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Dampening and brooding jointly link temperament with depressive symptoms: A prospective study

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ABSTRACT

Integrated affective-cognitive models of depression suggest that the effects of trait temperament (low positive affectivity (PA) and high negative affectivity (NA)) on depressive symptoms may be mediated by maladaptive cognitive strategies. Research and theory suggest that the effect of NA on depression is mediated by brooding and the effect of PA on depression is mediated by dampening. Despite correlations among these constructs, no studies have examined joint contributions of PA, NA, brooding, and dampening on depression. The present study examined the effects of NA and PA on prospective increases in depressive symptoms, and whether effects were mediated by brooding and dampening. Hypotheses were tested in an eight-week study of 333 young adults; depressive symptoms were assessed at weeks one and eight. Participants reported their use of dampening and brooding in response to ideographically identified weekly events in weeks two through seven. Results suggest that the effect of PA on increases in depressive symptoms was mediated by use of dampening and the effect of NA on increases in depressive symptoms was mediated by use of both brooding and dampening. Future research should consider temperament traits and cognitive strategies jointly to understand the development and maintenance of depression.

1. Introduction

Depression is a significant mental health concern, especially in adolescence and young adulthood when depression increases significantly (Hankin & Abramson, 2001). Research suggests that between 11% and 16% of young adults will experience a major depressive episode by age 25 (Blazer, Kessler, McGonagle, & Swartz, 1994; Shanahan, Copeland, Costello, & Angold, 2011). Studies also suggest that subthreshold symptoms are important to examine due to their association with impaired current and future functioning. Depressive symptoms in adolescence and young adulthood increase risk for suicidality (Andrews & Lewinsohn, 1992), substance use (Lewinsohn, Solomon, Seeley, & Zeiss, 2000), difficulties with everyday functioning and academic performance (Gotlib, Lewinsohn, & Seeley, 1995; Rothon et al., 2008), and later depressive episodes (Bardone, Moffitt, Caspi, Dickson, & Silva, 1996). Understanding factors influencing the development of depressive symptoms in young adults is important for the development of effective depression prevention and intervention methods.

Depression is an affective disorder characterized by high amounts of negative emotion (depressed mood) and low amounts of positive emotion (anhedonia; American Psychological Association, 2013). Affective models of depression have posited that the temperamental traits of high negative affectivity (NA) and low positive affectivity (PA) are associated with depression (Clark & Watson, 1991). Integrated affective-cognitive models of depression have suggested that the effects of temperament on depression may be mediated by use of maladaptive cognitive strategies in response to life events, with brooding, perseverative attention on NA and negative events, mediating the effect of high trait NA on depression and dampening, directing of attention away from PA and positive events, mediating the effect of low trait PA on depression. While research and theory support both affective-cognitive pathways to depression distinctly, no research has examined the combined contributions of NA and PA, brooding, and dampening on increases in depressive symptoms.

1.1. Temperament as a risk factor for depressive symptoms

Research indicates that temperament, one's pattern of emotional, behavioral, and attentional experience and reaction to the world (Rothbart, 2007), is a vulnerability factor for psychopathology in general and for depression specifically (Compas, Connor-Smith,

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& Jaser, 2004; Muris & Ollendick, 2005). One component of temperament, trait NA, has been heavily implicated in the development of depressive symptoms. NA is described as individual trait tendency to experience more frequent, intense, and prolonged negative emotions and to demonstrate sensitivity to novel or aversive cues (Rothbart & Bates, 2006; Belsky, Hsieh, & Crnic, 1996). Studies have found a strong association between trait NA and internalizing and externalizing disorders, (Rothbart & Bates, 2006) and specifically depressive symptoms (Lengua, West, & Sandler, 1998; Mineka, Watson, & Clark, 1998; Clark & Watson, 1991). In adolescent samples, research has found that trait NA predicts depressive symptoms across the following 8 weeks (Mezulis & Rudolph, 2012), 5 months later (Verstraeten, Vasey, Raes, & Bijttebier, 2009) and 12 months later (Wetter & Hankin, 2009). In a study of young adults, Loh, Schutte, and Thorsteinsson (2014) found that high NA predicted greater depressive symptoms over 3 months. Parrish, Cohen, and Laurenceau (2011) found that while NA reactivity (one aspect of trait NA) predicted depressive symptoms 2 months later, depressive symptoms did not predict NA reactivity 2 months later, supporting the hypothesis that NA is an affective vulnerability established before and affecting later depressive symptoms.

