



Perseverative thinking in depression and anxiety

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The current study investigated the impact of worry and brooding as moderators of the tripartite model of depression and anxiety (TMDA). We hypothesized that both types of perseverative thinking would moderate the association between negative affectivity (NA) and both anxiety and depression. Complete data sets for this questionnaire survey were obtained from 537 students. Participants' ages ranged from 16 to 49 years with a mean age of 21.1 years (SD = 3.6). Overall, results from path analyses supported the assumptions of the TMDA, in that NA was a non-specific predictor for both depression and anxiety whilst lack of positive affectivity (PA) was related to depression only. Unexpectedly, perseverative thinking had an effect on the dependency of negative and positive affectivity. Worry was a significant moderator for the path NA–anxiety. All other hypothesized associations were only marginally significant. Alternative pathways as well as methodological implications regarding similarities and differences of the two types of perseverative thinking are discussed.

Keywords: depression, anxiety, perseverative thinking, rumination, brooding, worry

INTRODUCTION

About two-thirds of depressed individuals also meet the criteria for an anxiety disorder (Judd and Burrows, 1992). Clark and Watson's tripartite model of depression and anxiety (TMDA) is an affective model that aims to explain both the comorbidity and differentiation of depression and anxiety symptoms (Clark and Watson, 1991). In this model, anxiety and depression symptoms share a non-specific component that encompasses general affective distress (negative affectivity, NA). The syndromes can be distinguished by physiological hyperarousal (PH) on the one hand, which is assumed to be specific for anxiety, and the relative absence of positive affectivity (PA) on the other hand, believed to be specific for depression. The model is both descriptive and prospective by explicating patterns of affectivity that predispose individuals to develop the respective disorders.

The TMDA has generally received good empirical support, with the strongest evidence coming from factor analytic studies across a variety of populations, for example child, undergraduate, community, and clinical samples (Watson et al., 1995; Joiner, 1996; Joiner et al., 1996; Lonigan et al., 2003; Tully et al., 2009). Nevertheless, there are also reports on inconsistencies and limitations of the model. For instance, the proposed specific role of low PA or anhedonia for the development of depressive symptoms is questionable as low PA is a factor in depression but also in some forms of anxiety, i.e., social phobia (Shankman and Klein, 2003).

Clark and Beck's cognitive content specificity hypothesis – a product of Beck's cognitive theory – states that automatic thoughts or cognitive content should be related to emotional states (Beck, 1976; Clark et al., 1989). Following this view, anxious and depressive symptoms can be differentiated by unique cognitive

contents. In a meta-analytic review, Beck and Perkins (2001) evaluated the evidence for this hypothesis. They argued that – given the degree of shared variance between depression and anxiety constructs – the convergent symptomatology/cognition relationships should be stronger than the divergent ones. This was true for specific depressive contents across studies, while anxious cognitive content shared equal variance with depressive and anxious symptomatology. Also, in 5 out of the 13 studies included in the meta-analysis, anxious and depressive cognitive content was stronger interrelated than anxious and depressive symptoms, which weakens the hypothesis further. It can be argued that there are no cognitions that are truly specific to all anxiety disorders, emphasizing the problem of the heterogeneity of anxiety disorders.

Taken together, these results suggest that cognitive content alone might not be sufficient to explain depression and anxiety symptomatology. Rather, the way individuals engage in automatic cognitions may also be important for the two syndromes. For example, perseverative thinking in the form of depressive rumination and anxious worry has been shown to be related to depression and anxiety symptomatology, respectively. Depressive rumination has been defined as passively and repetitively focusing on symptoms of distress and the circumstances surrounding those symptoms, and can be understood as a stable emotional response style (Just and Alloy, 1997; Bagby et al., 2004). Rumination has been shown to intensify depressed mood, predict the onset, recurrence, severity, and duration of depressive episodes as well as suicidal ideation. It interferes with problem solving, leads to more pessimistic future perspectives and less social support (Morrow and Nolen-Hoeksema, 1990; Nolen-Hoeksema and Morrow, 1991; Lyubomirsky and Nolen-Hoeksema, 1995; Nolen-Hoeksema and Davis, 1999; Bagby et al., 2004; Miranda and Nolen-Hoeksema, 2007).

