

The Mediation Role of Responses to Positive Affect in the Association Between Temperament and (Hypo)manic Symptoms in Children

Katrien Verstraeten · Michael W. Vasey ·
Filip Raes · Patricia Bijttebier

Published online: 11 October 2011
© Springer Science+Business Media, LLC 2011

Abstract The present study focused on (hypo)manic symptoms and their relations to temperament and rumination on positive affect (R-PA). As predicted, R-PA (including dampening, emotion-focus and self-focus) was associated with (hypo)manic symptoms, with high levels of dampening, emotion-focus and self-focus predicting higher levels of (hypo)manic symptoms. R-PA also contributed to the prediction of depressive symptoms over and above rumination on negative affect (including brooding and reflection), with high levels of brooding and dampening and low levels of emotion-focus predicting higher levels of depressive symptoms. Aspects of temperament (high PA, high NA, low EC and PAxNA) were also associated with (hypo)manic symptoms. Ruminative response styles were also predicted by temperament. Finally, mediational analyses showed that all R-PA scales were mediators of the PA-(hypo)mania relation.

Keywords (Hypo)mania · Rumination on positive and negative affect · Temperament · Children

Introduction

Accumulating evidence supports the notion that temperament is a vulnerability factor for depressive symptoms in childhood and adolescence (see, e.g., Compas et al. 2004). Temperament is defined as individual differences in affective-motivational reactivity and effortful control (Rothbart and Bates 1998). Reactivity consists of positive affectivity (PA; reflecting one's tendency toward feeling active, happy and enthusiastic) and negative affectivity (NA; reflecting one's tendency toward subjective distress). Effortful control (EC) comprises processes that modulate reactivity. Higher NA and lower PA (e.g., Anderson and Hope 2008) as well as lower EC (e.g., Muris and Ollendick 2005) are associated with increased vulnerability to depressive symptoms. Verstraeten et al. (2009) also reported significant NAXEC and PAXEC interactions (the latter albeit only in girls): Higher NA and (in girls) lower PA were only associated with more depressive symptoms in adolescents reporting lower EC. Studies in which the NAXPA interaction was investigated found that higher NA was more strongly predictive of depressive symptoms at low versus high PA (e.g., Wetter and Hankin 2009).

Besides temperament, the way in which individuals habitually respond to negative affect also plays an important role in depression vulnerability. Rumination on negative affect (R-NA) is a response style characterized by the tendency to constantly dwell on one's sad and depressed mood or feelings, and on the possible causes and implications of such feelings (e.g., Nolen-Hoeksema et al. 2008). Results from prospective studies have supported the role of R-NA in the maintenance and exacerbation of depressive mood in children and adolescents (e.g., Abela et al. 2002). Furthermore, R-NA has been linked to the onset of depressive episodes and predicts the severity of

K. Verstraeten (✉) · F. Raes · P. Bijttebier
Department of Psychology, University of Leuven,
Tiensestraat 102, 3000 Leuven, Belgium
e-mail: Katrien.Verstraeten@psy.kuleuven.be

K. Verstraeten
Department of Child and Adolescent Psychiatry,
University Hospital Leuven, Leuven, Belgium

M. W. Vasey
Department of Psychology, Ohio State University,
Columbus, OH, USA

depression among clinical samples (Just and Alloy 1997). Finally, R-NA is predictive of concurrent depression in older children and adolescents (Abela et al. 2002) and associated with increases in depressive symptoms up to 3 years later (Broderick and Korteland 2004). Recent research revealed that R-NA has two subtypes: reflection refers to “purposeful turning inward to engage in cognitive problem solving to alleviate one’s depressive symptoms”, whereas brooding involves “a passive comparison of one’s current situation with some unachieved standard” (Trenor et al. 2003, p. 256). In youth samples, only brooding and not reflection was found to be associated with concurrent depressive symptoms (Lopez et al. 2009; Verstraeten et al. 2010b) and with increases in depressive symptoms over time (Burwell and Shirk 2007).

Although most studies mentioned above focused on the role of either temperamental or response style factors in depressive symptoms, recent evidence suggests that both vulnerability factors are interconnected. Consistent with hierarchical vulnerability models (see, e.g., Norton and Mehta 2007), Nolan et al. (1998) showed that the relation between neuroticism and depression is mediated by a ruminative response style. More recently, Verstraeten et al. (2011) replicated these findings using a two-dimensional model of R-NA. They found that the NA-depression relation was mediated only by brooding.