Recently, research has begun to examine the relationship between trait PA and depression. PA is another component of temperament described as the individual tendency to experience more frequent, intense, and prolonged positive emotions and to demonstrate sensitivity to positive cues (Rothbart & Bates, 2006). Low trait PA is uniquely associated with depression above and beyond the effects of high trait NA (Clark & Watson, 1991; Feldman, Joormann, & Johnson, 2008). Research has found that trait PA prospectively predicts depressive symptoms 1 year later in an adolescent sample (Verstraeten et al., 2009) and 3 months later in a young adult sample (Loh et al., 2014). While studies often consider the effect of one temperament trait while controlling for the other, or the interactive effects of temperament (Vasey, Harbaugh, Lonigan, et al., 2013; Vasey, Harbaugh, Mikolich, Firestone, & Bijttebier, 2013), less research has considered these temperament traits jointly for additive effects. More research is needed to understand joint effects of PA and NA on depression and mechanisms driving the relationship between these temperament traits and depressive symptoms.

1.2. Cognitive strategies may mediate effects of temperament on depressive symptoms

Affective-cognitive theories of depression suggest that the effects of temperament on depression may be mediated by deployment of maladaptive cognitive strategies (Gotlib & Joormann, 2010). Research on depression suggests that cognitive strategies for responding to emotions in the face of life events may influence the effects those emotional responses have on the development of depressive symptoms (Feldman et al., 2008; Gentzler, Kerns, & Keener, 2010; Johnson, McKenzie, & McMurrich, 2008). Rumination, a well-established cognitive strategy, is a pattern of repetitive focus on negative emotions, thoughts, or life events (Nolen-Hoeksema, 1991; Mezulis, Abramson, & Hyde, 2002) and has been found to predict the onset and maintenance of depression (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Brooding, the more maladaptive component of rumination, is the passive focus on negative emotions, thoughts, and events without engagement in problem-solving to alleviate negative emotions (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Research shows that brooding mediates the relationship between NA and depression (Arger, Sanchez, Simonson, & Mezulis, 2012; Burwell & Shirk, 2007; Schoofs, Hermans, & Raes, 2010). While often studied as a trait measure, one study has found that when controlling for trait rumination and concurrent depressive symptoms, state rumination in response to weekly negative events predicted increases in depressive symptoms the following week (Mezulis & Rudolph, 2012). Brooding on negative life events has been examined as a cognitive pathway for NA only thus far. However, brooding on negative life events may also represent a cognitive response that reduces positive emotions in the moment through distraction or fault finding (Quoidbach, Berry, Hansenne, & Mikolajczak, 2010).

One maladaptive cognitive strategy which may mediate the relationship between PA and depression is dampening, which is the tendency to distract or redirect attention away from positive emotion in order to reduce it (Quoidbach et al., 2010). Individuals may dampen positive emotions for a variety reasons, including to remain consistent with their self-image or attribution style or if they believe they do not deserve to experience the positive emotion (Hayden, Klein, Durbin, & Olino, 2006; Wood, Heimpel, & Michela, 2003). Dampening has been shown to reduce state PA and predict greater depressive symptoms (Raes, Daems, Feldman, Johnson, & Van Gucht, 2009; Werner-Seidler, Banks, Dunn, & Moulds, 2013). While research has not yet found that trait PA predicts dampening, theory suggests that trait PA may predict state PA through cognitive responses that predict state PA (Fredrickson, 2004). Dampening has also been found to correlate with brooding (Johnson et al., 2008), suggesting that dampening may also be associated with NA. Raes, Smets, Nelis, and Schoofs (2012) examined brooding and dampening as mechanisms predicting depressive symptoms 3 and 5 months later. They found that greater dampening of positive emotions at time 1 predicted greater depressive symptoms after controlling for depressive symptoms and brooding at time 1. Also, the significant association between brooding and depressive symptoms fell away when controlling for dampening, suggesting that dampening is an important cognitive strategy to consider in the development and maintenance of depressive symptoms. This study also highlighted the importance of jointly considering cognitive strategies for regulating positive and negative emotions.

1.3. The current study

Little research has examined the joint contributions of temperament and cognitive strategies in the outcome of depressive symptoms. The current study aimed to investigate the role of temperament factors (NA and PA) and cognitive strategies (brooding and dampening) in predicting depressive symptoms in young adults. We hypothesized that together high NA and low PA would be associated with increases in depressive symptoms prospectively. In addition, we expected high brooding in response to negative events and high dampening in response to positive events would be associated with prospective increases in depressive symptoms. Given previous studies and correlational analyses, we hypothesized that with all variables in the model, dampening and brooding would mediate the relationships between PA and depressive symptoms and NA and depressive symptoms.