Abbreviations: NA, negative affectivity; PA, positive affectivity; PH, physiological hyperarousal; TMDA, tripartite model of depression and anxiety.

There is growing evidence that at least two forms of rumination with distinct effects on depression can be distinguished: brooding and reflection. Brooding or passively dwelling on symptoms of distress has been found to be the key factor in the prediction of depressive symptoms. Self-reflection or actively attempting to gain insight into problems, on the other hand, is not related to any negative outcomes (Treyner et al., 2003; Burwell and Shirk, 2007; Moberly and Watkins, 2008). Therefore, studies on the detrimental effects of rumination should rely preferably on the brooding dimension of the construct.

Rumination and its maladaptive subtype brooding share common elements with worry, another form of perseverative thinking. Worry can be defined as “repetitive, uncontrollable thoughts about potential negative life events” (Segerstrom et al., 2000). It is a cardinal feature of general anxiety disorder (GAD) which is often co-morbid with depression (American Psychiatric Association, 2000). The perseverative nature of both rumination and worry entails a similarity between these two constructs, whilst the content of them appears to differ with rumination being past oriented and worry being future oriented (Papageorgiou and Wells, 2004). Nevertheless, there is no consensus on the specificity of the two constructs in the literature. Most studies investigating perseverative thinking link rumination specifically to depression, and worry to anxiety. Far fewer studies have investigated the contribution of both forms of perseverative thinking to both syndromes (Nolen-Hoeksema, 2000; Fresco et al., 2002; Garnefski et al., 2002; Sarin et al., 2005). Segerstrom et al. (2000), for example, found that repetitive thought was related to both anxiety and depression; specific forms of repetitive thinking such as worry and rumination, however, did not predict anxiety or depression by themselves. Given these findings, perseverative thinking might be especially relevant for mixed depression/anxiety symptoms. To our knowledge, the role of perseverative thinking within the TMDA has not been investigated yet.

For the present study we used a sample of adults that were slightly younger than the average age at onset of Major Depressive Disorder (American Psychiatric Association, 2000). The aim in doing so was to investigate the prospective properties of the TMDA for individuals that are at an at-risk age for the development of this disorder.

We hypothesize that both depressive brooding and anxious worry moderate the associations as predicted by the TMDA, by strengthening the associations between NA, and anxiety and depression (Figure 1). We hypothesize further that there will be no specific contribution of either brooding or worry as moderators of the TMDA, as we assume that the moderating properties of brooding and worry are due to the higher-order factor perseverative thinking.

MATERIALS AND METHODS

PARTICIPANTS AND DESIGN

For this questionnaire survey, 537 (477 female) undergraduate students were recruited from the student population of a British University. Complete data sets were obtained from 508 students. Participants' age ranged from 16 to 49 years with a mean age of 21.1 years ($SD = 3.6$). Most of the student volunteers indicated being British (64.7%), followed by Indian (7.8%), other European (4.7%), Caribbean (3.5%), Irish (2.1%), and other (3.9%). Seventy

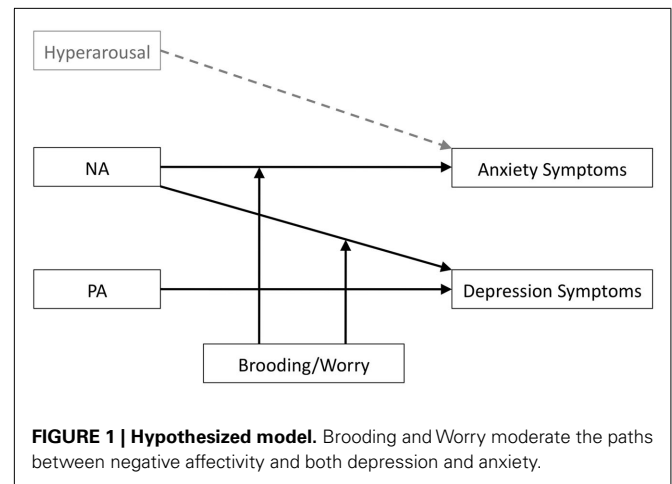


FIGURE 1 | Hypothesized model. Brooding and Worry moderate the paths between negative affectivity and both depression and anxiety.

