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Self-Reported Extremely Adverse Life Events and Longitudinal Changes in Five-Factor Model Personality Traits in an Urban Sample

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Abstract

This study examined longitudinal personality change in response to extremely adverse life events in a sample ($N = 458$) drawn from the East Baltimore Epidemiologic Catchment Area study. Five-factor model personality traits were assessed twice over an average interval of 8 years. Twenty-five percent of the participants reported an extremely horrifying or frightening event within 2 years before the second personality assessment. Relative to the rest of the sample, they showed increases in neuroticism, decreases in the compliance facet of agreeableness, and decreases in openness to values. Baseline personality was unrelated to future events, but among participants who reported extreme events, lower extraversion and/or conscientiousness at baseline as well as longitudinal increases in neuroticism predicted lower mental health at follow-up.

There is growing evidence that long-standing environmental conditions such as relationship involvement (Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007; Robins, Caspi, & Moffit, 2002), work experiences (Roberts, 1997; Roberts, Caspi, & Moffit, 2003), or enrollment in psychotherapy (De Fruyt, Van Leeuwen, Bagby, Rolland, & Rouillon, 2006; Piedmont, 2001) may be linked to longitudinal trajectories of Five-Factor Model (FFM) personality traits. In contrast, research on personality changes in response to distinct life events is rare, the reported effects are only modest, and results are inconsistent across studies (Costa, Herbst, McCrae, & Siegler, 2000; Magnus, Diener, Fujita, & Pavot, 1993; Vaidya, Gray, Haig, & Watson, 2002).

Previous research on event-related changes in 5FM traits may be hampered by the tendency to group more extreme negative events (e.g., accidents) with less severe events (e.g., failing a class) to form summary scores of negative events (Costa et al., 2000; Magnus et al., 1993;

Vaidya et al., 2002). A related problem is the reliance on student samples who tend to be healthy, wealthy, and sheltered, and therefore less likely to experience events that are serious enough to potentially alter their personality (Magnus et al., 1993; Vaidya et al., 2002). Further, some previous studies have lag times of several years between the occurrence of an event and subsequent personality assessments (Costa et al., 2000). Over time, homeostatic processes in the aftermath of an event may mask its initial impact, an effect that is well documented in research on well-being (e.g., Silver, 1982; Suh, Diener, & Fujita, 1996).

Given these concerns with previous research, it is plausible that very stressful and adverse events would have more pronounced and predictable effects on subsequent change in 5FM traits, especially when personality is assessed shortly after the event. Support for the notion that extremely adverse life events may affect 5FM traits comes from research on posttraumatic stress. Because severely stressful events are rare, most studies are limited to assessing personality in the aftermath of traumatic events. These studies suggest that individuals suffering from posttraumatic stress have a distinct personality profile characterized by high neuroticism (e.g., Breslau, Davis, Andreski, & Peterson, 1991; Chung, Berger, & Rudd, 2007; Chung, Dennis, Easthope, Werrett, & Farmer, 2005; Davidson, Kudler, & Smith, 1987; Hyer et al., 1994; McFarlane, 1988), low extraversion (e.g., Chung et al., 2005; Davidson et al., 1987; McFarlane, 1988), and low agreeableness (e.g., Chung et al., 2007; Hyer et al., 1994; Talbert, Braswell, Albrecht, Hyer, & Boudewyns, 1993).

The few studies that measured aspects of 5FM personality traits before a traumatic event found that participants who show high baseline levels of neuroticism (Bramsen, Dirkzwager, & Van Der Ploeg, 2000; Lee, Vaillant, Torrey, & Elder, 1995) and possibly openness (Knezevic, Opacic, Savic, & Priebe, 2005) are more likely to show symptoms of posttraumatic stress. Moreover, those with higher neuroticism scores immediately after a traumatic experience are more likely to develop symptoms of posttraumatic stress later on (e.g., Fauerbach, Lawrence, Schmidt, Munster, & Costa, 2000; Holeva & Tarrier, 2001). Unfortunately, none of these studies assessed personality traits both before and after the traumatic experience occurred. Thus, it is not clear to what extent the personality correlates of posttraumatic stress reflect preexisting personality versus event-related personality changes.

