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Personality and fear responses during conditioning: Beyond extraversion

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Abstract

The personality domain of introversion-extraversion has been theorized to be associated with the strength of fear conditioning, but the literature on this topic has been equivocal. Furthermore, except for extraversion and neuroticism, relationships of the other Big Five personality domains with fear response acquisition have not been explored. In the current study, multi-level modeling was used to examine the relationships of facets of the Big 5 domains to fear response acquisition. Participants were 217 police and firefighter trainees who completed the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992) and a fear conditioning task as part of a larger study. Results indicated that several facets of extraversion have opposing associations with fear response acquisition of an electrodermal response—possibly contributing to the mixed results in the literature. Additionally, facets of other Big Five domains were found to be associated with fear response acquisition.

Keywords

fear conditioning; Big 5; personality; extraversion; neuroticism; multi-level modeling; psychophysiology

Researchers have long been interested in the relationships between fear conditioning and personality traits, with the vast majority of studies focusing on the personality dimension of introversion-extraversion. This line of research is predicated on Eysenck's (1965, 1967) theory in which introverts are purported to acquire conditioned fear responses more easily (under conditions of low to moderate arousal) than extraverts. Although this hypothesis is clearly articulated, the extant literature has been equivocal. Whereas some studies have found

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Ethical Statement

My coauthors and I do not have any interests that might be interpreted as influencing the research, and APA ethical standards were followed in the conduct of the study. Informed consent was obtained and the rights of subjects were protected.

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introverts to have stronger conditioned fear responses than extraverts (e.g., Franks, 1956), other studies observed no difference (e.g., Davidson *et al.*, 1964; Otto *et al.*, 2007). Neuroticism has also been investigated as a potential influence of fear conditioning, as neuroticism has been hypothesized to be positively related to sensitivity to signals of punishment (e.g., H.J. Eysenck, 1967). However, there is little evidence to suggest that individuals high on neuroticism acquire conditioned fear responses more quickly than others (e.g., Davidson *et al.*, 1964; Otto *et al.*, 2007, for null results; Grillon *et al.*, 2006; for positive results).

Research on the relationships between personality domains and conditioning has mostly focused on extraversion and neuroticism. However, there are other important personality domains, i.e., conscientiousness, agreeableness, and openness to experience, in addition to neuroticism and extraversion that are incorporated into the Big Five, a widely accepted model of personality (e.g., Fiske, 1949; Goldberg, 1981; McCrae & Costa, 1987). Within the Big Five, the extraversion and neuroticism domains are similar to the constructs as defined by Eysenck (1965, 1967). Individuals scoring high on extraversion are characterized as sociable, fun-loving, and affectionate and individuals with high neuroticism scores tend to be anxious, insecure, and self-conscious. Openness to experience encompasses originality, imaginativeness, and having an array of interests. Individuals high on agreeableness can be described as forgiving, sympathetic, and acquiescent. The conscientiousness domain includes carefulness, reliability, and being hardworking. As discussed above, research on personality and conditioning has primarily focused on extraversion and, to a lesser extent, neuroticism. To our knowledge, the relationships of conscientiousness, openness to experience, and agreeableness with fear conditioning have not been studied. Examining these relationships may yield useful insights into predictors of fear acquisition, and possibly the construct of learning more broadly. Furthermore, these data may guide future hypothesis-driven research on these topics.

The mixed results regarding the relationships between personality and conditioning may be related to the methods used for assessing fear conditioning. Much of the extant research on personality and conditioning used simple conditioning tasks with conditioning operationalized as a count (or percentage) of the number of conditioned responses produced by an individual (e.g., Davidson *et al.*, 1964). Other studies used differential fear conditioning procedures whereby conditioning is calculated as a difference score between responses to CS- trials (i.e., trials in which a similar stimulus is *not* paired with an aversive stimulus) and CS+ trials (i.e., trials pairing a conditioned stimulus with an unconditioned aversive stimulus; e.g., Grillon *et al.*, 2006). Although conditioning is understood to reflect learning across trials, these conditioning scores represent conditioning as a state rather than a process. Furthermore, these measures of conditioning reflect averages across people and individual error variance is not modeled.