Recently, research interest has increased regarding mood disorders involving elevated or expansive mood. Albeit remaining relatively uncommon, (hypo)manic symptoms and bipolar disorder are being diagnosed in children and adolescents at a rapidly increasing rate (Youngstrom et al. 2008). It can be expected that temperament factors not only play a role in depression symptoms, but also have relevance for (hypo)manic symptoms. The first aim of the present study therefore was to investigate the associations of NA, PA and EC with (hypo)manic symptoms in children. Given that (hypo)mania is characterized by elevated as well as irritable mood (APA 2000), positive associations with both types of temperamental reactivity can be expected. As for EC, one might expect that it does not only help the individual to modulate abnormal and persistent depressed mood, but also increases the individual’s potential to regulate elevated or irritable mood. Consistent with this, bipolar disorder has been found to be associated with deficits in executive control (Joseph et al. 2008).

As noted by Raes et al. (2009), research on response style factors in mood problems has been mainly directed toward responses to negative affect and has mostly ignored responses to positive affect and their consequences for mood disorders. Nonetheless, responses to positive affect may be equally important in research on emotion regulation problems (e.g., Raes et al. 2010). Rumination on positive affect (R-PA) has been defined as “the tendency to

respond to positive affective states with thoughts about positive self-qualities, positive affective experience, and one’s favorable life circumstances that might amplify the positive affect” (Johnson et al. 2008, p. 704). Feldman et al. (2008) designed the *Responses to Positive Affect questionnaire* (RPA) to assess three types of responses to positive affect in adults: *Dampening* (e.g., ‘remind yourself these feelings won’t last’, or “think ‘my streak of luck is going to end soon’”) *Self-focused positive rumination* (Self-focus; e.g., ‘think “I am achieving everything”’, or “think ‘I am getting everything done’”), and *Emotion-focused positive rumination* (Emotion-focus; e.g., ‘think about how happy you feel’, or ‘savor this moment’). Thus far, positive rumination has only been studied in adult samples. It has been found to differentiate people with bipolar disorder from controls (Johnson et al. 2008). Also, preliminary evidence in non-clinical adults reveals positive associations between the three R-PA scales and manic symptoms (Feldman et al. 2008). People with hypomanic symptoms pursue goals with greater vigor after an initial success, which intensifies emotion-focused and self-focused positive rumination (Johnson et al. 2005). However, at least some people with lifetime mania try to put the brakes on periods of elevated mood and choose self-calming, dampening strategies to prevent the emergence of manic symptoms (Lam and Wong 1997).

Given these findings in adults, the second aim of the present study was to develop a downward extension of the RPA for use in children and examine the extent to which R-PA predicts (hypo)manic symptoms. In spite of the fact that NA is assumed to play a role in (hypo)manic symptoms, no hypotheses are put forward with respect to the association of R-NA to (hypo)manic symptoms. This is because R-NA is conceptualized and measured exclusively in terms of responses to depressed mood and does not include responses to irritable mood.

The third aim of the present study was to examine the extent to which R-PA mediates the association between temperamental reactivity and (hypo)manic symptoms, consistent with the meditational models put forward with respect to depression vulnerability. To the best of our knowledge, no previous study has tested such model. We hypothesized that the relation between PA and (hypo)manic symptoms should be mediated by dampening, emotion-focus and self-focus: children with high levels of PA are expected to intensify their positive relation with the environment using strategies such as self-focusing and emotion-focusing, leading to an increase in (hypo)manic symptoms. Also, children with high levels of PA may use dampening strategies in an attempt to prevent the emergence of (hypo)manic symptoms, but in spite of this dampening, they will experience higher levels of (hypo)manic symptoms.

Finally, as indicated above, not only high levels of NA but also low levels of PA play a role in depression vulnerability. For that reason, the way in which people respond to positive affect may have incremental value in explaining depression onset, maintenance and recurrence above and beyond responses to negative affect. Consistent with this, both high dampening and low emotion-focus were found to predict depressive symptoms (Feldman et al. 2008; Raes et al. 2009). Therefore, in spite of the focus of the paper on manic symptoms, a fourth aim of the present study was to examine the extent to which R-PA dimensions predict depressive symptoms above and beyond R-NA.

Method

Participants

One hundred and ninety five 5th graders from six Belgian primary schools were invited to take part in the study and 93.8% of them ($n = 183$, 53% girls), ranging age from 9.8 to 12.2 years ($M = 10.8$; $SD = .39$), received parental consent.