students (13.6%) did not indicate their ethnic background. Students were recruited from non-psychology courses in order to avoid confounding effects due to familiarity with the topics investigated. Ethical approval was obtained from the University's ethics board.

MEASURES

The Positive and Negative Affect Scale (PANAS, trait version; Watson et al., 1988) provides a brief, reliable, valid, and stable measure of trait affectivity. This questionnaire is the standard instrument for measuring trait affect as proposed in the TMDA and has been developed with and applied on undergraduate student samples. It consists of 20 items, half of which measure positive and negative affect, respectively.

The disposition to engage in brooding responses to sad mood was assessed using a revised version of the Ruminative Response Scale (RRS) of the Response Styles Questionnaire (RSQ). For this scale, items of the original RRS that were contaminated with depressive symptoms were omitted. The revised RRS consists of 10 items and loads on two factors: brooding and reflection. Participants indicated how they generally react when in a depressed mood with a range from 0 (never) to 3 (always). The revised version is a reliable and valid measure of both the brooding and reflective subtype of depressive rumination, as was shown in investigations with healthy and clinical populations of all age groups including student samples (Kasch et al., 2001; Treyner et al., 2003). For this study, only the brooding dimension was used for analysis.

Anxious worry was assessed using the Penn State Worry Questionnaire (PSWQ, trait version; Meyer et al., 1990) which has been extensively applied and validated. The PSWQ has shown good reliability in student samples (Fresco et al., 2003).

Depressive symptoms

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) is a standardized and extensively used instrument to measure depression in the general population. It is the most commonly used instrument in depression research with young adult samples. The scale consists of 20 items and has been extensively validated. The psychometric properties have been shown to be satisfactory.

Table 1 | Means, SD, range, and reliability for all measures.

	PA	NA	Brooding	PSWQ	BAI	CES-D
<i>n</i>	523	523	532	518	497	510
Mean/SD	3.50 (0.57)	2.09 (0.64)	1.30 (0.66)	3.21 (0.88)	1.56 (0.50)	0.83 (0.55)
Total score	35.01	20.94	6.49	51.32	32.79	16.58
Range	13–49	17–80	0–15	17–80	21–74	0–55
Cronbach's α	0.830	0.835	0.782	0.929	0.923	0.908

Table 2 | Zero-order correlations between variables.

	NA	Brooding	PSWQ	BAI	CES-D
PA	-0.181**	-0.148**	-0.192**	-0.171**	-0.355**
NA		0.491**	0.426**	0.471**	0.474**
Brooding			0.526**	0.513**	0.566**
PSWQ				0.485**	0.532**
BAI					0.661**

** $p < 0.001$.

Anxiety symptoms

Beck's anxiety inventory (BAI; Beck et al., 1988) was originally developed for the assessment of clinical anxiety, but has been shown to be the superior instrument for anxiety assessment in non-clinical undergraduate samples as well (Creamer et al., 1995). The 21-item scale has high internal consistency and high discriminant validity to depression in student samples.

STATISTICAL ANALYSIS

For all scales, total sums were computed and used for analysis. To test the proposed causal relationships (Figure 1) between PA/NA and the TMDA dimensions, path analyses were conducted (Kline, 2005). To assess moderating effects of brooding and worry we used multigroup analyses. Multigroup analyses allow for the assessment of the question whether specific path coefficients, a group of path coefficients, or all path coefficients of a path model simultaneously differ between groups. We divided each of the two scales for brooding and worry into two groups based on a median split. The path model was thus analyzed for high/low brooding ruminators and high/low worriers in order to detect moderating effects of perseverative thinking for specific path coefficients and for all path coefficients simultaneously. PA and NA were exogenous variables in this model, anxiety and depression symptoms were endogenous variables.