Over the past decade there has been a call for the use of multi-level analytical models in the study of psychophysiology (Bagiella *et al.*, 2000; Kristjansson *et al.*, 2007). Similar to ANOVA, these analytic strategies model fixed effects (i.e., group means). However, they also model random effects (i.e., individual differences), whereas repeated-measures ANOVA does not differentiate between measurement error and systematic error due to individual differences. Thus, these methods are extremely well-suited for examining individual differences. A primary advantage of random effects regression analysis is that it adjusts for correlation or dependency among observations within individuals. This is done by modeling within-individual error that varies randomly across individuals, which allows for an examination of both within-individual changes in each psychophysiological measure over time and between-individual differences in within-individual change over time. Compared to traditional data analytic techniques, mixed-effects models have been described as more powerful because of their methods for handling missing observations and unbalanced designs, and because of their ability to model

error variance. They also have more flexibility, which allows for both fixed and time-varying predictors (Bagiella et al., 2000; Kristjansson et al., 2007).

The study and analyses reported here have two primary goals. The first goal is to examine the relationships between personality and fear conditioning using multi-level modeling. This data analytic technique is capable of examining conditioned fear acquisition as a process while accounting for individual error variance. The second goal is to extend the personality and conditioning literature by using a more fine grained analysis of extraversion and neuroticism's relationships with fear response acquisition, whereby different facets within these domains are examined. Finally, the present study explores the relationships between the remaining Big 5 domains (i.e., conscientiousness, openness to experience, and agreeableness) and the strength of fear response acquisition.

Method

Participants and procedures

Study participants included 217 police and firefighter trainees from New England (12% female, 84% Caucasian) who participated in a larger prospective study examining risk factors for developing posttraumatic stress disorder (PTSD). As part of this study, participants completed the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992) and a fear conditioning task at a baseline assessment. Participants were included in the current study if they completed and had valid data for the NEO-PI-R and the fear-conditioning task. Average age and education level were 27.1 (SD=6.2) and 14.1 (SD=1.8) years, respectively. Written informed consent was obtained from all participants.

NEO-PI-R—The NEO-PI-R is a well-validated self-report measure of the Big 5 domains of personality: neuroticism, extraversion, openness to experiences, agreeableness, and conscientiousness (Costa & McCrae, 1992). Within each domain, six subscales assess more specific facets of the domain. In the present study, means and standard deviations for each facet and domain were similar to published norms ($M_{Tscores}$ range from 46.02 to 57.57, with SDs ranging from 8.09 to 10.65).

Fear Conditioning Task—The procedures for this task were identical to those used in previous research (Orr *et al.*, 2000). In this discrimination fear-conditioning task, the CS+ (i.e., stimulus paired with an unconditioned aversive stimulus) and CS− (i.e., stimulus not paired with the unconditioned aversive stimulus) were represented by 6-inch diameter blue and white circles, respectively, displayed on a computer screen. The unconditioned stimulus (US) was a 500-ms. electric shock set by each participant at a level (s)he defined as “highly annoying but not painful”. The US was delivered through electrodes attached to the second and fourth fingers of the dominant hand. It was generated by a Coulbourn Transcutaneous Aversive Finger Stimulator using a 9-V dry cell battery that produced electric stimuli ranging from 0.2–4.0 milliamperes. Skin conductance level was recorded throughout this procedure.