Instruments

The trait version of the *Positive Affect and Negative Affect Scales* (PANAS; Watson et al. 1988) is a self-report instrument consisting of two 10-item subscales, which assess high arousal NA and PA, but not low arousal states. It taps individual differences in affectivity that overlap with higher-order dimensions of temperament (e.g., Anthony et al. 2001). The PANAS was originally designed for adults, but adequate internal reliability and good convergent and discriminant validity have been demonstrated in children age 10–15 years (Gijsbers van Wijk and Kolk 1996).

The *Effortful Control Scale* (ECS; Lonigan and Phillips 2001) is a self-report questionnaire consisting of 24 items to be rated on a 5-point scale. Two subscale scores (Persistence/Low Distractibility and Impulsivity) can be derived, but in the present study only the total score was used. The internal consistency of the total ECS is supported by studies in 11–14 year olds ($\alpha = .84$; Ho 2004; Verstraeten et al. 2009).

The Rumination subscale of the *Children's Response Styles Questionnaire* (CRSQ; Abela et al. 2004) consists of 13 items to be answered on a 4-point scale. In the present study, we used the extended 19-item version (including three additional 'Reflection' items and three additional 'Brooding' items) developed and validated by Verstraeten et al. (2010a).

The *Responses to Positive Affect questionnaire* (RPA; Feldman et al. 2008; Raes et al. 2009) assesses responses to positive affective states and consists of 17 items. Items are rated on a 4-point scale, ranging from 1 (*almost never*) to 4 (*almost always*). The measure consists of three factor-analytically derived subscales: Dampening, Self-focus, and Emotion-focus. Initial psychometric results with the original English version show adequate reliability and validity for the subscales (e.g., Feldman et al. 2008). For the purpose of the present study, a downward extension of the RPA for use in children was developed, the RPA-C. The items of the RPA-C share the same content as the RPA items, but are slightly reworded to enhance their understandability by children.

The *Children's Depression Inventory* (CDI; Kovacs 2003) is a 27-item self-report questionnaire that measures symptoms of depression during the past week using a 3-point rating scale. The CDI has relatively high levels of internal consistency, test-retest reliability and predictive, convergent and construct validity, especially in nonclinical populations (Craighead et al. 1998).

The *Child Mania Rating Scale* (CMRS; Pavuluri et al. 2006) is a self-report instrument consisting of 21 DSM-IV-based items to measure current symptoms of (hypo)mania. The CMRS is scored on a 4-point rating scale ranging from 0 (=never) to 3 (=very often). The CMRS proved to have a good internal consistency and to be very sensitive and specific in differentiating children with mania from either healthy controls or children with ADHD (areas under the curve of .91 to .96; Pavuluri et al. 2006).

Procedure

Children were sent home with a letter describing the study, inviting them to take part and asking for parental permission. Children for whom parental informed consent was obtained filled out the questionnaires in a group setting during regular school hours. The instruments were administered in a fixed order.

Results

Confirmatory Factor Analysis on the RPA-C

To investigate the factor structure of the RPA-C, two models were compared: a 1-factor model (16¹ items

¹ Raes et al. (2009) examined the Dutch version of the RPA in adults with exploratory and confirmatory factor analysis. Item 12 of the Dutch version had a very low loading on the three factors and was removed from the Dutch version. Therefore, the Dutch version consists of 16 instead of 17 items.

Table 1 Pearson correlations (with internal consistencies on the diagonal), means, and standard deviations for all variables used in regression analyses

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total group |
|----------------------|---------|---------|--------|---------|--------|--------|--------|---------|-------|------|--------------|
| 1. CDI | .86 | | | | | | | | | | 8.13 (6.03) |
| 2. CMRS | .33*** | .85 | | | | | | | | | 15.04 (8.25) |
| 3. CRSQ-Reflection | .22** | .45*** | .67 | | | | | | | | 3.80 (2.89) |
| 4. CRSQ-Brooding | .47*** | .39*** | .61*** | .76 | | | | | | | 4.78 (3.51) |
| 5. RPA-Self-focus | -.01 | .47*** | .39*** | .29*** | .76 | | | | | | 7.90 (2.60) |
| 6. RPA-Emotion-focus | -.04 | .48*** | .56*** | .39*** | .62*** | .80 | | | | | 12.29 (3.45) |
| 7. RPA-Dampening | .45*** | .53*** | .50*** | .53*** | .41*** | .43*** | .79 | | | | 13.14 (4.23) |
| 8. ECS | -.36*** | -.33*** | -.11 | -.27*** | .05 | -.00 | -.23** | .72 | | | 84.60 (8.86) |
| 9. PANAS-PA | -.43*** | .17 | .07 | -.15* | .33*** | .31*** | .19* | .29*** | .82 | | 31.49 (6.71) |
| 10. PANAS-NA | .68*** | .40*** | .28*** | .42*** | .09 | .11 | .53*** | -.27*** | -.07 | .84 | 21.08 (7.10) |
| 11. Sex | -.15* | .16* | -.02 | -.06 | .24** | .15* | .09 | -.02 | .22** | -.06 | |