Our study extends prior research by examining the influence of recent and highly stressful life events on longitudinal change in 5FM personality traits over an 8-year interval in an urban community sample. Over a quarter of participants reported an extremely adverse event within 2 years preceding the follow-up personality measurement.¹ To obtain a fine-grained assessment of personality changes, we assessed traits both at the level of the five higher-order factors and at the level of individual facets. Because personality stability differs across demographic groups (Löckenhoff et al., 2008) we controlled for age, gender, ethnicity, and education. Among those participants who reported a highly stressful event, we also examined the influence of baseline personality and personality change on self-reported adjustment and mental health in the aftermath of the event.

Based on prior research regarding the personality characteristics associated with posttraumatic stress (see above) we expected that the recent experience of extremely adverse events would lead to an increase in neuroticism and decreases in extraversion and agreeableness. We further expected that both personality at baseline and the degree of personality change in response to the stressful events would predict subsequent adjustment. Consistent with research on personality and coping (see meta-analysis by Connor-Smith & Flachsbart, 2007), we predicted

¹High rates of stressful events in this sample are likely due to a combination of urban crime, vulnerability due to low socioeconomic status, and the impact of Hurricane Isabel that affected the region in 2003.

that low neuroticism and high scores on extraversion, and conscientiousness would be linked to better adjustment to extreme events.

METHOD

Participants and Procedure

Data are drawn from the East Baltimore Epidemiologic Catchment Area study (ECA; Eaton et al., 1997), an ongoing multidisciplinary study following a probability sample of 3,481 household residents who were initially interviewed in 1981. Follow-up data were collected in 1993–1998 ($N = 1920$) and in 2004–2005 ($N = 1071$). The 1993–1998 wave is abbreviated here as 1993 and the 2004–2005 wave as 2004. Participants who were lost to follow-up or failed to meet the criteria for inclusion in the present analysis were significantly older and less educated ($ps < .001$). For detailed information regarding attrition rates see Eaton, Kalaydjian, Scharfstein, Mezuk, and Ding (2007) and Löckenhoff and colleagues (2008).

Participants provided informed consent and completed the assessments in a quiet setting, either at their own home or at a participating institution. Personality and mental health measures were collected at each of the two follow-ups and life events data were collected at the 2004 follow-up.

The present sample is limited to participants who had valid personality assessments at both follow-ups, provided valid life events data in 2004, and scored above the cutoff value of 24 on the Mini-Mental State Examination at both follow-ups (MMSE; Folstein, Folstein, & McHugh, 1975).

Consistent with the population structure in East Baltimore, the parent sample is predominantly White and Black. To systematically control for ethnic differences, we excluded 2.5% of otherwise eligible participants who either did not belong to one of these groups or had not reported their ethnic background. The final sample consisted of 458 participants. Age in 1993 ranged from 31 to 88 years ($M = 47.2$, $SD = 10.6$). Years of education ranged from 5 to 17 years ($M = 12.8$, $SD = 2.3$), 64% were women, and 34% were Black. The average interval between personality assessments was 8.4 years ($SD = 2.1$).

Measures

Adverse life events were assessed in the context of a structured interview, which included a standard series of questions regarding life events such as loss of a job, separation and divorce, and death of a family member. After these questions, participants were told, “Now I want to ask you about events so extreme that some people try to forget them.” They were then asked whether they recently witnessed or experienced an event that “was extremely horrifying or frightening.” If participants indicated that this was the case, they were asked to briefly describe the event, give its approximate date, and indicate whether or not they had adjusted to the resulting changes. These events we characterize as extremely adverse events.

Personality was assessed with the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992), a comprehensive and well-validated questionnaire measure of the Five-Factor Model (for convergent validity with other personality measures, see Avia et al., 1995; Costa & McCrae, 1992; McCrae & Costa, 1985). Its 240 items assess five higher-order personality dimensions—Neuroticism, Extraversion, Openness to experience, Agreeableness, and Conscientiousness—as well as 30 lower-level facets. We computed t -standardized factor and facet scores based on adult combined-sex norms (Costa & McCrae, 1992). For details regarding reliability, data quality, and structural stability of NEO-PI-R scores in the Baltimore ECA see Löckenhoff and colleagues (2008).