2. Method

2.1. Participant characteristics

Participants were 333 (70% female) undergraduate students recruited from a liberal arts university in the Pacific Northwest. Participants were at least 18 years old, with a mean age of 19.09 years (SD = 2.10 years). Approximately 70.3% were Caucasian, 3.0% were African American, 15.6% were Asian, 0.6% were Native American, 5.4% were Hispanic/Latino, and 5.1% were otherwise identified.

2.2. Sampling procedures

Participants were recruited in undergraduate psychology courses to complete a baseline questionnaire that included measures of temperament (trait PA and trait NA) and depressive symptoms. Students who completed the first questionnaire were then invited to complete a weekly questionnaire over the next 6 weeks, which included a measure of state cognitive strategies in response to weekly life events. At 8 weeks following baseline, participants completed a second measure of depressive symptoms.

2.3. Measures

2.3.1. Temperament

Temperament was measured using two subscales, the NA subscale (51 items) and the PA subscale (11 items), of the Adult Temperament Questionnaire (ATQ; Evans & Rothbart, 2007). NA was measured using items such as, "I am always worried about something" and PA was measured using items such as, "It doesn't take much to evoke a happy response in me". All items were answered on a 7-point Likert scale from 1 (*Extremely untrue of you*) to 7 (*Extremely true of you*). We calculated the total score for each subscale, with higher scores representing higher PA and NA. In the present study, the internal consistency for the NA subscale was $\alpha = .89$ and PA subscale was $\alpha = .82$.

2.3.2. Depressive symptoms

Participants' depressive symptoms were reported at baseline and week 8 using the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), which is a 20 item measure of depressive symptoms. In each questionnaire participants rated how they felt and behaved during the past week. Rating responses ranged from 0 (*Rarely or none of the time*) to 3 (*Most or all of the time*) for items such as, "I felt sad." We calculated a total score ranging from 0 to 60. Higher scores represent greater depressive symptoms. The CES-D shows strong convergent validity with other depression measures (Radloff, 1977). In the present study, the CES-D was $\alpha = .88$ at baseline and $\alpha = .87$ at follow-up.

2.3.3. Cognitive strategies

Weekly brooding was assessed using the Event-Anchored Rumination Response Scale (EA-RRS; adapted from Treynor et al., 2003), which consisted of the five brooding subscale items of the RSQ (Nolen-Hoeksema & Morrow, 1991) that linked the worst weekly event to cognitive strategy. A mean score was calculated for brooding. While thinking about the worst weekly event, participants rated the extent to which they thought or did each item (i.e., "Think 'Why do I have problems other people don't have.'"). Participants rated on a 4-point scale ranging from 1 (*Almost never*) to 4 (*Almost always*). The internal consistency for the present study averaged $\alpha = .82$ (.79–.84) across 6 weeks.

Weekly dampening was assessed using the Event-Anchored Response to Positive Affect Scale (EA-RPA; adapted from Feldman et al., 2008), which consisted of the three items that loaded highest on the dampening subscale of the RPA. The EA-RPA scale links the best weekly event to cognitive strategies. A mean score was calculated for the dampening subscale. While thinking about the best weekly event, participants rated the extent to which they thought or did each item (i.e., "Think about things that could go wrong."). Participants rated on a 4-point Likert scale ranging from 1 (*Almost never*) to 4 (*Almost always*). The internal consistency of the dampening subscale for the present study averaged $\alpha = .71$ (.66–.75) across 6 weeks.

2.4. Data analyses

Preliminary analysis of our raw data suggested that of 348 cases, 45% had at least one missing value on a variable, 67% of the 163 variables had at least one missing value on a case and 5% of the total values were missing. Visual inspection of the missing value patterns chart produced in SPSS 22 indicated the general pattern described by Enders as the haphazard pattern (2010). Given Olinsky, Chen, and Harlow's (2003) recommendations, we calculated the percent of missing data per case and deleted cases with excessive missing data, which resulted in a dataset of 333 cases. We imputed data at the item level. All variables represented in the model were included in the imputation procedure. Maximum case draws were specified at 1000 and maximum parameter draws were set at 100.

3. Results

Intercorrelations between predictors and criterion variables are presented in Table 1. As expected, PA was correlated with weekly dampening and depressive symptoms and NA was correlated with weekly brooding and depressive symptoms. Consistent with previous research, weekly dampening correlated with weekly brooding. PA and NA were significantly correlated, as were PA and brooding and NA and dampening. These initial analyses support the premise that all pathways need to be jointly considered in the prediction of depressive symptoms.