Preliminary analyses were conducted excluding data from male participants (11%) and compared with results from the whole sample. There were no differences in anxiety or depression scores between men and women, nor did the results of the path analyses differ when excluding men from those including men and women. Results are, therefore, reported for the entire sample. Scales were transformed (log, square root) if necessary to meet regression analysis assumptions.

All analyses were conducted using the software package AMOS 18.

RESULTS

Means, SDs, ranges, and scale reliabilities of all measures are shown in Table 1. As the path model was just identified, no fit statistics are shown. Zero-order correlations between all variables are shown in Table 2. All variables were significantly interrelated, with p -values below 0.01 for all measures ($n = 506$). Perseverative thinking was more closely related to NA than to PA (e.g., brooding–NA: $r = 0.491$; brooding–PA: $r = -0.148$). Depression and anxiety symptoms were highly related ($r = 0.661$). Both kinds of perseverative thinking had strong associations with depression as well as with anxiety (e.g., PSWQ–CES-D: $r = 0.532$).

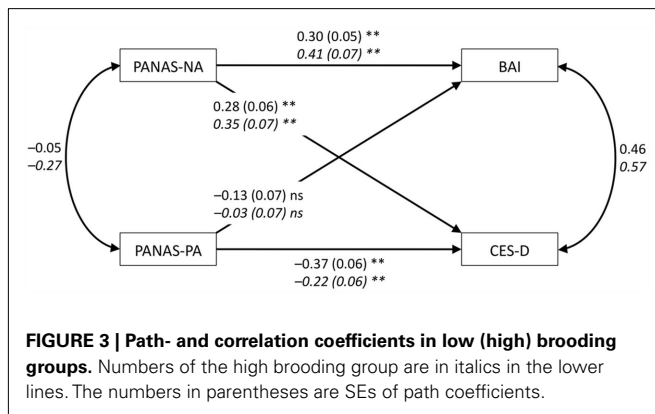
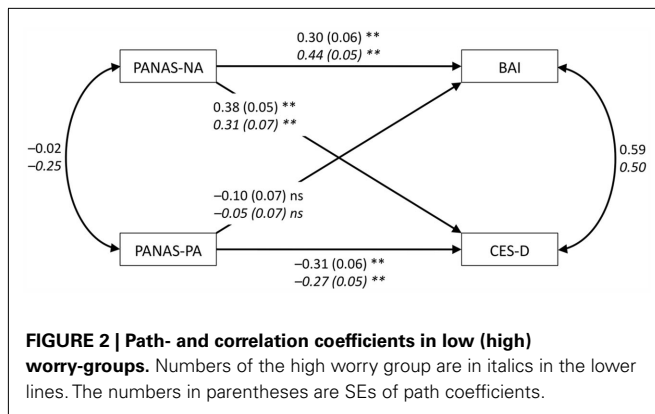
PATH ANALYSES

Overall model

All four coefficients significantly differed from zero although the coefficient PA–BAI was the least significant ($\beta = -0.093$, $p = 0.019$). The other three coefficients had absolute β -values between 0.28 and 0.45 and p -values of < 0.001 each. The correlation between PA and NA was $r = -0.18$ ($p < 0.001$). Anxiety and depression symptoms were strongly related ($r = 0.57$, $p < 0.001$).

