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Agreeableness and the Self-Regulation of Negative Affect: Findings Involving the Neuroticism/Somatic Distress Relationship

Scott Ode and Michael D. Robinson

North Dakota State University

Abstract

In the temperament literature, agreeableness has been theoretically linked to effortful control. Further, research in this area has suggested that effortful control may play a broad role in moderating temperament-based tendencies toward negative affect. The present three studies, involving a total of 300 undergraduate participants, sought to extend this perspective to the adult literature by examining potential interactions between agreeableness and neuroticism in predicting reported somatic symptoms. Although such symptoms have been linked to neuroticism, they are not characteristic of the interpersonal concerns linked to agreeableness. Nevertheless, all studies found that agreeableness and neuroticism interacted to predict somatic symptoms such that high levels of agreeableness decoupled the relationship between neuroticism and somatic distress. These findings indicate a broad role for agreeableness in the self-regulation of neuroticism-linked distress.

Keywords

Agreeableness; Neuroticism; Somatic Symptoms; Self-Regulation; Effortful Control

Agreeableness is often viewed in terms of its interpersonal correlates. Experience-sampling studies have found that, in comparison to disagreeable individuals, agreeable individuals generally engage in less quarrelsome behavior and more cooperative behavior in daily life (Moskowitz, 1994). In terms of the social cognitive basis of agreeableness, this trait dimension has been associated with less perceived interpersonal conflict in laboratory interaction paradigms (Graziano, Jensen-Campbell, & Hair, 1996) and agreeable individuals exhibit a preference for more socially adaptive modes of conflict resolution (Graziano et al., 1996; Jensen-Campbell & Graziano, 2001).

In addition, we suggest that agreeableness may also tap broad tendencies toward effortful control in domains that are less tied to interpersonal outcomes. Consistent with this perspective, Tangney, Baumeister, and Boone (2004) report a relationship between agreeableness and a dispositional self-control measure assessing the ability to override intrapsychic urges, such as those related to overeating or laziness. Furthermore, Jensen-Campbell et al. (2002) found that agreeableness was associated with smaller Stroop-interference effects, suggesting superior abilities to inhibit cognitive conflicts. These findings, although modest in number, are

Correspondence can be sent to Scott Ode, Psychology Department, North Dakota State University, Fargo, ND 58105. Internet correspondence can be sent to E-mail: Scott.Ode@ndsu.edu (phone: 701-231-5486; fax: 701-231-8426).

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suggestive of a possible broad relation between agreeableness and self-regulation, a theoretical view consistent with the developmental construct of effortful control.

Agreeableness as Effortful Control

Effortful control is primarily a cognitive construct that has been theoretically linked to operations of the cognitive control regions of the brain (Posner & Raichle, 1994; Rueda, Posner, & Rothbart 2004). Although the developmental literature does not tend to use self-report measures to assess personality, it has been suggested that effortful control is an important precursor to adult levels of trait agreeableness (Ahadi & Rothbart, 1994; Cumberland-Li, Eisenberg, & Reiser, 2004; Kochanska & Knaack, 2003). This suggestion is consistent with data indicating that both effortful control (Calkins, Gill, Johnson, & Smith, 1999) and agreeableness (Martin, Watson, & Wan, 2000) are inversely related to anger and aggression.

If effortful control is a substantial precursor of agreeableness, then the developmental literature makes some other points that deserve more systematic attention. First, the construct of effortful control is broader than that of anger-control, encouraging a more extensive conceptualization of agreeableness as self-regulation. As such, agreeableness may be associated with the self-regulation of forms of negative emotionality other than anger, including anxiety and depression (Eisenberg et al., 1996).

Second, it has been suggested that effortful control is particularly important among children with temperamental tendencies toward negative affect, presumably a precursor of neuroticism (Ahadi & Rothbart, 1994; Eisenberg, Fabes, Guthrie, & Reiser, 2000; Nigg, 2006). In the developmental literature, a frequent finding is that, among children high in negative emotionality, those high in effortful control are less vulnerable to mood-disordered outcomes (e.g., Eisenberg et al., 2000; see Nigg, 2006). Translating such findings to the adult trait literature, agreeableness may be expected to offer some protection against negative affect at high levels of neuroticism, but be less consequential at low levels of neuroticism. The purpose of the present studies was to examine such interactive predictions in the context of adult personality traits and we did so in relation to somatic symptoms.