We hypothesized that both high NA and low PA would be associated with greater depressive symptoms at week 8, even controlling for baseline depressive symptoms. We also expected that high brooding and high dampening would be associated with greater depressive symptoms. Our model included four mediation paths because we hypothesized that brooding would mediate the relationship between NA and depressive symptoms and PA and depressive symptoms and that dampening would mediate the relationship between PA and depressive symptoms and NA and depressive symptoms.

This mediation model was evaluated using structural equation modeling with AMOS (v. 22) statistical software. We specified a double mediated model (see Fig. 1) with 2 degrees of freedom, noting our hypothesized direction of the relation between the predictors (NA, PA, depressive symptoms week 1), mediators (dampening, brooding), and outcome variable (depressive symptoms week 8). We specified direct and indirect paths between the five observed variables; the direction of the paths is illustrated in Fig. 1.

Because the specified model retains indirect effects, we followed the recommendations by Mallinckrodt, Abraham, Wei, and Russell (2006) to determine if they were statistically significant. In AMOS we generated 1000 bootstrap samples drawn by default with replacement from the correlation matrix representing 333 cases with 95% bias-corrected confidence intervals and bootstrap estimates of indirect, direct, and total effects. Results (see

Table 1
Variable correlations, means and standard deviations.

Variable	1	2	3	4	5	*M*	(*SD*)
1. Dep Sx week 1						14.27	(9.17)
2. PA	−.49*					5.09	(1.00)
3. NA	.56*	−.41*				3.97	(0.68)
4. Dampening	.44*	−.33*	.37*			4.53	(1.40)
5. Brooding	.42*	−.23*	.46*	.64*		9.66	(2.94)
6. Dep Sx Week 8	.44*	−.34*	.36*	.50*	.49*	13.56	(9.96)

PA = trait positive affectivity; NA = trait negative affectivity.
* $p < .01$.

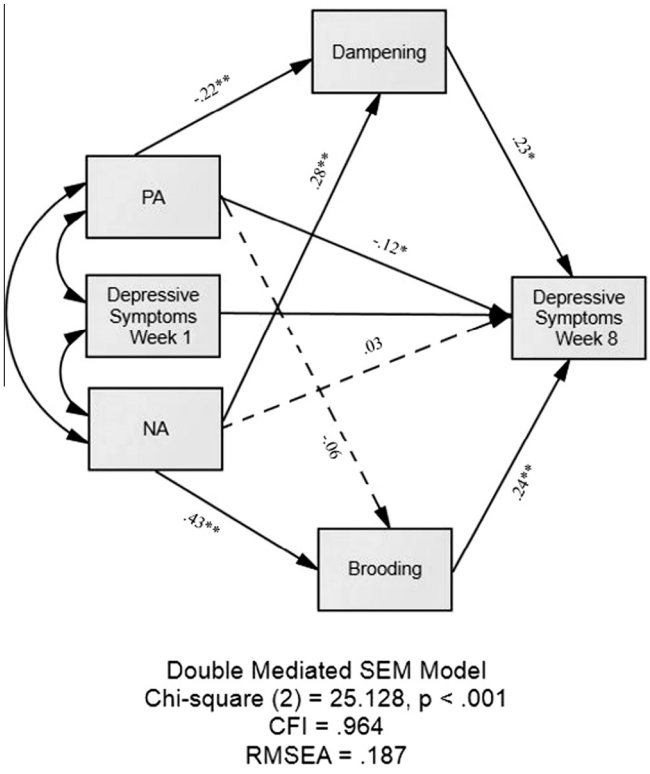

Fig. 1. Standardized direct effects of the double mediator model in the relationship between NA and PA and depressive symptoms. $^{*}p < .05$, $^{**}p < .01$.

Table 2) indicated which direct and indirect paths were statistically significant. The effect of NA on depressive symptoms was fully mediated through brooding and dampening, such that the direct effect of NA on depressive symptoms was no longer significant with brooding and dampening in the model. The effect of PA on depressive symptoms was partially mediated through dampening, such that the direct effect of PA on depressive symptoms remained significant with dampening in the model. The effect of PA on depressive symptoms was not mediated by brooding.

