



Mediating effects of rumination and worry on the links between neuroticism, anxiety and depression

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Abstract

The present study further examined the relations between neuroticism, rumination, and worry, on the one hand, and anxiety and depression, on the other hand, in a sample of 73 undergraduate students. The results indicated that there were significant correlations among neuroticism, rumination, and worry. Further, neuroticism, rumination, and worry were all positively linked to both anxiety and depression. Finally, support was found for a mediational model in which neuroticism was associated with the cognitive factors of worry and rumination, which in turn were related to anxiety and depression. The implications of these findings are discussed.

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1. Introduction

Recurrent, negative thoughts are an important feature of anxiety and depressive disorders. In anxiety, these thoughts may take the form of worry, which can be defined as apprehensive expectation of possible negative outcomes in future events (Borkovec, Robinson, Pruzinsky, & DePree, 1983). In depression, such negative thinking is labelled as rumination, which can be characterized as pondering about the depressive symptoms, as well as the causes and consequences of these symptoms (Nolen-Hoeksema, 1998). Obviously, worry bears strong resemblance to the construct of rumination as both constructs can be described as a cognitive concomitant of psychopathology that has to do with unproductive, repetitive thoughts.

Most researchers have exclusively related rumination to depression and worry to anxiety, although there is evidence to suggest that worry also occurs in depression (Starcevic, 1995) and that rumination is involved in anxiety (Blagden & Craske, 1996). Only a handful of studies have made an attempt to systematically explore the links between rumination and worry, on the one hand, and anxiety and depression, on the other hand. In a first study, Segerstrom, Tsao, Alden, and Craske (2000) reported substantial correlations between rumination and worry, and this appeared true for clinical and non-clinical subjects. Furthermore, using structural equations modeling, these authors demonstrated that rumination and worry both loaded on one and the same latent variable, labelled as ‘repetitive thought’, which in turn was significantly linked to both depression and anxiety. A second study was carried out by Fresco, Frankel, Mennin, Turk, and Heimberg (2002) who asked a large sample of undergraduate students to complete self-report scales of rumination, worry, anxiety, and depression. Results of a common factor analysis on rumination and worry items revealed separate factors for rumination and worry. In addition, it was found that rumination and worry were highly correlated with each other and demonstrated equally strong relationships to both anxiety and depression. In a third study, Muris, Roelofs, Meesters, and Boomsma (2004) examined relations among rumination, worry, anxiety and depression symptoms in a sample of 337 non-clinical adolescents. Results showed that rumination and worry were substantially correlated. Further, a factor analysis showed that both constructs were nevertheless distinct as rumination and worry items loaded on separate factors. Interestingly, both rumination and worry correlated more substantially with anxiety symptoms than with depression symptoms. Finally, worry emerged as a unique predictor of anxiety symptoms, even when controlling for rumination. In contrast, when controlling for worry, rumination no longer accounted for a significant proportion of the variance in depression symptoms.

Although there is some factor analytic evidence indicating that worry and rumination have distinct features (Fresco et al., 2002; Muris et al., 2004), the findings of these studies seem to justify the conclusion that worry and rumination are closely related cognitive constructs. Some authors have even reached the conclusion that worry and rumination are both manifestations of the dispositional vulnerability factor of neuroticism, which is believed to reflect the general predisposition to develop psychopathological symptoms such as anxiety and depression (e.g., Segerstrom et al., 2000). There is accumulating evidence demonstrating that worry and rumination are indeed substantially linked to neuroticism (e.g., Davey & Tallis, 1994; Keogh, French, & Reidy, 1998; Lam, Smith, Checkley, Rijdsdijk, & Sham, 2003; Roberts, Gilboa, & Gotlib, 1998).