Somatic Symptoms

Somatic symptoms refer to all classes of bodily complaints, including headaches, muscle tension, nausea, and respiratory difficulties. Self-reports of such disturbances are influenced by physiological conditions and diseases, as well as by psychological factors (Pennebaker, 2000). One psychological factor that has been identified as a robust predictor of somatic symptoms is trait neuroticism (Pennebaker, 2000).

There are two prominent explanations for the robust neuroticism-symptom relationship. One explanation emphasizes psychological factors related to self-focus and threat vigilance, which are characteristic of individuals high in neuroticism (Watson & Pennebaker, 1989). The other explanation emphasizes the fact that chronic stress and negative affect undermine physiological functioning (Herbert & Cohen, 1993). Both of these perspectives are compelling and they will be revisited in the discussion.

Aside from the considerations involving neuroticism mentioned above, the focus on somatic symptoms seemed very useful in the present context for an additional reason. This form of distress, unlike others, possesses few obvious implications for social functioning. Therefore it is unlikely that such distress will trigger the interpersonal motives characteristic of agreeable individuals. Thus, to the extent that agreeableness moderates this form of neuroticism-linked distress, findings would seem to support the broad role of agreeableness in self-regulation proposed in the developmental literature (e.g., Ahadi & Rothbart, 1994).

Studies 1–3

It was predicted that neuroticism and agreeableness would interact to predict the intensity of somatic symptoms. Furthermore, we predicted that relations between neuroticism and somatic symptoms would be stronger at low levels of agreeableness and potentially non-significant at high levels of agreeableness. To ensure the robust nature of such interactions, three independent studies were conducted. For sake of parsimony, all three studies are reported together.

Method

Participants—Participants were independent samples of 94 (55 female, 39 male), 130 (81 female, 49 male), and 76 (57 female, 19 male) participants from the University of Illinois, Champaign (Studies 1–2) and North Dakota State University (Study 3). Analyses were conducted to determine if sex moderated the interactions reported below. No consistent pattern emerged and thus sex was dropped from further consideration.

Measures

Agreeableness and Neuroticism: Agreeableness and neuroticism were assessed using Goldberg's (1999) broad-bandwidth scales. These scales correlate highly with alternative measures of agreeableness and neuroticism, such as those based on the NEO-PI (Costa & McCrae, 1992; see Goldberg, 1999). Each scale consisted of 10 items asking participants to rate the extent to which each item was generally characteristic of the self (1 = very inaccurate; 5 = very accurate). The agreeableness scale contained both positively (“take time out for others”) and negatively keyed (“insult people”) items. Likewise, the neuroticism scale included positively (“worry about things”) and negatively keyed (“seldom feel blue”) items. These scales have good internal consistency (alphas ranging from .75–.85; Goldberg, 1999).

Somatic Symptoms: Validated scales were used to assess the degree to which participants experienced various somatic symptoms during the previous week. Although this time frame does not capture experiences as they occur, it is consistent with prior data suggesting that week-retrospective reports are fairly accurate in capturing daily experiences (Parkinson, Briner, Reynolds, & Totterdell, 1995; Robinson & Clore, 2002). Additionally, prior scales assessing somatic symptoms frequently use such week-retrospective reporting frames (Pennebaker, 2000; Watson & Clark, 1994), presumably because somatic symptoms are relatively more common during the course of a week than at any specific moment in time.

In Studies 1 and 2, we used a 13-item scale adopted from the longer Pennebaker (2000) inventory. Participants were asked to indicate how much discomfort (0 = not at all; 4 = extremely) each symptom (e.g., “chest or heart pain”) caused them during the previous week. This scale has been used in previous studies and has been shown to be a reliable and valid measure of somatic distress (e.g., Robinson & Wilkowski, 2006).