Subgroups worry low/high

Taken together, the four path coefficients significantly differed between the two subgroups ($p = 0.016$). This was primarily due to the coefficient NA–anxiety symptoms, which was strongly and significantly increased in the “high worry” subgroup compared to the “low worry” subgroup ($p < 0.001$, constraining the three other coefficients to be equal between subgroups), whereas the other three coefficients did not differ between subgroups ($p > 0.40$ for each coefficient). Note that when using three instead of two subgroups (low, medium, and high worry), results for the coefficient NA–anxiety symptoms were similar with the highest coefficients for the “high worry” and the lowest coefficients for the “low worry” subgroup, suggesting a linear association. The correlations between NA and PA were $r = -0.02$ ($p = 0.75$) and $r = -0.25$



($p = 0.001$) for low and high worry, respectively. For the subgroup “low worry,” all but one coefficient significantly differed from 0 (absolute β between 0.30 and 0.38, $p < 0.001$) with the exception of the path PA–BAI ($\beta = -0.10$, $p = 0.084$). The correlation between BAI and CES-D was 0.59 ($p < 0.001$). For the subgroup “high worry,” all but one coefficient significantly differed from 0 (absolute β between 0.27 and 0.44, $p < 0.001$), the exception was PA–BAI ($\beta = -0.05$, $p = 0.44$). The correlation between BAI and CES-D was 0.50 ($p < 0.001$; **Figure 2**).

Subgroups RSQ brooding low/high

For both groups, all path coefficients differed significantly from zero with the exception of PA–BAI in the high brooding group ($\beta = -0.03$, $p = 0.65$). Considered together, the four path coefficients did not differ significantly between the two subgroups ($p = 0.084$). In addition, none of the four coefficients differed between the two subgroups, although the path coefficient NA–anxiety was 0.41 for the high versus 0.30 for the low brooding group ($p > 0.05$ for each coefficient, constraining the three other coefficients to be equal between subgroups). The relationship between PA and NA was stronger in the high brooding group (brooding low: $r = -0.05$, $p = 0.36$; brooding high: $r = -0.27$, $p < 0.001$; **Figure 3**).

DISCUSSION

The main aim of the present study was to investigate the impact of brooding and worry as moderators of the association between NA

and depression and anxiety in a sample of young adults. The results support the assumptions of the TMDA, in that NA predicted both anxiety and depressive symptoms. Low PA also significantly predicted both anxiety and depression, but the association between low PA and anxiety was negligible, thus confirming the proposed specific role of low PA for depression.

Results regarding the moderating role of brooding and worry were mixed. Although both types of perseverative thinking moderated the associations between NA and both anxiety and depression in the hypothesized direction, this was statistically significant for worry only. As hypothesized, worry moderated the predicted association by strengthening the path NA–anxiety. The hypothesis that both kinds of perseverative thinking moderate both paths NA–depression/NA–anxiety symptoms, therefore, received only partial support. Nevertheless, even though brooding was not a significant path moderator, it still had a strong tendency to strengthen the association between NA and anxiety. Neither worry nor brooding had a significant impact on the path NA–depression. While worry was a significant specific path moderator, brooding moderated both paths NA–worry and NA–depression only marginally. In the present study, worry had a specific and strong effect, while the moderating effect of brooding was non-specific and weak.

Segerstrom et al. (2000) found a stronger non-specific effect in non-depressed students, while specific associations between rumination and depression were found in patients only. It could be argued that the general proneness to perseverative thinking is a predisposing factor for both anxiety and depression, which may develop into the respective clinical syndromes when filled with specific content. This notion is also supported by the high inter-correlations between brooding, worry, anxiety, and depression in our non-clinical sample. In the future, it should be investigated whether interventions to reduce perseverative thinking would be effective for the prevention of both disorders. However, in individuals with clinical depression or anxiety, it could be useful to target rumination and worry specifically. Even though the impact of perseverative thinking in the present path model was mixed, zero-order correlations between worry, brooding, depression, and anxiety were high. This suggests that there may be other pathways that connect perseverative thinking with depression and anxiety. There is preliminary evidence that higher-order cognitions like beliefs about rumination and worry may explain associations between perseverative thinking and psychopathology. In their review, Papageorgiou and Wells (2004) argue that in addition to content and process, negative beliefs about worry and rumination link perseverative thinking with psychopathology. This approach should be followed up in future research.