Taken together, available research strongly suggests a mediational model in which neuroticism is associated with the cognitive factors of worry and rumination, which in turn are related to

anxiety and depression. So far, no study can be found that included all these relevant variables in one model. The current study was set up as an attempt to fill this gap. A sample of 73 undergraduate students completed measures of neuroticism, worry, rumination, anxiety, and depression. It was hypothesized that (1) neuroticism would correlate significantly with anxiety and depression, (2) neuroticism would be associated with worry and rumination, (3) worry and rumination would be linked with anxiety and depression, and (4) the correlations between neuroticism and anxiety and depression would be reduced or eliminated when controlling for the mediating variables of worry and rumination.

2. Method

2.1. *Participants and measures*

Seventy-three undergraduate students (61 females and 12 males) of Maastricht University participated in the present study in return for a small financial compensation. Their mean age was 20.8 years ($SD = 2.0$, range 18–28 years). The main constructs in this study were assessed by asking participants to complete the following questionnaires.

(1) Neuroticism was measured using the short version of the *Eysenck Personality Questionnaire* (EPQ; Eysenck, Eysenck, & Barrett, 1985). This scale consists of 12 dichotomous (yes–no) items (e.g., “Are your feelings easily hurt?”), which assess emotional instability. Yes-responses are summed to yield a total score, with higher scores reflecting higher levels of neuroticism ($\alpha = 0.78$).

(2) Rumination was indexed by the *Ruminative Response Scale* (RRS; Nolen-Hoeksema & Morrow, 1991), which is a 22-item questionnaire commonly used to assess ruminative coping responses to depressed mood. Items such as “Go away by yourself and think about why you feel this way” have to be scored on a four-point scale with 1 = *almost never* and 4 = *almost always*. A total rumination score is computed by adding up all items ($\alpha = 0.90$).

(3) Worry was assessed by means of the *Penn State Worry Questionnaire* (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990), which is a 16-item scale measuring the tendency to engage in excessive, generalized, and uncontrollable worry. Items such as “I worry all the time” have to be rated on five-point scales with 1 = *not at all typical of me* and 5 = *very typical of me*. A PSWQ total score is calculated by summing the scores on all items after recoding reversed items ($\alpha = 0.88$).

(4) Anxiety was measured with the trait anxiety scale of the *State-Trait Anxiety Inventory* (STAI; Spielberger, Gorsuch, & Lushene, 1970). This measure is generally regarded as an index of dispositional anxiety, and consists of 20 items (e.g., “I feel nervous and restless”) that are rated on four-point scales with 1 = *almost never* and 4 = *almost always*. After recoding reversed items, a total trait anxiety score can be derived by summing all items ($\alpha = 0.89$).

(5) Depression was assessed through the *Self-rating Depression Scale* (SDS; Zung, 1965). This scale contains 20 items reflecting cognitive, affective, and somatic symptoms of depression (e.g., “I feel sombre and depressed”). Items have to be rated on a four-point scale with 1 = *rarely or never* and 4 = *almost always or always*, and after recoding reversed items, a total depression score can be obtained ($\alpha = 0.80$).

3. Results

Mean scores on various questionnaires were 3.9 (SD = 2.8) for the EPQ-N, 42.0 (SD = 11.7) for the PSWQ, 36.6 (SD = 9.5) for the RRS, 34.9 (SD = 8.2) for the STAI, and 34.2 (SD = 6.3) for the SDS. A comparison with normative data of various questionnaires indeed confirmed the non-clinical nature of the present sample. Females scored somewhat higher on all questionnaires than males, but the only significant gender difference was found for the PSWQ. Thus, females showed a stronger tendency to worry than males [means being 34.6, SD = 7.8 versus 43.5, SD = 11.8, $t(71) = 2.5$, $p < 0.05$].

Correlations among neuroticism, rumination, and worry were all positive and significant (r s between 0.32 and 0.71, all $ps < 0.01$). Further, as can be seen in Table 1, there were also substantial correlations between neuroticism, rumination, and worry, on the one hand, and anxiety and depression, on the other hand (r s between 0.46 and 0.74, all $ps < 0.001$). Note, in passing, that neuroticism and worry were more substantially related to anxiety than to depression (both Z s were 2.8, $ps < 0.01$). This was not the case for rumination, which showed equally strong correlations with anxiety and depression. Finally, anxiety and depression were substantially correlated ($r = 0.80$, $p < 0.001$).