To support the generality of our conclusions, we administered a different measure of somatic symptoms in Study 3. Specifically, we administered the Anxious Arousal scale from Watson and Clark's (1991) inventory. This scale assesses somatic distress (e.g., “felt faint”) and possesses high internal consistency (alphas = .86–.90; Watson & Clark, 1991). Participants were asked to indicate the extent to which they had experienced each of 17 symptoms during the previous week (1 = not at all; 5 = extremely).

Procedures—Participants in Studies 1 and 3 completed the measures in a single assessment session. In Study 2, we inserted a three-week delay between the collection of the trait measures and the later collection of somatic symptom reports. The longer delay used in Study 2 allowed us to assess whether the hypothesized interaction can be used to make prospective predictions.

In terms of replication considerations, then, Studies 1 and 2 involve the same scale, but different temporal lags, whereas Studies 1 and 3 involve different symptom measures, but an identical temporal lag. These variations were deemed useful in supporting a general interactive pattern.

Results

Descriptive statistics—Table 1 reports descriptive statistics for the measures of neuroticism, agreeableness, and somatic symptoms, along with correlations among these measures. As expected, correlations indicated that neuroticism predicted somatic symptom reports, whereas agreeableness did not. The fact that agreeableness did not tend to predict somatic symptoms in zero-order terms is consistent with prior data (e.g., Robinson & Wilkowski, 2006) and not inconsistent with our interactive hypotheses. Table 1 also shows that neuroticism and agreeableness were significantly and inversely correlated in two of the three studies. This is consistent with prior suggestions that neuroticism and agreeableness may share at least one common substrate related to self-regulation capacity (Jang et al., 2001).

Interactive Predictions—We hypothesized that neuroticism and agreeableness would interact to predict recent somatic symptoms. To examine this prediction, we followed the recommendations of Aiken and West (1991) by first *z*-scoring neuroticism and agreeableness and then creating an interaction term by multiplying these *z*-scores. Multiple regressions were then performed for each study, in which Neuroticism, Agreeableness, and the Neuroticism by Agreeableness interaction term were entered as simultaneous predictors of somatic symptoms.

In the prediction of Study 1 somatic symptoms, there was a main effect for Neuroticism, $t = 2.49, p < .05, \beta = .25$, no main effect for Agreeableness, $t = -0.70, p > .45, \beta = -.07$, and a significant Neuroticism \times Agreeableness interaction, $t = -2.28, p < .05, \beta = -.22$. Likewise, in the prediction of Study 2 somatic symptoms, there was a main effect for Neuroticism, $t = 2.61, p < .05, \beta = .23$, no main effect for Agreeableness, $t = -0.49, p > .60, \beta = -.04$, and a significant Neuroticism \times Agreeableness interaction, $t = -1.99, p < .05, \beta = -.17$. Finally, in Study 3, there was a marginal main effect for Neuroticism, $t = 1.66, p = .10, \beta = .20$, a significant main effect for Agreeableness, $t = -2.06, p < .05, \beta = -.25$, and a significant Neuroticism \times Agreeableness interaction, $t = -2.15, p < .05, \beta = -.23$. Importantly, neuroticism and agreeableness interacted to predict somatic symptoms in all studies.

To interpret the significant interactions observed in all studies, we estimated somatic symptom means for those low ($-1 SD$) and high ($+1 SD$) in neuroticism who were low ($-1 SD$) and high ($+1 SD$) in agreeableness (see Aiken & West, 1991). Estimated means for each study are graphed in Figure 1. As shown there, all studies found neuroticism to be a robust predictor of somatic symptoms at low levels of agreeableness, but not at high levels of agreeableness. Additionally, the highest levels of somatic symptoms were consistently found among individuals high in neuroticism and low in agreeableness.