**P* < .05

***P* < .01

****P* < .001

loading on a single latent ‘rumination in response to positive affect’ factor) and a 3-factor model (five emotion-focused items, four self-focused items and seven Dampening items, loading on three distinct but related factors). The three-factor model met the criteria of adequate fit ($\chi^2(101) = 200.68$, RMSEA = .06, CFI = .95), whereas the one-factor model did not ($\chi^2(119) = 408.98$, RMSEA = .14, CFI = .87). The fit of the three-factor model was significantly better than that of the one-factor model ($\Delta\chi^2(18) = 208.30$, *P* < .0001), suggesting that the RPA-C taps three distinct (albeit related) aspects of positive rumination: Dampening, Self-focus and Emotion-focus.

Descriptive Data

Table 1 reveals that all scales showed acceptable internal consistency. Sex differences emerged for CDI, CMRS, Self-focus, Emotion-focus and PA: girls reported more depressive symptoms compared to boys, whereas boys reported more (hypo)manic symptoms, self-focused R-PA, emotion-focused R-PA and PA compared to girls.

All correlations between response style variables were significantly positive. Specifically, Reflection, Brooding and Dampening were significantly positively correlated with both CDI and CMRS, whereas Self-focus and Emotion-focus were positively associated only with CMRS.

NA was positively correlated with Brooding, Reflection and Dampening as well as with CDI and CMRS. PA was positively correlated with Brooding, all three R-PA scales and CMRS are significantly negatively correlated with CDI. EC was negatively correlated with Brooding, Dampening, CDI and CMRS.

Prediction of (Hypo)manic Symptoms by Temperament

We conducted a regression analysis to predict (hypo)manic symptoms. Sex and the temperamental variables (EC, NA and PA) were entered in step 1, the two-way temperamental interactions were added in step 2 and the three way temperamental interaction was added in step 3. Table 2 reveals that, despite the significant zero-order correlation between Sex and CMRS, Sex was no longer significantly associated with (hypo)manic symptoms when entered simultaneously with the temperament variables. In contrast, PA, NA and EC were significant predictors in step 1, 2 and 3, with higher levels of PA and NA and lower levels of EC being related to more (hypo)manic symptoms. The three way temperamental interaction was found to be non-significant. The NAXPA interaction was significant. As shown in Fig. 1, the simple slope for PA at low NA (i.e.,

Table 2 Regression analysis predicting (hypo)manic scores by temperament

| | <i>R</i> ² | <i>R</i> ² -change | β | <i>P</i> |
|--------|-----------------------|-------------------------------|--|--|
| Step 1 | .30*** | .30*** | | |
| Step 2 | .32*** | .02* | Sex = .10 PA = .26 NA = .32 EC = -.33 PAxNA = .15 PAxEC = .13 NAXEC = -.05 | .14 .000 .000 .000 .04 .06 .46 |
| Step 3 | .32*** | .00 | | |

****P* < .001

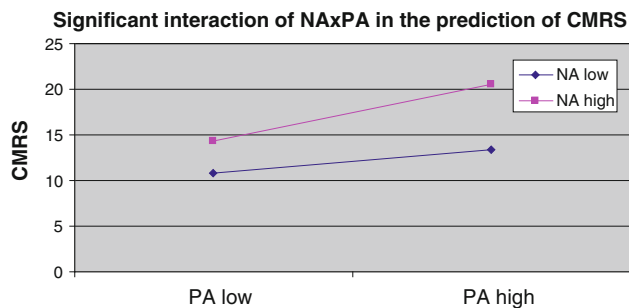


Fig. 1 NAXPA interaction predicting (hypo)manic scores

–1 SD) was 1.25, $t(174) = 1.66$, $P = .10$, whereas at high NA (i.e., +1 SD) it was 3.11, $t(174) = 4.53$, $P = 0$. Thus, PA was significantly associated with CMRS except when NA was low. Specifically, examination of the region of significance revealed that the simple slope for PA was significant only for values of NA greater than $-.84$ SDs.