This task consisted of a 5-minute baseline recording period, followed by three phases of the conditioning task: habituation, acquisition, and extinction.¹ During the instructions, participants were told that there would be shocks during the second phase and there would *not* be shocks during the third phase of the study. Habituation consisted of five presentations each of the to-be CS+ and CS− in pseudo-random order. The CS duration was 8s, with inter-

¹Only the results for the acquisition phase are discussed in this paper. Analyses were also conducted on the extinction data, with few significant effects. We attribute these mostly null results to restricted variance in extinction rates likely related to the nature of the participants and instructions. Participants were psychologically healthy firefighter and police recruits who were told that they would no longer receive shocks in the extinction phase.

trial intervals (ITIs) of 20+/-5s, determined at random by the computer. Acquisition consisted of five presentations of each stimulus type in pseudo-random order; the US occurred immediately following each CS+ offset. Extinction consisted of 10 non-reinforced presentations each of the CS+ and CS- in pseudo-random order. In each phase, SC was sampled and stored at 10 Hz., beginning 4s prior to CS onset and ending 6s following CS offset.

A skin conductance response (SCR) for each CS interval was calculated by subtracting the mean skin conductance (SC) level for the 2s interval immediately preceding the CS onset from the highest SC level value recorded during the 8s CS interval. A difference score was calculated for successive, ordinal "pairings" of CS+ and CS- trials, to assess the relative reactivity to CS+ versus CS- stimuli (SCR DIFF). Thus, the acquisition phase contained five CS+ versus CS- difference scores. More positive difference scores reflect a larger response to the CS+, i.e., stronger acquisition. Reactivity to the CS+ trials alone was analyzed as another measure of conditioning (SCR CS+). Finally, a score for the unconditioned response (SC UCR) was calculated by subtracting the mean level for the 2s interval immediately preceding US onset from the highest SC level value among those recorded during the US interval (0-6s post-US offset).

Equipment

A Coulbourn Lablinc V, Human Measurement System (Allentown, PA, USA) was used to record SC level analog signals, which were digitized by a Coulbourn analog to digital converter. Skin conductance was measured by a Coulbourn Isolated SC coupler using a constant 0.5 V through 9-mm (sensor diameter) In vivo Metric Ag/AgCl electrodes (separated by 14mm) filled with isotonic paste and placed on the hypothenar surface of the subject's non-dominant hand in accordance with published guidelines (Fowles *et al.*, 1981).

Results

Analyses

The study design included repeated measurements of psychophysiological reactivity in response to the fear-conditioning task, which were nested within individuals. Hierarchical Linear Modeling statistical software (Raudenbush *et al.*, 2004) was used for all random effects regression analyses.

For all analyses, trials was treated as a within-individual (Level-1) variable, scores on NEO-PI-R personality facets were included as between-individuals (Level-2) variables, and SCR observed during the task served as the outcome variable. Analyses were first conducted to determine whether a linear or curvilinear model best represented within-individual change over trials for each conditioning measure. A natural logarithmic transformation of the trials variable was performed to represent curvilinear change (Singer & Willett, 2003), and we estimated both linear and curvilinear within-individual models. Consistent with recommendations, we compared estimated R^2 s corresponding to the amount of within-individuals variance in slope accounted for by linear versus curvilinear models as well as deviance statistics (Singer & Willett, 2003). Specific results from the comparison of linear and curvilinear models are available from the first author. Once an appropriate Level-1 model was selected for each conditioning measure, analyses were conducted to examine whether individuals' imputed initial value (i.e., intercepts) and change in the measure (i.e., slopes) were associated with the personality facets of interest. (The intercept value is the imputed estimate of reactivity to the first trial because the first trial was coded as zero.) For each domain, the six personality facets of that domain were entered simultaneously into Level 2 of the equation. All significant effects and the direction of these effects are displayed in Table 1.

Modeling Change in Psychophysiological Reactivity over Trials

A curvilinear model provided the best fit for SCR DIFF scores, which showed a significant increase over acquisition trials, $B=.10$, $t(211)=2.15$, $p<.05$. SCR DIFF scores showed an initial increase, followed by a gradual decrease and a substantially smaller value for the final trials. Although findings revealed significant between-individuals variance for imputed initial reactivity, $\sigma^2=.11$, $\chi^2(211)=256.15$, $p<.05$, there was no significant between-individual variance for within-individual slope over time, $\sigma^2=.04$, $\chi^2(211)=232.63$, ns .