Mental health was assessed with the 12-item version of the General Health Questionnaire (GHQ; Goldberg & Williams, 1988), which assesses ratings of distress and positive mental health “over the past few weeks.” Consistent with previous research (e.g., Malyszczak et al., 2007), there was a moderate negative association between GHQ scores and *N* ($r = -.36, p < .01$), but only small associations ($-.1 < r < .1$) with the remaining personality traits. This indicates that although GHQ and *N* are related, each of the constructs captures unique variance.

Data Analysis

To examine the influence of baseline personality on subsequent life events and adjustment to such events, we conducted hierarchical logistic regressions. Residualized change in personality factors and facets was examined using hierarchical regressions (for a discussion of the merits of this approach in modeling personality change, see Roberts & Chapman, 2000). Separate hierarchical linear regressions for each of the personality factors and facets examined the influence of life events on personality scores in 2004 after controlling for personality in 1993 in a first block and demographic variables in a second block. An analogous approach was used to examine the influence of personality on residualized change in mental health.

RESULTS

Descriptive Analyses

More than a quarter of respondents (25.2%) reported that they had recently experienced an extremely horrifying or frightening event. Six participants were excluded because the events were not dated or occurred more than 2 years in the past. Among the remaining 111 participants, on average $M = 241$ days ($SD = 158$) had elapsed since the event; 74% of events occurred less than a year before the 2004 assessment. Twenty-five percent experienced or witnessed an accident, 24% lost a close other, 14% faced a potentially life-threatening health event in themselves or others, 13% experienced or witnessed a crime, 9% were affected by extreme weather, 10% reacted to worldwide events (such as the Iraq war or the tsunami in 2004), and 5% reported severe interpersonal conflicts. Almost a third (32%) indicated that they had not yet adjusted to the changes resulting from the event. Note that more than 85% of the events reported by participants match screening measures for exposure to trauma such as the Life Events Checklist by the National Center for Posttraumatic Stress Disorder (Gray, Litz, Hsu, & Lombardo, 2004) or the Traumatic Events Questionnaire (Vrana & Lauterbach, 1994). The pattern of results was comparable when analyses were limited to participants who had reported events that matched with these screening measures.

Personality as a Predictor of Self-Reported Extreme Events

To examine personality traits as predictors of self-reported adverse events, we conducted a hierarchical logistic regression in the full sample ($N = 458$). The dependent variable was the recent experience of an extreme event (*yes* vs. *no*). In the first block of predictors, we entered demographic variables (age, gender, ethnicity, and education); in a second block we entered personality factor scores in 1993. Neither demographic variables nor personality traits at baseline were significant predictors of extreme events.

Personality Change in Response to Self-Reported Extreme Events

To examine personality change in response to self-reported extreme events, we conducted a series of hierarchical linear regressions in the full sample ($N = 458$). Separate analyses were conducted for each of the personality factors and facets. The dependent variables were personality scores in 2004. As predictors, we entered personality scores in 1993 in Block 1, demographic variables in Block 2, and self-reported extreme events (*yes* or *no*) in Block 3. Table 1 reports regression coefficients and proportions of explained variance for each of the

blocks. Because of concerns about multiple tests, we limit our discussion of facet-level findings to effects that reached significance at $p < .01$.

Consistent with the high retest stability of the NEO-PI-R (Costa & McCrae, 1992), personality in 1993 predicted personality in 2004 (Block 1). The effects of demographic variables on personality change in the ECA sample (Block 2) are merely included for control purposes in the present study and have already been described elsewhere (see Löckenhoff et al., 2008, for a discussion). The third blocks of the regressions are summarized in the right columns of Table 1. Compared to the rest of the sample, participants who reported an extremely stressful event increased in neuroticism. Specifically, they showed an increase in N2: angry hostility. At the same time, they decreased in O6: openness to values and A4: compliance.²

An additional hierarchical regression examined the influence of self-reported adverse events on residualized change in mental health as measured by the GHQ. Results are reported in the bottom row of Table 1 and indicate that whereas change in GHQ was unrelated to demographic characteristics, participants who reported an extreme event experienced a decrease in mental health from 1993 to 2004.