Prediction of (Hypo)manic Symptoms by R-PA

Table 3 reveals that all three R-PA dimensions were predictors of (hypo)manic symptoms, with higher levels of Self-focus, Emotion-focus and Dampening predicting more (hypo)manic symptoms. As clarified in the introduction, we had no hypotheses regarding associations between R-NA and manic symptoms given the exclusive focus of R-NA on depressed mood. In support of our view that this conceptualization R-NA is irrelevant to manic symptoms and consistent with earlier evidence by Feldman et al. (2008), regression analyses with inclusion of Brooding and Reflection showed that neither predicted manic symptoms.

Prediction of Depressive Symptoms by R-PA Above and Beyond R-NA

Table 3 reveals that Brooding, Emotion-focus and Dampening significantly contributed to the prediction of depression, with higher levels of Brooding and Dampening

and lower levels of Emotion-focus predicting more depressive symptoms.

Mediational Influence of R-PA in the Prediction of Manic Symptoms by Temperament

As described above, all three temperament variables and all three R-PA dimensions predicted (hypo)manic symptoms significantly. Also, PA was a significant predictor of Emotion-focus ($R^2 = .41$, $F(9,170) = 14.93$, $P < .001$; PA: $\beta = .15$, $P < .05$), Self-focus ($R^2 = .47$, $F(9,170) = 16.81$, $P < .001$; PA: $\beta = .15$, $P < .05$) and Dampening ($R^2 = .49$, $F(9,170) = 18.15$, $P < .001$; $\beta = .14$, $P < .05$) and NA and EC were significant predictors of Dampening ($R^2 = .49$, $F(9,170) = 18.15$, $P < .001$; NA: $\beta = .42$, $P < .001$; EC: $\beta = -.12$, $P < .05$). Taken together, conditions were met to test the following mediational models: Emotion-focus, Self-focus and Dampening as mediators of the relation between PA and (hypo)manic symptoms and Dampening as mediator of the relation between NA and (hypo)manic symptoms and of the relation between EC and (hypo)manic symptoms.

We used a nonparametric resampling method (bootstrap, Preacher and Hayes 2008) with 5,000 resamples to derive the 95% confidence interval for the indirect effect of PA via the hypothesized mediators to (hypo)manic symptoms. We also included Sex and the other temperamental constructs (NA and EC) as covariates. For the prediction of (hypo)manic symptoms, the true indirect effect involving Emotion-focus was estimated to lie between .14 and 1.12, for Self-focus between .22 and 1.23 and for Dampening between .01 and .59. Because zero is not in any of these 95% confidence intervals, we can conclude that the three indirect effects are significantly different from zero at $P < .05$, and thus that Emotion-focus, Self-focus and Dampening mediated the relation between PA and (hypo)manic symptoms. Figure 2 shows the multiple mediator model between PA and (hypo)manic symptoms.

Concerning the mediational influence of Dampening in the associations of NA and EC with (hypo)manic symptoms,

Table 3 Regression analyses predicting depressive and (hypo)manic symptoms by response styles

| | Prediction of depressive symptoms | | | | Prediction of (hypo)manic symptoms | | | |
|--------|-----------------------------------|---------------|------------------------|------|------------------------------------|---------------|---------------------|------|
| | R^2 | R^2 -change | β | P | R^2 | R^2 -change | β | P |
| Step 1 | .38*** | .38*** | Sex = $-.09$ | .16 | .38*** | .38*** | Sex = .05 | .41 |
| | | | Brooding = .35 | .000 | | | Self-focus = .20 | .01 |
| | | | Reflection = $-.01$ | .95 | | | Emotion-focus = .19 | .02 |
| | | | Self-focus = $-.09$ | .27 | | | Dampening = .36 | .000 |
| | | | Emotion-focus = $-.29$ | .000 | | | | |
| | | | Dampening = .44 | .001 | | | | |