We assessed the adequacy of its measurement model by evaluating the fit statistics including the chi-square (χ^2) likelihood ratio statistic, the comparative fit index (CFI), and root mean square error of approximation (RMSEA). The fit indices were: $\chi^2(2) = 25.126$, $p < .001$, CFI = .964, RMSEA = .187. Our CFI values indicated an excellent fit based on recommendations, while the RMSEA value was adequate (Byrne, 2013).

4. Discussion

Based on affective-cognitive theories of temperament and depression, cognitive responses can increase or decrease affective response to life events. Patterns of affective responses become trait affect over time and predict depressive symptoms mediated by cognitive responses (Nolen-Hoeksema & Morrow, 1991). The current study examined the hypothesis that high NA and low PA would be associated with greater depressive symptoms. We further hypothesized dampening and brooding would mediate the relationship between PA and depressive symptoms and NA and depressive symptoms.

We found that, consistent with hypotheses, individuals with high NA and low PA reported greater depressive symptoms at the 8-week follow up. The relationship between high NA and greater depressive symptoms was mediated by greater brooding and greater dampening. The relationship between low PA and greater depressive symptoms was mediated by greater dampening but not greater brooding.

The current findings are consistent with research that high NA and low PA predict depressive symptoms (Hankin et al., 2009), supporting the idea that these temperament traits represent unique affective vulnerabilities to depression. Results also support affective-cognitive theories proposing that high NA predicts greater brooding and low PA predicts greater dampening. Results are consistent with recent studies that have found association between greater NA and greater dampening (Harding, Hudson, & Mezulis, 2014). The relationship between NA and dampening suggests that high NA may influence individuals to use greater dampening of positive emotions, which over time can lead to the presentation of depressive symptoms.

Interestingly, the relationship between NA and depressive symptoms was fully mediated with brooding and dampening in the model, suggesting more research is needed around joint effects of cognitive strategies and the implications for depression interventions used to increase positive emotion and decrease negative emotion. In addition, the relationship between PA and depressive symptoms was only partially mediated with dampening and brooding in the model, suggesting that more research is needed to understand all possible mechanisms contributing to this relationship (i.e., positive rumination; Feldman et al., 2008).

Table 2
Bootstrap analysis of magnitude and statistical significance of indirect and direct effects.

IV → mediator → DV (if any)	β (standardized path coefficient and product)	ME(B)	*SE* of mean	90% CI		Two-tailed significance
				Lower	Upper	
Indirect effects						
PA → Damp → DS	−.22 × .23 = −.05	−.53	.23	−1.12	−.18	.002
PA → Brood → DS	−.06 × .24 = −.01	−.15	.16	−.49	.14	.285
NA → Damp → DS	.28 × .23 = .06	.92	.36	.32	1.74	.002
NA → Brood → DS	.43 × .24 = .10	1.51	.51	.59	2.61	.001
Direct effects						
PA → Damp	−.22	−.35	.09	−.51	−.16	.001
PA → Brood	−.06	−.18	.18	−.54	.18	.332
NA → Damp	.28	.58	.13	.33	.87	.001
NA → Brood	.43	1.87	.24	1.39	2.34	.001
Damp → DS	.23	1.57	.50	.61	2.58	.003
Brood → DS	.24	.81	.24	.32	1.29	.001
PA → DS	−.12	−1.27	.63	−2.53	−.07	.041
NA → DS	.03	.36	.92	−1.40	2.13	.676

Note: $N = 333$. The 90% confidence intervals (CIs) for the results were produced with the bias-corrected option. PA = trait positive affectivity; NA = trait negative affectivity; Damp = average weekly dampening; Brood = average weekly brooding; DS = depressive symptoms at week 8.

4.1. Study limitations and future research

The current study was limited by the repetitive nature of a weekly questionnaire that participants became familiar with over the course of the study. The study was a non-experimental design and therefore was susceptible to internal validity concerns. Also, the sample of college students may not generalize to all young adult populations and data was collected solely through self-report questionnaire and may impacted by monomethod bias. Finally, this study did not investigate effortful control, another aspect of temperament, as other studies have in conjunction with NA and PA (Vasey, Harbaugh, Lonigan, et al., 2013; Vasey, Harbaugh, Mikolich, et al., 2013).

Future studies may consider examining the additive effects of NA, PA, and effortful control in order to better determine the relationship between temperament and depression. In addition, further research may explore the joint effects of additional cognitive strategies in the relationship between temperament and depressive symptoms, especially cognitive strategies that may mediate the relationship between PA and depressive symptoms. Moving toward a more comprehensive understanding of affective and cognitive processes driving depression can improve treatment and prevention efforts in depression.

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