Personality Traits and Adjustment to Self-Reported Extreme Events

To examine the implications of personality at baseline and personality change for adjustment to stressful events, we focused further analyses on the group of 111 participants who had reported extremely adverse events. Within this group, we examined two indicators of adjustment: Self-reported adjustment to the event (*yes* or *no*) in 2004 and longitudinal trajectories of mental health from 1993 to 2004.

To examine the influence of personality traits on self-reported adjustment, we conducted a logistic regression, which predicted self-reported adjustment to the event in 2004 (adjusted vs. not adjusted), based on time elapsed since the event (Block 1), demographic variables (Block 2), personality factor scores in 1993 (Block 3), and residualized change scores for each of the personality factors (Block 4). Among the demographic variables, higher education levels were a significant predictor of adjustment ($B = 0.24$, $SE = 0.10$, $\chi^2(4)$ Block 2 = 9.60, $p < .05$). The time that had elapsed since the event, personality traits in 1993, and residualized change in personality traits did not predict self-reported adjustment.

To examine the influence of personality at baseline and personality change on longitudinal trajectories of mental health, we conducted a hierarchical regression predicting GHQ scores in 2004 based on GHQ scores in 1993 (Block 1), demographic variables (Block 2), personality factor scores in 1993 (Block 3), and residualized change scores for each of the personality factors (Block 4). After accounting for GHQ in 1993 ($\beta = .19$, $p < .05$, $R^2 = .036$) and demographic variables (women scored lower on mental health, $\beta = -.22$, $p < .05$, $\Delta R^2 = .088$), personality scores in 1993 emerged as a significant predictor of mental health in 2004 ($\Delta R^2 = .11$, $p < .05$). Specifically, participants experienced better mental health in 2004 if they scored high in extraversion ($\beta = .22$, $p < .05$) and/or conscientiousness ($\beta = .21$, $p < .05$) before experiencing the adverse event. Neuroticism at baseline did not predict mental health trajectories, but an increase in neuroticism from 1993 to 2004 was associated with lower mental health in 2004 ($\beta = -.23$, $p < .05$, $\Delta R^2 = .073$).

²In supplemental analyses, we added a fourth block examining interactions between the event variable and baseline personality. None of these interactions reached significance. In addition, the statistical approach to calculating change scores may influence estimates of mean level change (Roberts & Chapman, 2000). For comparison purposes, we computed repeated measures ANCOVAs with personality scores in 1993 and 2004 as the dependent variables. Adverse events were entered as a between-subjects factor and demographic variables were entered as covariates. All of the effects in Block 3 that reached significance at $p < .01$ were replicated with this method.

DISCUSSION

The present study contributes to the literature by suggesting that the experience of extremely adverse events is associated with a selective pattern of changes in personality traits. Compared to the rest of the sample, participants who reported a recent and extremely adverse life event showed increases in the tendency to experience negative affect (neuroticism), especially anger and frustration (N2: angry hostility). At the same time, they became less likely to cooperate and deescalate in situations of interpersonal conflict (A4: compliance). These effects are consistent with previous research, which suggests that stressful life events can take a toll on emotional well-being and interpersonal relationships (e.g., Hammen, 2005; Story & Bradbury, 2004). Importantly, our findings indicate that these effects can be strong enough to shift—at least temporarily—selected aspects of an individual's core personality traits. In addition, participants who had experienced extreme events decreased on O6: openness to values, indicating an increased tendency to embrace authority, dogma, and tradition. These results are consistent with terror management theory, which predicts that increased salience of one's mortality leads people to reaffirm their cultural worldviews and reject alternative opinions (e.g., Greenberg et al., 1990).