A linear model best fit the SCR CS+ scores, suggesting that SC response magnitude to the CS+ demonstrated a relatively steady decrease over trials, $B=-.10$, $t(211)=-6.73$, $p<.05$. Moreover, results indicated significant between-individuals variance in the magnitude of imputed initial reactivity, $\sigma^2=.35$, $\chi^2(211)=488.80$, $p<.05$. However, the between-individuals variance in within-individual slope over trials did not achieve statistical significance, $\sigma^2=.002$, $\chi^2(211)=222.51$, ns .

A curvilinear model was found to best fit the SC UCR data, suggesting that the unconditioned response demonstrated a rapid increase following by a more gradual reduction in later trials. There was a significant decrease in SC UCR over time, $B=-.50$, $t(211)=-10.41$, $p<.05$. In addition, results indicated significant between-individual variance for imputed initial reactivity and within-individual variance for the slope over trials, $\sigma^2=1.46$, $\chi^2(211)=1301.64$, $p<.05$ and $\sigma^2=.25$, $\chi^2(211)=447.46$, $p<.05$, respectively.

Predictors of Imputed Initial Reactivity and Change in Reactivity over Acquisition Trials

Extraversion—There were no significant associations between the extraversion facets and imputed initial reactivity for the three fear-conditioning measures. Both warmth (E1) and activity (E4) demonstrated negative relationships with the slope for SCR CS+ during acquisition, indicating a more rapid reduction in SCR magnitude over fear-conditioning trials for those high on these facets, $t(205)=-2.09$, $p<.05$, $pr=.14$; $t(205)=-2.44$, $p<.05$, $pr=.17$, respectively. In contrast, positive emotions (E6) demonstrated a positive relationship with slope for SCR CS+, $t(205)=2.42$, $p<.05$, $pr=.17$, and excitement-seeking (E5) demonstrated a positive relationship with slope for SC UCR, $t(205)=2.50$, $p<.05$, $pr=.17$. These latter findings suggest a more gradual reduction in SCR magnitudes to fear-related stimuli for individuals high in positive emotions and excitement-seeking.

Neuroticism—One Neuroticism facet demonstrated a significant association with the three SCR measures from the fear-conditioning task. Individuals higher in self-consciousness (N4) showed a steeper decline in SCR CS+ scores over trials compared to individuals lower in self-consciousness, $t(205)=-2.45$, $p<.05$, $pr=.17$.

Openness to Experience—The fantasy (O1) facet was positively related to imputed initial reactivity and negatively related to slope for SC UCR, indicating that individuals who are more open to fantasy demonstrated a larger initial SC response to the first shock followed by a steeper decrease in SC UCR magnitude over trials, compared to individuals low in fantasy, $t(205)=2.35$, $p<.05$, $pr=.16$ for intercept; $t(205)=-2.70$, $p<.05$, $pr=.19$ for slope. The feelings (O3) facet demonstrated a positive relationship with slope for SCR DIFF during acquisition, $t(205)=2.40$, $p<.05$, $pr=.16$. Individuals who were more open to feelings maintained or developed stronger differential fear conditioning over acquisition trials, as measured by the difference in SCR to CS+ versus CS- trials.

Agreeableness—Tender-mindedness (A6) was negatively related to imputed initial reactivity for SCR DIFF, indicating that more tender-minded individuals showed a smaller initial difference in reactivity to acquisition CS+ versus CS- trials, $t(205)=-1.99$, $p<.05$, $pr=.$

14. The modesty (A5) facet was positively related to initial SC UCR, indicating that more modest individuals produced larger SC response magnitudes to the first shock presentation, compared to less modest individuals, $t(205) = 2.03, p < .05, pr = .14$. The compliance (A4) and tender-minded facets demonstrated opposite relationships with slope for SCR CS+. Specifically, compliance was negatively associated with slope, $t(205) = -2.23, p < .05, pr = .15$, whereas tender-mindedness was positively associated with slope, $t(205) = 1.97, p < .05, pr = .14$. Individuals higher on compliance and lower on tender-mindedness show steeper reductions in SCR magnitudes over trials.