*** $P < .001$

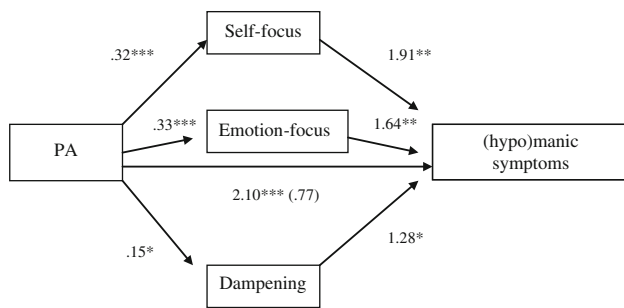


Fig. 2 Multiple mediator model in the prediction between PA and (hypo)manic symptoms. Path values are unstandardized regression coefficients. The value outside of the parentheses represents the total effect of PA on (hypo)manic symptoms prior to the inclusion of the mediating variables and is significant. The value in parentheses represents the direct effect, from bootstrapping analyses, of PA on (hypo)manic symptoms after the mediators are included. * $P < .05$, ** $P < .01$, *** $P < .001$. * $P < .05$, ** $P < .01$, *** $P < .001$

we again used the bootstrap method. We also included Age, the other temperamental constructs and the other R-PA dimensions as covariates. For the NA-mania association, the true indirect effect involving Dampening was estimated to lie between $-.01$ and 1.38 , showing that Dampening did not mediate the relation between NA and (hypo)manic symptoms. For the EC-(hypo)mania association, the true indirect effect lied between $-.47$ and $.01$, showing that Dampening was not a significant mediator.

Discussion

The present study examined associations between aspects of temperament, rumination on positive and negative affect and (hypo)manic symptoms. All pairwise correlations between R-PA and R-NA scales were found to be significant, suggesting that these response styles have shared features, namely perseverative thinking, be it negative or positive in focus. Both R-NA scales and one R-PA scale (Dampening) were positively correlated with depressive as well as (hypo)manic symptoms, which is consistent with the results of Raes et al. (2009). In our study the two R-PA scales (Self-focus and Emotion-focus) were only correlated to (hypo)manic symptoms, which was also found in the Feldman et al. (2008) study.

Concerning the link between temperament and (hypo)manic symptoms, no prior study has examined these relations in children. In our study, we found that high PA, high NA and low EC were predictors of (hypo)manic symptoms. These results are in line with the description of (hypo)manic symptoms as involving both elevated mood (linked to high PA) and irritable mood (linked to high NA). Also the NAXPA interaction was a significant predictor of (hypo)manic symptoms, showing that PA was associated

with (hypo)manic symptoms, except when NA was low. This finding stresses again the vulnerability associated with extreme levels of reactivity. Unexpectedly, EC did not moderate the associations of PA and NA with (hypo)manic symptoms.

Concerning the relation between response styles and (hypo)manic symptoms, results showed that high Self-focus, high Emotion-focus and high Dampening were predictors of (hypo)manic symptoms. This is consistent with the results of the study of Feldman et al. (2008), although in that study, regression analyses including Brooding and R-PA scales only found Self-focus to be positively related to (hypo)manic symptoms. In our study, children who were vulnerable to (hypo)manic symptoms reported that they were more likely to dampen or intensify a positive mood state. The positive relation between Dampening and (hypo)manic symptoms can be interpreted as suggesting that children vulnerable to (hypo)mania may attempt to put the brakes on periods of elevated mood or try to prevent the emergence of (hypo)manic symptoms by choosing self-calming strategies (Johnson et al. 2005) but that such strategies are typically ineffective.

Concerning the value of R-PA over and above R-NA in the prediction of depressive symptoms, regression analyses indicated that high Dampening and low Emotion-focus were predictors of high depression scores on top of high Brooding. Moreover, suppressing or downplaying one's positive feelings and accomplishments was associated with heightened depressive symptoms, even when repetitively thinking about negative feelings is already accounted for. These results are consistent with the findings of Raes et al. (2009, 2010) and Feldman et al. (2008).

Finally, the results of the mediational analyses in the prediction of (hypo)manic symptoms by PA revealed that Self-focus, Emotion-focus and Dampening were all unique mediators, showing that high PA is associated with tendencies to intensify positive mood states (Self-focus and Emotion-focus) and to attempt to dampen positive mood. In turn, these three tendencies are associated with higher levels of (hypo)manic symptoms. This mediational analysis, conducted in this study for the first time, yield insight into the underlying mechanisms linking temperament to (hypo)manic disorders. The occurrence of (hypo)manic symptoms is associated with the way people react to positive feelings. Pleasurable engagement with the environment (high PA) may lead to the awareness that those positive feelings may disappear and evokes as a consequence processes meant to intensify these positive feelings (high Self-focus and high Emotion-focus) or to dampen such positive feelings to maintain reality testing and prevent disappointment when these positive feelings would disappear. These latter efforts seem to be inadequate as they are paradoxically positively associated with (hypo)manic symptoms.