In individuals reporting high levels of perseverative thinking there was a significant negative association between NA and PA. Unexpectedly, in participants with low levels of perseverative thinking no such association was found. To our knowledge, there is no literature on the impact of brooding and worry on the association of NA and PA. Diener and Emmons (1984) found the association between NA and PA to depend on the time frame assessed: when measuring momentary affect, PA and NA were inversely related. This association diminished linearly when longer intervals were evaluated. In another study (Johnson et al., 2008), only students with bipolar disorder ruminated in response to

positive affect compared to students with unipolar depression or students with no disorder. It is possible, therefore, that the tendency to ruminate or worry predominantly leads most individuals to exacerbate their negative affect only. Following Diener's findings (1984) that it does not seem possible to experience positive and negative affect at the same time, one could apply this result to people who experience negative affect for longer periods. People with high levels of rumination have prolonged periods of negative affect (Nolen-Hoeksema, 1991; Lyubomirsky and Tkach, 2004). During these prolonged periods, it is unlikely for these individuals to experience positive affective states. This way, the negative association between NA and PA in participants with high levels of perseverative thinking might occur. Another explanation could be that worriers' and ruminators' access to the recall of their general affect could be biased and influence the PANAS scores toward the more negative (Lyubomirsky and Nolen-Hoeksema, 1995; Lyubomirsky et al., 1998). In order to obtain more valid data, these processes should be investigated with ecologically momentary assessment methods.

LIMITATIONS

There could be methodological reasons for the rather weak moderating properties of brooding on the associations between NA and anxiety/depression. One concern lies in the definition of rumination and, therefore, the wording of the brooding items of the RSQ. Thoughts assessed by the RSQ focus on the content of the respective cognition but not on their perseverative nature. Although the internal consistency and predictive validity of the RSQ for depression have been demonstrated, there are no data on the construct validity of the brooding subscale. In the present study, the subscale had the lowest internal consistency of all measures employed (see **Table 1**). Similar problems were reported by Johnson et al. (2008) who found no association between the brooding subscale of the RSQ and depression scores in participants without mood disorders. For future research, instruments that reliably assess the perseverative aspect of depressive rumination are needed. Similarly, when comparing definitions of rumination and worry, there are differences regarding the controllability of the two. The dimension of uncontrollability is a defining criterion for worry but not brooding, and it might be beneficial for future research to emphasize the aspect of uncontrollability for brooding as well.

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Papageorgiou and Wells (1999), for example, report that in patients with major depressive disorder and panic disorder, rumination was rated longer in duration, and less controllable than worrying. Watkins et al. (2005) found that rumination and worry share the same processes although different content. Sharpening the definition of rumination in a way that the aspects of uncontrollability or perseveration are emphasized would contribute to improving instruments assessing brooding.

Another limitation regarding the external validity of the present results lies in the sample investigated. To capture factors underlying depression and anxiety we focused mostly on young adults that were younger than the average ages of onset for anxiety (25 years) and depression (30–40 years, American Psychiatric Association, 2000). The results are relevant from the clinical perspective of a higher prevalence of these disorders in young adults but may not apply to older individuals or clinical samples. There is some evidence that the mechanisms linking perseverative thinking and mood or anxiety disorders differ between student populations and clinical samples. In clinical samples, the specific associations between rumination and depression seem much stronger (Segerstrom et al., 2000; Johnson et al., 2008). If this was confirmed in future research, specific implications for prevention and intervention could be drawn. For the prevention of anxiety and depression, the reduction of general perseverative thinking might be a useful target. For the intervention of clinical depression and anxiety, brooding and worry should be targeted specifically. Another potential limitation was the skewed gender ratio. To address this issue, we conducted all analyses for the female sample only, with no impact on the results.

CONCLUSION

The double role of perseverative thinking, i.e., specific and general, should attract more attention in future investigations. The present result that brooding had a stronger moderating impact on the path NA–anxiety than on the path NA–depression emphasizes this point. The current findings suggest that the assumption of the cognitive content specificity hypothesis should be extended. It is not only the contents of automatic cognitions that have detrimental effects on mental health but also the perseverative nature of these cognitions. More research in this area could have implications for the prevention and treatment of anxiety and depression.

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