Conscientiousness—Only the order (C2) facet was associated with the magnitude of imputed initial SC UCR, $t(205) = 2.10, p < .05, pr = .15$. Individuals with higher order scores produced a larger SC response magnitude to the initial shock presentation. Dutifulness was negatively related to the slope for SCR DIFF, $t(205) = -2.35, p < .05, pr = .16$. Individuals who scored higher on dutifulness maintained or developed stronger differential fear conditioning over acquisition trials. The order and dutifulness facets were negatively related to slopes for SCR CS+, $t(205) = -1.97, p < .05, pr = .14$; $t(205) = -2.66, p < .05, pr = .18$, respectively; individuals higher in dutifulness and order produced a steeper decline in SCR magnitudes to the CS+ trials over trials. In contrast, the self-discipline (C5) facet was positively related to slope for SCR CS+, $t(205) = 2.03, p < .05, pr = .14$, suggesting that individuals higher in self-discipline had a more gradual decrease in SCR magnitude over trials, compared to those lower in self-discipline.

Discussion

The current study used multi-level modeling to explore the relationships between facets of the Big 5 personality domains and acquisition of a fear response. This method allowed for an examination of fear acquisition as a process rather than an end state and provides more reliability and power than traditional data analytic techniques (Bagiella et al., 2000; Kristjansson et al., 2007). Findings from the present study offer a perspective on the elusive nature of the relationship between extraversion and the acquisition of fear responses. In addition, the findings suggest that facets of other Big 5 domains may also predict acquisition strength of fear responses.

Although Eysenck (1965, 1967) hypothesized that individuals high on extraversion should exhibit slowed acquisition of fear responses (when under conditions of low to moderate arousal), research results have been equivocal (e.g., Davidson et al., 1964; Franks, 1956; Otto et al., 2007). These mixed results may be partially explained by the differing associations that particular facets of extraversion appear to have with fear response acquisition. In particular, when the six facets of extraversion were examined as predictors of reactivity to the CS+ over trials, warmth and activity emerged as predictors of greater weakening of the fear response during acquisition. In contrast, higher scores for the positive emotion facet emerged as a predictor of longer maintenance of the fear response during acquisition.

The different facets of extraversion have both shared and unique variance (Costa & McCrae, 1992). Therefore, it is possible that the domain of extraversion is only weakly related to fear response acquisition, whereas specific facets of extraversion are more strongly predictive of this relationship. Based on an examination of the NEO-PI-R items, we parsed the six facets of extraversion into those related to social interactions and those related to positive arousal and excitement. Of the social interaction facets, only warmth was associated with fear response acquisition; individuals scoring lower on warmth showed increased maintenance of the fear response. Compared with the other social interaction facets (i.e., gregariousness and assertiveness), warmth is most relevant to interpersonal intimacy and the ease with which one forms close attachments (Costa & McCrae, 1992). In distinct literatures, both quality of

intimate relationships (e.g., McLeod, 1994) and acquisition of fear responses (see Lissek et al., 2005 for a review) have been associated with the presence of anxiety disorders.

As for the positive arousal and excitement facets (i.e., activity, positive emotions, and excitement-seeking), only activity was associated with fear response acquisition in the expected direction. Individuals with lower activity scores showed increased maintenance of the fear response. This facet captures having a fast-paced life and keeping busy and appears to measure excitement derived from within oneself, whereas the excitement-seeking facet assesses the desire to seek stimulation through exciting activities (Costa & McCrae, 1992). The distinction between these two facets is subtle, but potentially important in determining predictors of fear response acquisition.

