



Individuals high in neuroticism are not more reactive to adverse events

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ABSTRACT

Numerous studies have related neuroticism to negative emotional outcomes of adverse life events, including post-traumatic stress disorder (PTSD) symptoms. However, the nature of the relationship between neuroticism and post-trauma symptoms is unclear. The purpose of this study was to prospectively examine whether individuals high in neuroticism, relative to low neuroticism individuals, show a larger increase in symptoms after an adverse event. A sample of infantry troops completed questionnaires before deployment to Iraq ($n = 214$) and about five months ($n = 170$; 76%) thereafter. The findings showed that, after controlling for an indicator of trauma severity, (a) higher neuroticism individuals reported more PTSD symptoms, depression symptoms, and somatic problems after negative events, and (b) these relationships disappeared after controlling for pre-trauma symptoms. There were no significant differences between individuals high and low in neuroticism in the increase in symptoms from pre to post-trauma. This suggests that individuals high in neuroticism are not more reactive to adverse events.

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1. Introduction

Numerous studies have related neuroticism to negative emotional outcomes of adverse life events, such as distress (e.g., Ormel & Wohlfarth, 1991; van Os & Jones, 1999), grief (e.g., Janssen, Cuijsinier, de Graauw, & Hoogduin, 1997), depression (e.g., Ormel, Oldehinkel, & Brilman, 2001), somatic problems (e.g., Chung, Berger, Jones, & Rudd, 2006), and (symptoms of) posttraumatic stress disorder (PTSD). When indicators of trauma severity or trauma type are held constant, individuals with elevated neuroticism scores are more likely to develop PTSD (e.g., Cox, MacPherson, Enns, & McWilliams, 2004; Kelly, et al, 1998), and report more severe PTSD symptoms (e.g., Bramsen, Dirkzwager, & van der Ploeg, 2000; Holeva & Tarrier, 2001). These data have been taken to imply that high neuroticism individuals are more reactive to adverse events (e.g., Janssen et al., 1997; Kelly et al., 1998).

However, this conclusion does not necessarily follow from the data. Neuroticism is associated with a wide range of complaints even before the occurrence of a negative life event (see Claridge & Davis, 2001; Ormel, Rosmalen, & Farmer, 2004; Watson & Pennebaker, 1989). Watson and Clark (1984) have argued that individuals who score high on neuroticism are more likely to experience distress at all times and across situations, even in the absence of overt stress. The increase in symptoms after an adverse event may not differ between individuals high and low in neuroticism.

In other words, neuroticism may not have a moderator effect on the stressor-symptoms association. The impression of a larger symptom-increase in high neuroticism individuals may be created by the absence of mental health measures before a negative life event. Perhaps individuals high in neuroticism are more likely to be classified as a psychiatric patient after a negative life event (e.g., Breslau, Davis, Andreski, & Peterson, 1991), because they have more subclinical complaints before the event, and require less additional (event-related) symptoms to enter the clinical realm.

Such a pattern of a parallel increase in symptoms in high/low neuroticism individuals was recently suggested by Ormel et al. (2004), p. 907: "...prospective associations of neuroticism with mental health outcomes are basically futile, and largely tautological since scores on any characteristic with substantial within-subject stability will predict, by definition, characteristic and related variables at later points in time." It is an empirical issue whether the net increase in symptoms after life events is higher among individuals high in neuroticism. It should be studied by measuring neuroticism and relevant emotional distress before a negative event and re-measuring distress afterwards. Such a design can determine whether neuroticism interacts with negative events, resulting in a greater post-event increase in distress for high neuroticism individuals. Engelhard, van den Hout, and Kindt (2003) reported a study with this design. In a sample of 1372 pregnant women, neuroticism and PTSD symptoms were assessed. In a subsample of 118 women who had a miscarriage or stillbirth, PTSD symptoms were re assessed. The data gave unequivocal support for the tautology account: relative to low neuroticism women, high

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neuroticism women had more symptoms after pregnancy loss, but they already had more symptoms before the loss, and the rise in symptoms did not differ between the groups. Further evidence comes from a prospective study by De Beurs and colleagues (2005) among a large nonclinical elderly sample. They found that neuroticism is associated with a decrease in emotional health over time, but showed that life events involving threat did not have a stronger impact on high compared to low neuroticism individuals.

The present study was carried out to test the generalizability of the findings of the Engelhard et al. (2003) study, using the same basic design: measuring distress and neuroticism before (an) adverse life event(s) and re-measuring distress after the event(s). Army soldiers (95% male) were tested before and after deployment to Iraq. Although the pre-deployment period may be stressful itself, 'baseline' symptoms were assessed during this period, because we were interested in *increases* in these symptoms after deployment. The nature of adverse events was obviously rather different from pregnancy loss, and included being shot at, being informed that a colleague got killed, being injured because of an accident, and seeing dead or injured individuals. The first goal of this study was to replicate the earlier findings of more PTSD symptoms after these events for higher neuroticism individuals, while controlling for trauma severity, which would disappear after controlling for PTSD symptoms before these events. A second goal was to extend the earlier findings by testing whether (non-PTSD) common complaints after stressful life events (i.e., depressive symptoms and somatic problems) would yield a comparable pattern. The data presented are part of a larger project, which is described in detail elsewhere (see Engelhard et al., 2007b; Engelhard & van den Hout, 2007).

