protective and risk mechanisms (Beck, 1967; Fredrickson, 2001; Nolen-Hoeksema, 1991), with no unified theory to explain the joint roles and similarities between positive rumination and brooding or how PA and NA are amplified through cognitive mechanisms to predict depressive symptoms. The unique effects of trait PA and trait NA in predicting brooding further blur theoretical distinctions between cognitive protections and cognitive risks, since brooding is supported to mediate trait PA and trait NA pathways to depressive symptoms. Findings support broaden-and-build theory by demonstrating that trait PA impacts PA and NA distinctly, which strengthens the theoretical view that greater PA both amplifies experiences of PA and mitigates experiences of NA. Findings are also consistent with the appraisal theory framework that events elicit a combination of PA and NA, which may explain why brooding is distinctly impacted by PA and NA *and* how brooding potentially exerts its effects on depressive symptoms through increasing NA and decreasing PA in response to events, whether those events are labeled as negative or positive. While appraisal theories do not explicitly integrate protective and risk mechanisms in pathways to depressive symptoms, incorporating appraisal theories with existing

theories may offer a unifying foundation to better understand how PA and NA jointly predict depressive symptoms.

Clinical Implications

Applied clinically, findings suggest that interventions aiming to decrease brooding may exert a stronger effect in decreasing depressive symptoms compared to interventions aiming to increase positive rumination. Due to limited literature examining positive rumination and brooding as related constructs, it is unknown whether clinical interventions that aim to decrease brooding may concurrently decrease or increase positive rumination. This question is partially addressed through research by Kiken and Shook (2014), which found that trait mindfulness was negatively associated with negative rumination but not associated with positive rumination. Hence, mindfulness interventions may decrease brooding without discouraging positive rumination.

Determining how brooding interventions impact positive rumination is an important clinical consideration, since discouraging rumination as a blanket construct may inaccurately communicate to individuals that rumination is maladaptive across contexts. While literature is mixed on positive rumination as a protection against depressive symptoms, interventions that target both positive rumination and brooding may present a greater therapeutic benefit for individuals with bipolar mood symptoms, since greater brooding is demonstrated to predict greater depressive symptoms and greater positive rumination is demonstrated to predict greater hypomanic symptoms (Feldman et al., 2008; Johnson, McKenzie, & McMurrich, 2008; Raes et al., 2010). Since increasing positive rumination may risk the onset of a hypomanic or manic episode in individuals with bipolar disorders, interventions that increase positive rumination should be monitored and moderated among certain clinical populations.

Clinical interventions that promote directed attention to PA and the reappraisal of events from negative to positive are important future directions in the study of resiliency against depressive symptoms (Quoidbach, Mikolajczak, & Gross, 2015). If redirecting brooding to positive rumination may be considered a form of reappraisal, this shift in ruminative focus may improve control over an individual's event-specific experiences of PA. Instead of considering mindfulness as a cognitive intervention to combat ruminative responses, mindfulness instead may be clinically applied as a similar or complementary approach to rumination. For example, a mindfulness exercise involving a full sensory experience of an enjoyable meal may pair mindful attention to the sensory experience of eating with positive rumination on thoughts related to how enjoyable the meal is. Comparing the affective experience of this activity when engaging in rumination only, mindfulness only, or a combination of rumination and mindfulness may provide valuable insight into the contributions of rumination as a context-specific protective or risk factor. Clinical literature commonly assumes that rumination and mindfulness are contradictory cognitive responses (Ietsugu et al., 2015; Snippe et al., 2015), but this unexamined assumption may limit our capacity to clinically utilize the potential strengths inherent in both cognitive responses.

Limitations and Future Directions

Several study limitations should be considered when interpreting findings. First, the current study applied a non-experimental design that is consistent with causality but cannot directly test for causal relationships due to the presence of only two time points and lack of direct experimental manipulation. Second, trait PA, trait NA, and cognitive responses were measured at Week 1, which limited the prospective nature of the causal model and prevented us from statistically demonstrating the temporal precedence of trait PA before ruminative

responses. However, the nature of trait PA does theoretically support the temporal precedence of trait affect due to its description as a stable dimension of temperament across time and situations. In contrast, positive rumination and brooding represent more malleable and event-specific responses. Third, an overall lack of research on the integration of cognitive mechanisms in the relationship between trait affect and depressive symptoms limits available literature to support the proposed relationships.

Future directions may seek to replicate the supported relationships, since the presented findings represent the only known examination of the joint contributions of positive rumination and brooding. If these relationships are supported, including PA and NA as well as positive rumination and brooding in predictive models of depressive symptoms may be warranted as standard practice, since results support considerable statistical overlap among these affective and cognitive predictors (Table 1). In addition, growing literature on PA and depressive symptoms would benefit from an integrated theoretical understanding on the joint contributions of cognitive mechanisms in the relationship between trait PA and depressive symptoms. To date, theories on depressive symptoms offer largely distinct conceptualizations of affective and cognitive protections and risks. Lastly, future clinical interventions to prevent and treat depressive symptoms could develop cognitive interventions that both increase PA and decrease NA, since difficulty experiencing PA (i.e., anhedonia) is often under-emphasized in measuring depressive symptoms. Rumination may represent a protective and a risk factor that impacts PA and NA, and integrating understanding of resiliency against and risk toward depressive symptoms may better enable individuals to think adaptively in addition to or in spite of their trait affective tendencies.

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