Finally, when accounting for the other extraversion facets, positive emotions was associated with fear response acquisition in the *opposite* than expected direction. Individuals with more positive emotions showed increased maintenance of the fear response. In hierarchical models of anxiety and depression, the high comorbidity of anxiety and mood disorders is attributed to shared and unique factors of the different diagnoses – with lack of positive emotions emerging as a unique factor of depression (Mineka *et al.*, 1998). Therefore, as fear conditioning is theorized and shown to be associated with anxiety rather than depression, it is interesting to note that this facet is not related to fear response acquisition in the expected direction. Alternatively, high scores on the positive emotion facet may be tapping a dimension of emotional lability rather than simply lack of depression, as this facet's items suggest an element of "hypomania." Therefore, it is possible that emotional lability is predictive of greater maintenance of the fear response.

Consistent with the literature (Davidson et al., 1964; Otto et al., 2007), most facets of neuroticism were not found to be associated with fear response acquisition with one exception. Individuals with higher self-consciousness scores showed greater weakening of the fear response during acquisition. However, this is *not* in the expected direction. The self-consciousness facet is most closely associated with social anxiety and individuals with high scores on this facet are disturbed by uncomfortable social interactions (Costa & McCrae, 1992). It is possible that higher levels of self-consciousness may interfere with learning, i.e., the relationship between the fear cue and aversive UCS. In one influential model of social anxiety, self-focused attention is purported to maintain social anxiety by impeding input and learning from external information (Clark & Wells, 1995). Thus, having an exaggerated focus on oneself and one's internal experience may interfere with a wide variety of learning, including fear conditioning.

In addition to the analyses focused on extraversion and neuroticism, exploratory analyses assessing the relationships between the remaining Big 5 domains and fear response acquisition were also conducted. Within the openness domain, openness to feelings was the only facet associated with fear conditioning, as measured by the difference in SCR magnitude to CS+ versus CS- over acquisition trials. Individuals scoring high on this facet experience deeper and more differentiated emotional states, whereas the other openness facets are not related to emotional processing (Costa & McCrae, 1992). Therefore, it is not surprising that openness to feelings emerged as a predictor of conditioned fear acquisition whereas the other facets did not.

Within the agreeableness domain, two facets emerged as significant predictors of fear response acquisition, but in opposite directions. Individuals scoring low on the compliance facet (i.e., those who are relatively aggressive and expressive in their anger, Costa & McCrae, 1992) showed increased maintenance of the fear response. In contrast, those with relatively high scores on the tender-mindedness facet (i.e., individuals with a relatively high degree of empathy

and concern for others, Costa & McCrae, 1992) also showed increased maintenance of the fear response. It is possible that these seemingly conflicting results are because empathy, and not simply a relatively agreeable reaction to interpersonal conflict, predicts fear response acquisition.

Finally, there were several significant associations between the Conscientiousness facets and measures of fear response acquisition. Individuals with high dutifulness and order facet scores showed greater weakening of the fear response during acquisition. Similarly, high dutifulness scores were associated with smaller differential conditioning over time. Characteristics of high dutifulness scores are adherence to one's personal ethics and carefully fulfilling moral obligations. High scores on the order facet are characterized by being tidy and well organized (Costa & McCrae, 1992). In contrast, those high on self-discipline (i.e., individuals who continue working despite boredom and distraction, Costa & McCrae, 1992) exhibited increased maintenance of the fear response. Thus, it appears that within the domain of Conscientiousness, different facets have very different relationships to fear response acquisition.