To further understand the interactions, simple slopes analyses were performed (Aiken & West, 1991). Neuroticism was a robust predictor of somatic symptoms at low ($-1 SD$) levels of agreeableness in Study 1 ($t = 3.32, p < .01, \beta = .47$), Study 2 ($t = 3.01, p < .01, \beta = .41$), and Study 3 ($t = 2.77, p < .01, \beta = .40$). However, neuroticism did *not* predict somatic symptoms at high ($+1 SD$) levels of agreeableness in Study 1 ($t = 0.30, p > .40, \beta = .04$), Study 2 ($t = 0.36, p > .70, \beta = .04$), or Study 3 ($t = -0.03, p > .90, \beta = -.01$). Thus, the studies were consistent in revealing that neuroticism was predictive of somatic symptoms, but only at low levels of agreeableness.

Simple slopes analysis involving relations between agreeableness and somatic symptoms were also conducted. According to our self-regulation framework, agreeableness should be protective at high ($+1 SD$) levels of neuroticism, but less relevant to predicting somatic symptoms at low ($-1 SD$) levels of neuroticism. In support of such predictions, agreeableness

was unrelated to somatic symptoms at low levels of neuroticism (Study 1, $t = 0.99$, $p > .30$, $\beta = .14$; Study 2, $t = 1.04$, $p > .25$, $\beta = .14$; Study 3, $t = -0.27$, $p > .75$, $\beta = -.04$). However, agreeableness was inversely related to somatic symptoms at high levels of neuroticism (Study 1, $t = -2.13$, $p < .05$, $\beta = -.28$; Study 2, $t = -1.91$, $p < .10$, $\beta = -.22$; Study 3, $t = -3.22$, $p < .01$, $\beta = -.45$). Although the Study 2 simple slope was marginal rather than significant, it was consistent with the pattern found in Studies 1 and 3. Thus, the findings show that agreeableness is inversely related to somatic symptoms, but only at high levels of neuroticism.

Discussion

Summary of Findings—The purpose of the present studies was to examine whether agreeableness moderates neuroticism-linked tendencies toward distress. In this connection, we built on conceptually related proposals made in the developmental literature (e.g., Rothbart, Ellis, & Posner 2004) and focused on a distress-related outcome measure with no obvious interpersonal consequences. As hypothesized, neuroticism and agreeableness interacted to predict somatic symptoms in all three studies. Furthermore, the neuroticism-symptom relation was pronounced at low levels of agreeableness, but absent at high levels of agreeableness. Such findings attest to the importance of agreeableness in moderating trait-linked vulnerabilities toward somatic distress, and extend the developmental perspective on effortful control to the adult literature on agreeableness.

Agreeableness as Self-Regulation—Both proponents (Goldberg, 1993; McCrae & Costa, 1999) and detractors (Pervin, 1994; Western, 1995) of the Big 5 approach to personality converge on a common point, namely the need for social cognitive models that can explain *why* traits predict the outcomes that they do. Such mediating processes have been extensively theorized and studied in relation to extraversion and neuroticism (for reviews, see Matthews & Gilliland, 1999; Rusting, 1998), but less so in relation to the trait of agreeableness (for a review, see Graziano & Eisenberg, 1997). Thus, in the case of adult forms of agreeableness, we have relatively few sources of data to understand why it predicts the outcomes that it does.

On the basis of the literature, we can discern a number of social cognitive perspectives of agreeableness. One perspective extends agreeableness to the self-regulation of hostile thoughts and feelings. It is clear that agreeableness is inversely related to self-report scales tapping hostile thoughts, feelings, and behaviors (Martin et al., 2000). Moreover, agreeable individuals have been found to be less susceptible to the influence of accessible hostile thoughts in a number of social cognitive paradigms (e.g., Meier, Robinson, & Wilkowski, 2006; Wilkowski, Robinson, & Meier, 2006). On the basis of such data, it has been suggested that individuals high in agreeableness somewhat automatically self-regulate activated hostile thoughts. While the present results do not contradict this view, they do suggest a broader perspective on such agreeableness-linked self-regulation processes.

Specifically, agreeableness may play a broad role in down-regulating other forms of negative affect in addition to anger. This suggestion is consistent with the developmental literature on effortful control, which has been systematically linked to agreeableness (Ahadi & Rothbart, 1994; Cumberland-Li et al., 2004; Kochanska & Knaack, 2003). Although this broad view of agreeableness as self-regulation has rarely received a great deal of attention in the adult trait literature, it appears to us that this broad view has great potential and we encourage future research along the present lines.