Finally, limitations of the present study should be acknowledged. First, the sample was relatively small, which may have led to decreased precision in estimates of effects. Moreover, the sample was community-based and had a narrow age range. Further work with larger samples spanning a broader age range and with clinical populations is needed to test the generalizability of the results. Second, all measures relied on self-report. Future studies should incorporate multiple methods of assessment, such as clinical interviews, parent-ratings or interviewer-based measures. Third, the study had a cross-sectional design and thus we are not able to draw conclusions about temporal ordering of effects or causality. Our hypotheses were formulated in terms of a vulnerability model, according to which temperament places individuals at risk for experiencing (hypo)mania through the mediating mechanism of R-PA. However, cross-sectional research does not allow investigation of the direction of effects between variables. Longitudinal studies may reveal bidirectional effects. For example, previous research shows that after a manic episode and the experience of extreme emotions, people try to pursue goals with greater vigor and use strategies to intensify positive affect, which increases the risk for a new manic episode (Johnson et al. 2005). Similarly, bidirectional effects between temperament and mood disorders can be expected. According to the scar model (Clark et al. 1994), the experience of a manic episode changes personality. This could be possible especially in children, whose personality is still developing (Burcusa and Iacono 2007).

The results from the current study replicate and extend previous findings on the associations between temperament, response styles to positive and negative affect and depression and (hypo)manic symptoms in children. As such it adds to the growing body of research on (hypo)manic symptoms in children (Youngstrom et al. 2008) and suggests the value of future prospective studies of such factors. The results of the present study also may have clinical implications. Patients with (hypo)manic symptoms may benefit from gaining insight into the relation between their use of R-PA strategies and the intensification of their positive emotions and the occurrence of (hypo)manic episodes. Cognitive behavioral therapy may help patients learn to change harmful or negative thought patterns and behaviors.

References

- Abela, J. R. Z., Brozina, K., & Haigh, E. P. (2002). An examination of the response style theory of depression in third- and seventh-grade children: A short-term longitudinal study. *Journal of Abnormal Child Psychology*, *30*, 515–527.
- Abela, J. R. Z., Vanderbilt, E., & Rochon, A. (2004). A test of the integration of the response styles and social support theories of depression in third and seventh grade children. *Journal of Social and Clinical Psychology*, *5*, 653–674.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders (text revision)* (4th ed.). Washington, DC: Author.
- Anderson, E. R., & Hope, D. A. (2008). A review of the tripartite model for understanding the link between anxiety and depression in youth. *Clinical Psychology Review*, *28*, 275–287.
- Anthony, J. L., Lonigan, C. J., Hooe, E. S., & Phillips, B. M. (2001). An affect-based hierarchical model of temperament and its relations with internalizing symptomatology. *Journal of Clinical Child and Adolescent Psychiatry*, *31*, 480–490.
- Broderick, P. C., & Korteland, C. (2004). A prospective study of rumination and depression in early adolescence. *Clinical Child Psychology and Psychiatry*, *9*, 383–394.
- Burcusa, S. L., & Iacono, W. G. (2007). Risk for recurrence in depression. *Clinical Psychology Review*, *27*, 959–985.
- Burwell, R. A., & Shirk, S. R. (2007). Subtypes of rumination in adolescence: Association between brooding, reflection, depressive symptoms and coping. *Journal of Clinical Child and Adolescent Psychology*, *36*, 56–65.
- Clark, L. A., Watson, D., & Mineka, S. (1994). Temperament, personality and the mood and anxiety disorders. *Journal of Abnormal Psychology*, *103*, 103–116.
- Compas, B. E., Connor-Smith, J., & Jaser, S. S. (2004). Temperament, stress reactivity, and coping: Implications for depression in childhood and adolescence. *Journal of Clinical Child and Adolescent Psychology*, *33*, 21–31.
- Craighead, W. E., Smucker, M. R., Craighead, L. W., & Iardi, S. S. (1998). Factor analysis of the children's depression inventory in a community sample. *Psychological Assessment*, *10*, 156–165.
- 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.
- Gijsbers van Wijk, C. M. T., & Kolk, A. M. (1996). Psychometric evaluation of symptom perception related measures. *Personality and Individual Differences*, *20*, 55–70.
- Ho, A. C. (2004). Effortful control in early adolescence: Measure development and validation. Unpublished doctoral dissertation, University of Ohio.
- Johnson, S. L., McKenzie, G., & McMurrich, S. (2008). Ruminative responses to negative and positive affect among students diagnosed with bipolar disorder and major depressive disorder. *Cognitive Therapy and Research*, *32*, 702–713.
- Johnson, S. L., Ruggero, C., & Carver, C. (2005). Responses to reward among people vulnerable to mania. *Journal of Social and Clinical Psychology*, *24*, 894–906.
- Joseph, M. F., Frazier, T. W., Youngstrom, E. A., & Soares, J. C. (2008). A quantitative and qualitative review of neurocognitive performance in pediatric bipolar disorder. *Journal of Child and Adolescent Psychopharmacology*, *18*, 595–605.
- Just, N., & Alloy, L. (1997). The response style theory of depression: Tests and an extension of the theory. *Journal of Abnormal Psychology*, *106*, 221–229.
- Kovacs, M. (2003). *Children's depression inventory: Technical manual*. New York: Multi-health Systems.
- Lam, D., & Wong, G. (1997). Prodromes, coping strategies, insight and social functioning in bipolar affective disorders. *Psychological Medicine*, *27*, 1091–1100.
- Lonigan, C. J., & Phillips, B. M. (2001). Temperamental influences on the development of anxiety disorders. In M. W. Vasey & M. R. Dadds (Eds.), *The developmental psychopathology of anxiety* (pp. 60–91). New York: Oxford University Press.
- Lopez, C. M., Driscoll, K. A., & Kistner, J. A. (2009). Sex differences and response styles: Subtypes of rumination and associations