2. Method

2.1. Participants and procedure

A total of 216 infantry troops were invited to take part in this study about six weeks before a four-month deployment to Iraq in 2004. Their main duties were to create and maintain stability and peace, and assist in reconstruction. They suffered one casualty. At various sites, troops available during their preparation program were told about the study by their commanding officer. They met the principal investigator or research assistant a few days later, who gave complete information about the study. Participation was voluntary without financial compensation. Participants were told that commanders would be informed only about pooled results. Two soldiers refused, and 214 ($n = 10$ female) agreed and completed the baseline measures, including the Eysenck Personality Questionnaire (EPQ), PTSD Symptom Scale (PSS), and Symptom Checklist (SCL-90; see measures). About five months after deployment, the participants completed the Potentially Traumatizing Events Scale (PTES), PSS, and SCL-90. Most soldiers were tested in small groups ($n \leq 4$) at a base, but some completed questionnaires by mail. The majority also completed a clinical interview and follow-up assessment at 15 months, which will not be considered here. The institutional review board approved the study. Characteristics of this sample are reported elsewhere (Engelhard et al., 2007b).

2.2. Measures

Neuroticism was measured with the short version of the EPQ (Eysenck & Eysenck, 1975; Sanderman, Arrindell, Ranchor, Eysenck, & Eysenck, 1995). The psychometric properties of this scale are good (Sanderman et al., 1995). Only the neuroticism scale will be reported (EPQ-N; range 0–22).

PTSD symptom severity was measured with the 17-item PSS (Engelhard, Arntz, & van den Hout, 2007a; Foa, Riggs, Dancu, &

Rothbaum, 1993), which corresponds to the DSM-IV PTSD symptoms. Individuals were asked to rate how much each symptom had bothered them during the past month using a scale ranging from 0 (not at all) to 3 (very much). Scores were summed for the full scale and the subscales reexperiencing, avoidance/numbing, and hyperarousal. The psychometric properties of the PSS are good (Engelhard et al., 2007a; Foa et al., 1993). Cronbach's α was .79 before deployment and .90 after deployment.

Common mental problems were measured with the SCL-90 (Arrindell & Ettema, 2003; Derogatis, 1977). The depression (16 items) and somatization (12 items) subscales will be reported. Individuals were asked to rate how much each symptom had bothered them in the past week using a 1 (*not at all*) to 5 (*very often*) scale. The SCL-90 has established reliability and validity (Arrindell & Ettema, 2003).

Exposure to deployment-related war-zone stressors was measured with the PTES, which included 22 events (Engelhard & van den Hout, 2007; Maguen, Litz, Wang, & Cook, 2004). Individuals were asked to indicate for each event they experienced how negative it was for them at the time on a 4-point scale from 1 (*no impact*) to 4 (*extremely negative*). The sum score provided a trauma severity index.

3. Results

The response rate was 76% ($n = 170$) at 5 months. Non-response was partly due to soldiers being on leave, attending a course, or being posted to new units. No significant differences were found on baseline variables between responders and non-responders. The distribution of the EPQ-N ($M = 4.0$, $SD = 3.6$) was comparable to a community male sample of a similar age (Sanderman et al., 1995). The most common events experienced in Iraq included going on patrols or other dangerous duties (90%), being told that a colleague got killed (95%), witnessing violence (83%), witnessing an explosion (75%), and being shot at (62%). Five months after deployment, 4% ($N = 6/148$) of this sample had full-blown PTSD (Engelhard et al., 2007b). The PSS was skewed to the right and transformed with square root to normality for parametric analyses. The median (untransformed) PSS score was 2 ($M = 3.06$, $SD = 3.83$) before deployment and it was 4 ($M = 6.39$, $SD = 7.05$) after deployment. After deployment, PTSD symptom levels were higher than before, $t(155)^1 = 6.44$, $p < .001$.

To begin with, we examined whether neuroticism was significantly related to *post*-deployment PTSD symptoms, which was the case, $r(169) = .28$, $p < .001$. Neuroticism was also related to trauma severity, $r(169) = .18$, $p < .05$, and to *pre*-deployment PTSD symptoms, $r(192) = .41$, $p < .001$. A hierarchical regression analysis was conducted to examine whether the relationship between neuroticism and *post*-deployment PTSD symptoms would still stand after controlling for trauma severity and *pre*-deployment PTSD symptoms. Neuroticism and trauma severity were entered in Step 1, and *pre*-deployment PTSD symptoms were entered in Step 2. This analysis showed that *pre*-deployment neuroticism ($\beta = .20$, $t = 2.80$, $p < .001$) and trauma severity ($\beta = .44$, $t = 6.21$, $p < .001$) were independent predictors of *post*-deployment PTSD symptoms, $F(2, 152) = 27.05$, $p < .001$, $R^2 = .26$. When *pre*-deployment PTSD symptoms were entered, trauma severity ($\beta = .39$, $p < .001$) and *pre*-deployment symptoms ($\beta = .31$, $p < .001$) remained significant, but this was no longer the case for neuroticism ($\beta = .06$, $p = .40$), $F(3, 151) = 25.44$, $p < .001$, $R^2 = .34$. In other words, neuroticism was not significantly related to increases in PTSD symptoms from before to after deployment. This is shown in Fig. 1 by parallel slopes in PTSD symptoms for individuals high and low in

¹ Note that numbers vary due to missing values.

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