The hypothesized mediational model (i.e., neuroticism \rightarrow rumination and worry \rightarrow anxiety or depression) was tested following the guidelines of Baron and Kenny (1986). These guidelines suggest that besides the correlation between the model predictor (i.e., neuroticism) and the model criterion (i.e., anxiety or depression), three conditions should be met to demonstrate a mediational relationship: (1) the correlation between the model predictor (i.e., neuroticism) and the mediators (i.e., rumination and worry) should be significant, (2) the correlation between the mediators and the model criterion (i.e., anxiety or depression) should be significant, and (3) the correlation between the model predictor (i.e., neuroticism) and the model criterion (i.e., anxiety or depression) should be significantly reduced or eliminated when controlling for the mediators (i.e., rumination and worry). To test these conditions, correlational and regression analyses were carried out in which, we also corrected for gender.

Figs. 1 and 2 demonstrate our main findings regarding the hypothesized mediational model. As can be seen, the first condition was fulfilled as neuroticism was significantly linked to both

Table 1

Correlations (corrected for gender) among neuroticism (EPQ), rumination (RRS), worry (PSWQ), anxiety (STAI), and depression (SDS)

	(1)	(2)	(3)	(4)
(1) Neuroticism				
(2) Rumination	0.39*			
(3) Worry	0.71**	0.32*		
(4) Anxiety	0.70**	0.49**	0.74**	
(5) Depression	0.54**	0.46**	0.59**	0.80**

Notes. EPQ = Eysenck Personality Questionnaire, RRS = Ruminative Response Scale, PSWQ = Penn State Worry Questionnaire, STAI = State-Trait Anxiety Inventory, SDS = Self-rating Depression Scale. $N = 73$.

* $p < 0.01$.

** $p < 0.001$.

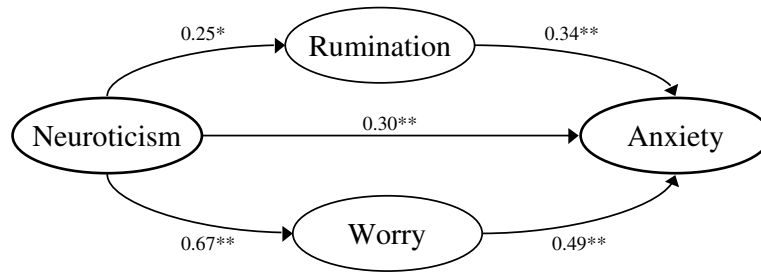


Fig. 1. Mediation effects of rumination and worry on the relationship between neuroticism and anxiety (* $p < 0.05$, ** $p < 0.01$).

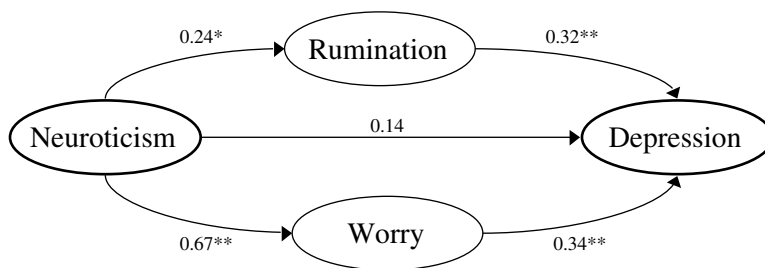


Fig. 2. Mediation effects of rumination and worry on the relationship between neuroticism and depression (* $p < 0.05$, ** $p < 0.01$).

rumination and worry, and this even appeared to be the case when controlling for the shared variance among these cognitive variables (partial r s being 0.24 and 0.67, respectively). As an aside, it should be mentioned that the correlation between rumination and worry disappeared when the influence of neuroticism was partialled out. The second condition was met as both rumination and worry made independent contributions to anxiety and depression, and this remained true when holding the influence of neuroticism constant (all partial r s between 0.32 and 0.49, p s < 0.01). Finally, the third condition was also fulfilled because it was found that the correlation between neuroticism and anxiety clearly attenuated (partial $r = 0.30$, $p < 0.05$), whereas that between neuroticism and depression disappeared (partial $r = 0.14$) when controlling for rumination and worry.