Conscientiousness as Self-Regulation—In addition to relations involving agreeableness, the developmental literature also suggests that effortful control is an important precursor of conscientiousness (Ahadi & Rothbart, 1994). This relationship has received support from a number of empirical findings. For example, Abe (2005) found that observer-

rated levels of conscientiousness in children as young as 3.5 years predicted parental ratings of effortful control several years later. Studies conducted by Jensen-Campbell and colleagues have converged on this systematic link among samples of older adolescent (e.g., Jensen-Campbell & Malcolm, 2007).

Although we did not assess conscientiousness in the current studies, we do view it likely that conscientiousness, too, would moderate neuroticism-distress relations of the present type. We encourage this direction of research. Furthermore, if similar results are obtained using measures of conscientiousness, then it may be useful to conceptualize effortful control in terms of what is common to agreeableness and conscientiousness, as is done with the dimension of psychoticism in Eysenck's model (Clark & Watson, 1999).

Neuroticism-Distress Relations—Neuroticism can be viewed as a risk factor for a wide variety of negative outcomes (Widiger, Verheul, & van den Brink, 1999). However, recent studies have shown that there are a large number of variables that moderate relations between trait neuroticism and everyday experiences of distress. These variables include those related to threat-recognition skills (Tamir, Robinson, & Solberg, 2006), habitual response tendencies (Robinson, Goetz, Wilkowski, & Hoffman, 2006b), and perseveration tendencies (Robinson, Wilkowski, Kirkeby, & Meier, 2006a). Although these sorts of moderator variables are cognitive in nature rather than based on trait self-reports, the more general point is that skills related to self-regulation appear to mitigate neuroticism-linked tendencies toward distress (e.g., Robinson et al., 2006a).

The present results are consistent with these other sources of data. In the present studies, it was found that neuroticism-symptom relations were pronounced among individuals low in agreeableness, but were absent among individuals high in agreeableness. Such interactive relations are consistent with the idea that self-regulation skills can inhibit trait-linked vulnerabilities, a general principle that has been suggested in both the adult (e.g., Mischel & Ayduk, 2004) and developmental (e.g., Kochanska, Murray, & Harlan, 2000) literatures.

On the Nature of Somatic Symptom Reports—Although recent data have shown that negative affect undermines the body's functioning (Herbert & Cohen, 1993; Johnson, 2003), other results link neuroticism to a perceptual bias independent of actual bodily functioning (Costa & McCrae, 1987; Watson & Pennebaker, 1989). In the present studies, the latter perceptual perspective seems to make the most sense. Although agreeableness could significantly moderate neuroticism's effects on the body, it seems more likely to us that the present results are due to the fact that agreeableness moderates neuroticism-linked tendencies related to self-focus and vigilance (Watson & Pennebaker, 1989).

In support of the latter point, agreeableness has been linked to the self-regulation of hostile thoughts and feelings (Wilkowski & Robinson, submitted), depressive thoughts and feelings (Ode & Robinson, submitted), and seems to be associated with broad tendencies to view the same objective circumstances in a more positive manner (Graziano et al., 1996; Jensen-Campbell & Graziano, 2001). All of these findings suggest a role for agreeableness in regulating negative thoughts rather than improving the health of the body. Regardless, it is intriguing to us to consider whether agreeableness might moderate the influence of negative affect on bodily functioning (Herbert & Cohen, 1993; Johnson, 2003) and we encourage this direction of research in the future.

Conclusion—The present studies sought to extend the idea that agreeableness may play an important role in the self-regulation of negative affect. To extend this perspective to the adult literature, it seemed important to focus on a correlate of neuroticism that possesses few obvious interpersonal consequences. Therefore we chose to focus on somatic symptoms in the current

investigation. In three studies, we showed that neuroticism and agreeableness interacted to predict somatic symptoms, such that the neuroticism-symptom relationship was strong at low levels of agreeableness and absent at high levels of agreeableness. Among other implications, our results encourage a further integration of the temperamental and trait perspective on trait agreeableness.

