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A Two-Factor Model of Temperament

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Abstract

The higher order structure of temperament was examined in two studies using the Adult Temperament Questionnaire. Because previous research showed robust levels of convergence between Rothbart's constructs of temperament and the Big Five factors, we hypothesized a higher order two-factor model of temperament based on Digman's higher order two-factor model of personality traits derived from factor analysis of the Big Five factors. Study 1 included 258 undergraduates. Digman's model did not fit the data well, so we conducted an exploratory two-factor solution. One factor included extraversion/positive emotionality, orienting sensitivity, and affiliativeness, and the other, negative affect versus effortful control content. This two-factor model of temperament model diverged from the Digman model only on the agreeableness-affiliativeness loadings. Study 2 involved a community sample of 700 participants. Confirmatory factor analysis supported the alternative model found in Study 1. Findings are discussed in relation to research on attention and emotion.

Keywords

temperament; personality; Big Five

Introduction

Evidence from a number of research areas suggests the existence of at least two high level affective-motivational temperament systems: childhood temperament (Putnam, Ellis, & Rothbart, 2001); adult temperament (Evans & Rothbart, 2007); personality (Tellegen, 1985); neuroscience (Depue & Collins, 1999; Gray, 1990); and individual differences in emotionality (Watson, Wiese, Vaidya, & Tellegen, 1999). The first system includes dimensions of negative emotionality-neuroticism (labeled as negative emotionality [Tellegen, 1985]; negative affect [Watson et al., 1999]; neuroticism [Costa & McCrae, 1992]; and emotional stability [Goldberg, 1993]). The second system is an extraversion/positive emotionality dimension (labeled as positive emotionality [Tellegen, 1985]; positive affect [Watson et al., 1999]; extraversion [Costa & McCrae, 1992]; and extraversion/surgency [Goldberg, 1993]).

Since variants of these two constructs are common across a number of studies, researchers have discussed possible mechanisms for both extraversion/positive emotionality and negative emotionality. However, the attentional temperament constructs of effortful control (Rothbart

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& Rueda, 2005) and orienting sensitivity derived from research at Oregon (Evans & Rothbart, 2007) have not been included in most theories of temperament, and to date have received little attention in research with adults. The orienting sensitivity construct includes perception and thought peripheral to current tasks, whereas effortful control includes the capacity to control attention under conditions of conflict, to plan and to detect errors.

Evans and Rothbart (2007) have developed a theory-driven model of temperament based on Derryberry and Rothbart (1988), extracting broad factors of orienting sensitivity, effortful control, affiliativeness, extraversion/positive emotionality, and negative affect. This data supported both five- and six-factor models, with the six-factor model dividing negative affect into separate aggressive and nonaggressive negative affect factors. Two of the temperament factors were related to attention (orienting sensitivity and effortful control), and the other three involved affective and motivational processes (affiliativeness, extraversion/positive emotionality, and negative affect). The intent of this previous research was to examine a more fine-grained discrimination of temperament constructs, including exploration of five-and six-factor solutions. Evans & Rothbart (2007) reported correlations among factors indicating that negative affect and effortful control were consistently negatively associated and relatively independent of the other factors. The remaining factors were also somewhat positively intercorrelated, suggesting a broader two-factor structure of temperament. In the current research, we explored further the possibility of a higher order two-factor model, investigating relations between attentional and affective-motivational scales. Our primary goal in these studies was thus to examine relations among broad temperament constructs at a higher level.

A higher order factor analytic approach to personality was previously followed by Digman (1997), who discovered that the Big Five model of personality traits may be further reduced to two higher order factors. He labeled the factors alpha and beta. As evidenced by the Greek factor labels Digman (1997) chose for these factors, their psychological meaning was not self-evident. However, Digman offered speculations about their meaning. Whereas the first factor, containing loadings for emotional stability (neuroticism in reverse), conscientiousness, and agreeableness, seemed to encompass qualities related to being a responsible, productive, and good person, the second factor, combining intellect/openness and extraversion, seemed to be more related to the person's dynamic, creative and expressive qualities.

The higher order factor alpha (neuroticism in reverse, conscientiousness, and agreeableness) was interpreted by Digman as reflecting effects of socialization. The idea was that the early social environment encouraged stability, secure attachments, and responsibility, resulting in higher levels of emotional stability (neuroticism in reverse), conscientious, and agreeable behavior. Digman suggested that the second higher order factor (beta) might be related to personal growth and self-fulfillment related to self-actualization. Indeed, being extraverted, outgoing, and open to experience is congruent with humanistic ideals emphasizing individual self-expression.

Interestingly, relations of the Evans and Rothbart (2007) five- and six-factor temperament models both converged substantially with the Big Five/FFM factors. In a college sample, there was one-to-one convergence between a five-factor model of temperament and a measure of the Big Five/FFM. The negative affect factor scores were highly correlated with Big Five neuroticism (r = .74), orienting sensitivity with Big Five intellect/openness (r = .65), temperamental extraversion/surgency with Big Five extraversion (r = .67), and affiliativeness with Big Five agreeableness (r = .69). The effortful control factor score was highly correlated with Big Five conscientiousness (r = .64), while also having a substantial negative correlation (r = −.41) with Big Five neuroticism. In a larger replication sample, these findings were essentially replicated and extended. Five of the factor scores from the six temperament factors converged with the FFM scales, with correlations ranging from .52 to .69. Non-aggressive

negative affect correlated highest with neuroticism ($r = .69$), whereas aggressive negative affect was correlated with both neuroticism ($r = .57$) and agreeableness ($r = -.43$). These strong levels of one-to-one convergence between temperament and Big Five factors coupled with the above-mentioned correlations among temperament factors suggests the possibility that a higher order two-factor structure of temperament may converge with Digman's two-factor higher order structure derived from factor analysis of Big Five factor level scales.