- with depressive symptoms. *Journal of Clinical Child and Adolescent Psychology*, 38, 27–35.
- Muris, P., & Ollendick, T. H. (2005). The role of temperament in the etiology of child psychopathology. *Clinical Child and Family Psychology Review*, 8, 271–290.
- Nolan, S. A., Roberts, J. E., & Gotlib, I. H. (1998). Neuroticism and ruminative response style as predictors of change in depressive symptomatology. *Cognitive Therapy and Research*, 22, 445–455.
- Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science*, 3, 400–424.
- Norton, P. J., & Mehta, P. D. (2007). Hierarchical model of vulnerabilities for emotional disorders. *Cognitive Behavior Therapy*, 36, 240–254.
- Pavuluri, M. N., Henry, D. B., Devineni, B., Carbray, J. A., & Birmaher, B. (2006). Child mania rating scale: Development, reliability and validity. *Journal of the American Academy of Child and Adolescent Psychiatry*, 45, 550–560.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879–891.
- Raes, F., Daems, K., Feldman, G. C., Johnson, S. L., & Van Gucht, D. (2009). A psychometric evaluation of the Dutch version of the responses to positive affect questionnaire. *Psychologica Belgica*, 49, 293–310.
- Raes, F., Smets, J., Nelis, S., Schoofs, H. (2010). Dampening of positive affect prospectively predicts depressive symptoms in non-clinical samples. *Cognition & Emotion*. doi:10.1080/02699931.2011.555474.
- Rothbart, M. K., & Bates, J. E. (1998). Temperament. In W. Damon & N. Eisenberg (Eds.), *Handbook of child psychology: vol. 3. Social, emotional and personality development* (pp. 105–176). New York: Wiley.
- Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research*, 27, 247–259.
- Verstraeten, K., Bijttebier, P., Vasey, M. W., & Raes, F. (2011). Specificity of worry and rumination in the development of anxiety and depressive symptoms in children. *British Journal of Clinical Psychology*. doi:10.1348/014466510X532715.
- Verstraeten, K., Vasey, M. W., Claes, L., & Bijttebier, P. (2010a). The assessment of effortful control in childhood: Questionnaires and the test of everyday attention for children compared. *Personality and Individual Differences*, 48, 59–65.
- Verstraeten, K., Vasey, M. W., Raes, F., & Bijttebier, P. (2009). Temperament and risk for depressive symptoms in adolescence: Mediation by rumination and moderation by effortful control. *Journal of Abnormal Child Psychology*, 37, 349–361.
- Verstraeten, K., Vasey, M. W., Raes, F., & Bijttebier, P. (2010b). Brooding and reflection as components of rumination in late childhood. *Personality and Individual Differences*, 48, 367–372.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54, 1063–1070.
- Wetter, E. K., & Hankin, B. L. (2009). Mediation pathways through which positive and negative emotionality contribute to anhedonic symptoms of depression: A prospective study of adolescents. *Journal of Abnormal Child Psychology*, 37, 507–520.
- Youngstrom, E. A., Frazier, T. W., Demeter, C., Calabrese, J. R., & Findling, R. L. (2008). Developing a 10-item mania scale from the parent general behavior inventory for children and adolescents. *Journal of Clinical Psychiatry*, 69, 831–839.