4. Discussion

The present study examined the relations between neuroticism, rumination, and worry, on the one hand, and anxiety and depression, on the other hand. The results can be summarized as follows. First, significant correlations were found among neuroticism, rumination, and worry. Second, neuroticism, rumination, and worry were positively linked to both anxiety and depression. Third and finally, support was found for a mediational model in which neuroticism was associated

with the cognitive factors of worry and rumination, which in turn were related to anxiety and depression.

As in previous studies (Fresco et al., 2002; Muris et al., 2004; Segerstrom et al., 2000), rumination and worry were related to each other. The current data also showed that both cognitive factors were related to neuroticism, and, most importantly, that when controlling for neuroticism, the correlation between rumination and worry disappeared. These findings not only suggest that rumination and worry both are manifestations of neuroticism, but also seem to indicate that neuroticism accounts for the communal features of these cognitive factors. This comes close to Segerstrom et al.'s (2000) notion that rumination and worry can best be considered as psychopathology-related unproductive, repetitive thought, which seems to be a cognitive concomitant of neuroticism.

Neuroticism was convincingly related to anxiety and depression, which is in keeping with the generally accepted idea that this personality trait makes individuals prone to exhibit psychopathological symptoms (e.g., Clark, Watson, & Mineka, 1994; Eysenck & Eysenck, 1985). As anticipated, rumination and worry were also significantly associated with anxiety and depression. No evidence was found indicating that worry was exclusively linked to anxiety, nor that rumination would merely be related to depression (see also Muris et al., 2004). In fact, regression analyses demonstrated that rumination and worry made significant and unique contributions to both anxiety and depression. Most interestingly, results supported the hypothesized model in which the relation between neuroticism and anxiety and depression was partially (anxiety) or fully (depression) mediated by rumination and worry. This finding fits most optimally in a diathesis-stress account. That is, when confronted with stress or threat, rumination and worry are activated in individuals characterized by high levels of neuroticism, which in turn enhance symptoms of anxiety and depression.

One could question whether rumination and worry are actually distinct cognitive factors. Previous studies that employed joint factor analysis have shown that rumination and worry items load on separate factors, and hence suggest that both constructs indeed have distinct features (Fresco et al., 2002; Muris et al., 2004). Further, the present data showed that rumination and worry both account for unique variance in psychopathology scores, and this finding also seems to indicate that they reflect different aspects of repetitive thought. However, it should be kept in mind that questionnaires for measuring rumination and worry were construed on the basis of separate theories and that as a result their content is somewhat different. Recent studies on the structure of rumination have identified two factors, namely reflective pondering which can be defined as purposefully turning inward to engage in cognitive problem solving to alleviate one's depressive symptoms, and brooding which reflects a passive comparison of one's current situation with some unachieved standard (e.g., Treynor, Gonzalez, & Nolen-Hoeksema, 2003). In a similar vein, worry researchers have made a distinction between type I worry (i.e., worrying about various topics such as health, finance etc.) and type II worry or meta-worry, which can be characterized as the negative appraisal of worrying itself (Wells & Carter, 1999). Thus, a closer examination of rumination and worry reveals further analogues, and suggests that it might be more fruitful to study repetitive thought in general instead of examining both constructs separately.

Admittedly, the present investigation suffers from various limitations. To begin with, the study was cross-sectional in nature, and hence it is not possible to draw conclusions on cause-effect

relations. Further, the study relied on non-clinical subjects. Thus, it remains to be seen whether the current findings can be generalized to clinical subjects.

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