Results from the present study clearly support the need for further research on the relationships between personality characteristics other than neuroticism and extraversion and fear conditioning. Because these analyses were exploratory, replication is necessary to confirm the results. In addition to this study's exploratory nature, there are several limitations to note. First, because the participants were firefighter and police recruits, the findings may not be representative of a broader population and instead may reflect a distinctly healthy population. However, based on the descriptive statistics for the domain and facet T scores, the population studied appears to reflect the general population upon which the NEO-PI-R was normed. Second, as with many studies of personality and conditioning, our primary outcome measure of fear acquisition was SC reactivity to the CS+ and many of the present findings were null for the measure of differential conditioning. This raises the possibility that some of these relationships reflect sensitivity to any stimulus within a threatening context, rather than conditioning to a specific fear cue.

Although this study has limitations, there are also significant strengths, including the large sample and the use of a sophisticated data analytic technique ideal for examining individual differences in trajectories of change. Overall, the relationships between personality domains and the acquisition of fear responses appear more complex than has been generally considered. Specifically, the equivocal results in the literature regarding the relationship between extraversion and fear response acquisition may be partly explained by the conflicting influence of different facets that comprise these domains. Further, facets of the other Big 5 factors – particularly those related to being attuned to one's own and others' emotions – appear to predict increased fear response acquisition. Because there appear to be a range of Big 5 facets that are associated with fear response acquisition, these results support both broader and deeper investigations into the complex relationships of personality and acquisition of fear responses. Data from this study and future investigations on this topic may yield more precise theoretical models of the associations between personality and fear conditioning. In turn, these models may contribute to a richer understanding of personality-related risk factors for the development and maintenance of anxiety disorders.

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Table 1

Significant Predictors of Imputed Initial Reactivity and Change in Reactivity During Acquisition and the Direction of these Effects

Extraversion															
		Intercept							Slope						
		E1	E2	E3	E4	E5	E6	E1	E2	E3	E4	E5	E6		
SCR DIFF	Curvilinear														
	Pos. slope														
SCR CS+	Linear														+
	Neg. slope														
SC UCR	Curvilinear														+
	Neg. slope														
Neuroticism															
		Intercept							Slope						
		N1	N2	N3	N4	N5	N6	N1	N2	N3	N4	N5	N6		
SCR DIFF	Curvilinear														
	Pos. slope														
SCR CS+	Linear														–
	Neg. slope														
SC UCR	Curvilinear														
	Neg. slope														
Openness to Experience															
		Intercept							Slope						
		O1	O2	O3	O4	O5	O6	O1	O2	O3	O4	O5	O6		
SCR DIFF	Curvilinear														
	Pos. slope														+
SCR CS+	Linear														
	Neg. slope														
SC UCR	Curvilinear														
	Neg. slope														–
Agreeableness															
		Intercept							Slope						
		A1	A2	A3	A4	A5	A6	A1	A2	A3	A4	A5	A6		
SCR DIFF	Curvilinear														
	Pos. slope														
SCR CS+	Linear														+
	Neg. slope														
SC UCR	Curvilinear														
	Neg. slope														–
Conscientiousness															
		Intercept							Slope						
		C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6		
SCR DIFF	Curvilinear														
	Pos. slope														–

Extraversion		Slope					
Intercept		E1	E2	E3	E4	E5	E6
SCR CS+	Linear	Neg. slope					
SC UCR	Curvilinear	Neg. slope					
		+					
		-					
		+					

Note. E1=Warmth, E2=Gregariousness, E3=Assertiveness, E4=Activity, E5=Excitement-seeking, E6=Positive emotions, N1=Anxiety, N2=Angry hostility, N3=Depression, N4=Self-consciousness, N5=Impulsiveness, N6=Vulnerability, O1=Fantasy, O2=Aesthetics, O3=Feelings, O4=Actions, O5=Ideas, O6=Values, A1=Trust, A2=Straightforwardness, A3=Altruism, A4=Compliance, A5=Modesty, A6=Tender-mindedness, C1=Competence, C2=Order, C3=Dutifulness, C4=Achievement striving, C5=Self-discipline, C6=Deliberation. All cells with values are significant, $p < .05$.