Our findings are also consistent with the clinical presentation of posttraumatic stress disorder (PTSD). In particular, the observed changes in facets of neuroticism and agreeableness match the persistent distress, irritability, outbursts of anger, and interpersonal estrangement that are part of the criteria for PTSD according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* (American Psychiatric Association, 1994). Importantly, our findings extend previous studies that report an association between exposure to trauma and high neuroticism/low agreeableness (Chung et al., 2007; Hyer et al., 1994; Talbert et al., 1993), by suggesting that the observed effects are not rooted in preexposure personality, but emerge as a result of experiencing extreme events.

Although the observed patterns of personality changes are intriguing, it is just as important to note that they only affected select facets of neuroticism, openness, and agreeableness and that the effect sizes are comparatively small. Among participants who reported extreme events, the observed changes in personality nevertheless amounted to 3 or more *t*-score points, which is 3 times larger than the rate of age-related change that would be expected in a late midlife sample (i.e., about one *t*-score point per decade; Terracciano, McCrae, Brant, & Costa, 2005).

Two of the five factors, extraversion and conscientiousness, were not influenced by self-reported extreme events at all. Instead, they appeared to act as resources for coping with such events: Among participants who reported an extreme event, those who were high in extraversion and/or conscientiousness before the event experienced more favorable trajectories of mental health in the aftermath. In addition, participants who reported a greater increase in neuroticism in response to the event showed a greater decline in mental health. In practical terms, these findings suggest that baseline assessments of personality traits may aid in the identification of individuals who are most likely to suffer from posttraumatic stress if they are exposed to extreme events. This is particularly relevant for professions for whom exposure to traumatic events is more likely (e.g., law enforcement, emergency response personnel).

One unexpected finding was that preexposure personality and personality change were unrelated to self-reported adjustment to the events. An obvious explanation lies in the psychometric shortcomings of the simple dichotomous adjustment variable, an issue that could be readily addressed in future studies. Our study has a number of other limitations. First, we assessed adverse life events via self-reports that could have been biased. However, in contrast to previous studies (e.g., Headey & Wearing, 1989; Vaidya et al., 2002), preexposure personality was not a significant predictor of adverse events—most likely because extreme

events such as accidents or crime are influenced by chance and less subject to risk-taking or protective behaviors than more mundane events. This finding speaks against personality-related biases in event reporting. Another concern is our use of a single-item screen to elicit reports of extreme events because such measures tend to underestimate the prevalence of trauma (Norris, Foster, & Weisshaar, 2002). Further, although most of the reported events match PTSD screening measures (Gray et al., 2004; Vrana & Lauterbach, 1994), we did not obtain formal PTSD diagnoses. Future studies that limit analyses to individuals meeting *DSM* criteria and use more sensitive screening measures for traumatic events would likely reveal even more pronounced effects of extreme events on personality traits. Moreover, because of limitations in sample size, we could not compare the influence of different types of events (e.g., accidents vs. crime) or examine the role of secondary events in the aftermath of an extreme event (e.g., losing one's job as a result of a health problem). Further, although community-based and fairly diverse, our sample is not representative of the U.S. population. Finally, it is not clear whether the observed personality changes are merely temporary reactions or reflect more permanent shifts. Data collected in future waves of the Baltimore ECA could help to answer this important question.

Despite these limitations, our findings add to the research record by examining longitudinal changes in 5FM traits after exposure to extremely stressful events. The results are theoretically relevant because they contribute to ongoing discussions regarding the environmental malleability of personality traits, and they are practically relevant because they may help clinicians to identify personality-based strengths and vulnerabilities among clients who have been exposed to extremely stressful experiences.