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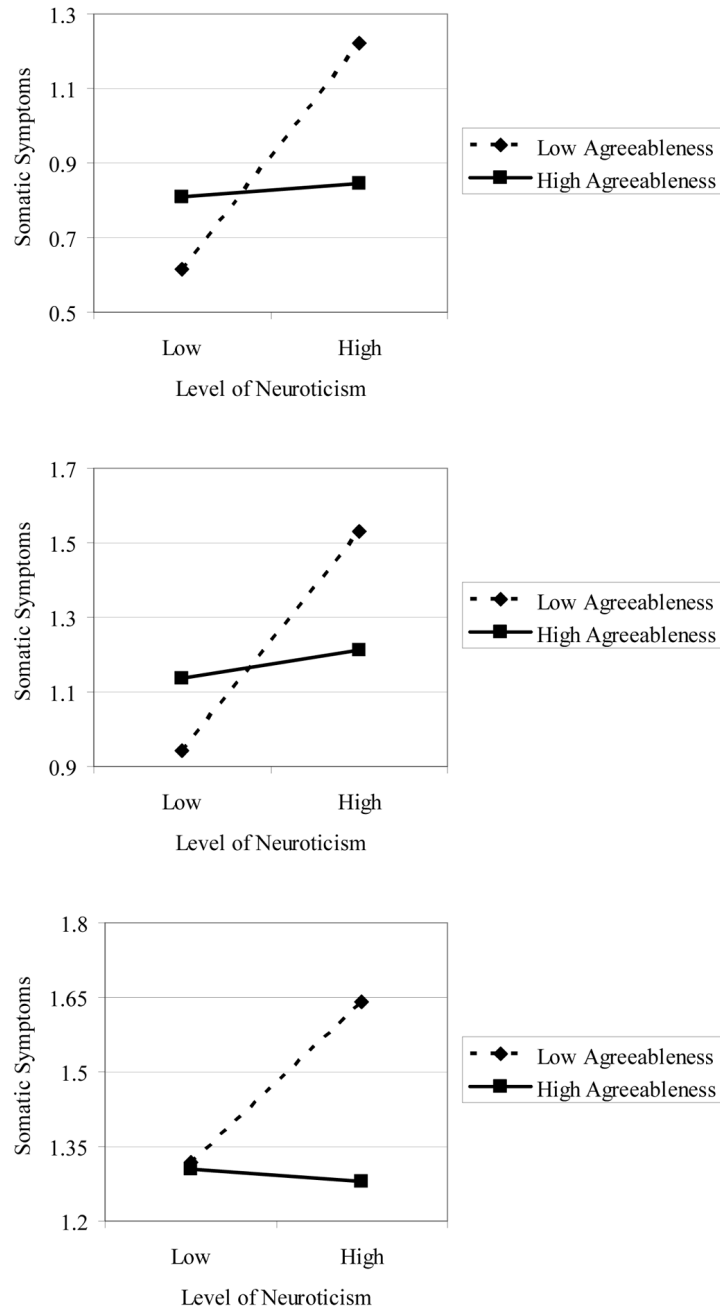


Figure 1. Estimated Means for the Neuroticism by Agreeableness Interactions, Study 1 (Top Panel), Study 2 (Middle Panel), and Study 3 (Bottom Panel)

Table 1
Descriptive Statistics and Correlations Among Measures, All Studies

	Study 1	Study 2	Study 3
<i>Descriptive Statistics: Mean (SD)</i>			
N	2.85 (.75)	2.00 (.78)	2.33 (.78)
A	3.83 (.73)	4.17 (.78)	4.23 (.78)
SS	1.87 (.64)	1.19 (.73)	1.39 (.51)
<i>Correlations</i>			
N & A	-.25*	-.03	-.49*
N & SS	.27*	.20*	.36*
A & SS	-.15	-.06	-.40*

Note: N = Neuroticism; A = Agreeableness; SS = Somatic Symptoms.

* = $p < .05$