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Table 1
Summary of Regressions Examining the Influence of Self-Reported Extreme Events on Residualized Change in Personality and Mental Health

	Block 1		Block 2				Block 3	
	β_{1993}	R^2	β_{Age}	$\beta_{Gender (Female)}$	$\beta_{Ethnicity (White)}$	$\beta_{Education}$	β_{Event}	ΔR^2
2004 Personality and mental health scores								
Neuroticism	.68**	.46**	-.04	.09*	.07*	-.06	.10**	.01**
Extraversion	.70**	.47**	-.09*	.06	.00	-.03	.03	.00
Openness	.74**	.55**	-.00	.02	-.08*	.07*	-.05	.00
Agreeableness	.72**	.51**	.00	.13**	-.02	.01	-.06	.00
Conscientiousness	.64**	.41**	-.07	-.06	-.04	-.01	.06	.00
N1: Anxiety	.63**	.40**	-.01	.10**	.09*	-.05	.06	.00
N2: Angry hostility	.57**	.33**	-.01	-.01	.02	-.05	.12**	.01**
N3: Depression	.64**	.41**	.03	.07*	.07	-.01	.07*	.01*
N4: Self-consciousness	.57**	.32**	.02	.04	.05	-.02	.06	.00
N5: Impulsiveness	.53**	.28**	-.07	.02	.03	-.08	-.03	.00
N6: Vulnerability	.64**	.41**	-.02	.10**	.05	-.06	.05	.00
E1: Warmth	.63**	.40**	-.03	.08*	-.02	.00	.06	.00
E2: Gregariousness	.60**	.36**	-.04	.09*	.00	.02	-.03	.00
E3: Assertiveness	.67**	.45**	-.03	-.02	-.06	.06	.03	.00
E4: Activity	.62**	.39**	-.12**	-.03	.04	-.02	.01	.00
E5: Excitement-seeking	.65**	.43**	-.04	-.10**	.01	-.02	.03	.00
E6: Positive emotions	.64**	.41**	-.03	.04	-.02	.01	.01	.00
O1: Fantasy	.59**	.35**	.02	-.02	.01	.06	-.04	.00
O2: Aesthetics	.66**	.44**	-.01	.06	-.05	.05	.03	.00
O3: Feelings	.55**	.30**	-.12**	.14**	.01	.05	.04	.00
O4: Actions	.58**	.34**	-.019	.03	-.07	.07	-.08*	.01*
O5: Ideas	.69**	.47**	.00	-.03	-.05	.07	-.04	.00
O6: Values	.56**	.31**	-.09	.00	-.04	.04	-.12**	.01**
A1: Trust	.64**	.41**	.04	.05	-.01	.06	-.08*	.01*
A2: Straightforwardness	.56**	.31**	-.01	.13**	-.01	-.03	-.04	.00

	Block 1		Block 2				Block 3	
	β_{1993}	R^2	β_{Age}	$\beta_{Gender (Female)}$	$\beta_{Ethnicity (White)}$	$\beta_{Education}$	β_{Event}	ΔR^2
2004 Personality and mental health scores								
A3: Altruism	.55**	.30**	-.05	.13**	.02	-.00	.03	.00
A4: Compliance	.57**	.32**	.05	.07	-.06	.04	-.14**	.02**
A5: Modesty	.56**	.32**	-.06	.08*	.04	-.05	-.04	.00
A6: Tender-mindedness	.49**	.24**	.02	.10*	-.13**	.01	-.02	.00
C1: Competence	.54**	.29**	-.07	-.09*	-.09*	.07	-.01	.00
C2: Order	.59**	.34**	-.06	-.05	-.02	-.08*	.04	.00
C3: Dutifulness	.52**	.27**	.02	-.03	.07	.06	.03	.00
C4: Achievement striving	.60**	.36**	-.04	-.07	-.10**	.06	.02	.00
C5: Self-discipline	.60**	.37**	-.09*	-.06	-.05	-.02	-.07	.00
C6: Deliberation	.59**	.35**	.03	-.05	-.04	.00	.01	.00
GHQ mental health	.36**	.13**	.03	-.08	.02	.09	-.09*	.01*

Note. GHQ = General Health Questionnaire. Analyses examine the effect of extreme events (Block 3) on residualized change in personality and mental health after controlling for baseline scores in personality and mental health (Block 1) and demographic variables (Block 2). ΔR^2 scores indicate additional variance explained by a given block after accounting for the variance explained by previous blocks.

* $p < .05$.

** $p < .01$.