Relating temperament to the Digman higher order model may lead to an improved understanding of psychological processes underlying the Digman model. Aspects of human personality extending beyond temperament were seen to include attitudes, beliefs, goals, and values, developing out of evolutionarily conserved temperament systems. Personality also includes higher-level cognitive functioning relatively unique to human beings (language and abstract thought). However, as previously suggested by Evans and Rothbart (2007), temperamental processes may be substrates of the Big Five factors. Rothbart and Derryberry (1981) defined temperament as constitutionally based individual differences in reactivity and self-regulation. In addition to emphasizing emotional reactivity, these theorists viewed attentional processes as self-regulatory components of temperament (Derryberry & Rothbart, 1988; Rothbart & Derryberry, 1981).

Study 1

The data from this study was previously analyzed as Study 1 in the Evans and Rothbart (2007) analysis of more differentiated models, which included Effortful Control, Orienting Sensitivity, Negative Affect, Extraversion/Positive Emotionality, and Affiliativeness as general constructs, and ultimately as empirical factors. Table 1 lists the Study 1 general constructs and their associated subscales. Sample items and definitions for all subscales are included in the Appendix.

Method

Participants and Measure—Undergraduate psychology students ($N = 258$; 150 women) completed the 253 items of the Adult Temperament Questionnaire (ATQ), using a randomly generated order of seven-response option Likert scales (i.e., as described previously by Evans and Rothbart, 2007). English was the first language for 95% of the subjects and 91.5% identified the United States as their country of origin. Participants received research participant credit toward their undergraduate psychology courses.

The Adult Temperament Questionnaire (ATQ) is a measure that built on the earlier Physiological Reactivity Questionnaire (PRQ) developed by Derryberry and Rothbart (1988). Scales previously developed as part of the PRQ were included in the first version of the ATQ, as well as additional temperament constructs. The PRQ emphasized definitional specificity of subscales loosely grouped under more general constructs (arousal, affect, and attention), and the ATQ included the same rigor in definition as the PRQ, investigating structure at a higher level. The Appendix contains sample items and definitions for all subscales included in the current studies. Each of the ATQ measures have reliable subscales, and the subscales show good convergent and divergent validity, as indicated by factor analyses showing subscales loading on factors indicative of more general constructs (see Evans & Rothbart, 2007).

Factor Analytic Issues and Strategies—Because general constructs from Rothbart's model of temperament show substantive one-to-one alignment with the Big Five domains (Evans & Rothbart, 2007), we were able to test Digman's model at the temperament level. The structural equation modeling software AMOS (a supplement to the SPSS program) was used to conduct confirmatory factor analysis (CFA) of the covariance matrix using maximum

likelihood estimation. As has been used in previous CFA tests of temperament/personality data, the chi-square, Jöreskog and Sörbom's Goodness of Fit Index (GFI), the Comparative Fit Index (CFI,), and the Root Mean Square Error of Approximation (RMSEA) fit indices will be reported. The χ^2 is rarely directly informative for these types of models (i.e., virtually all models are rejected), but is by convention usually reported, and can be used to test the relative fit of nested models. The GFI ranges from zero to 1.0, and fits of .90 or higher are generally considered good (see Bollen, 1989). The CFI compares the independent model with the fully saturated model, and also ranges from zero to 1.0, with 1.0 being a perfect fit, and .90 considered a good fit. Browne and Cudeck (1993) report that an RMSEA coefficient of .08 or less is considered a good fit. SPSS was used to perform the *post hoc* exploratory factor analysis (EFA) in Study 1.

Results

Of the 18 subscales, 13 had alpha coefficients of reliability of .80 or higher, and only one scale was lower than .70 (inhibitory control at .66). We tested the Digman model using temperamental correlates of the Big Five, resulting in a CFA examination of a model with affiliativeness content added to the negative affect and effortful control factor. That is, we tested CFA of the covariation matrix among subscales to see if they loaded in a manner consistent with the Digman model. The hypothesized model had a GFI of .61, CFI of .48, and RMSEA of .18. Chi-square for rejecting the null hypothesis was significant, $\chi^2(134, 258) = 1214.7$, $p < .001$. These fit indices indicated an overall poor fit.

In order to examine how the data might differ from the hypothesized model, we next performed an EFA, using principal axes factor analysis with varimax (orthogonal rotations) of all subscales. As can be seen in Table 2, all the Orienting Sensitivity, Extraversion/Positive Emotionality, and Affiliativeness subscales loaded substantially and positively on the first factor. The Negative Affect and Effortful Control subscales (negative loadings) all loaded substantially and highest on the second factor.

Discussion

The model deviated from Digman's (1997) higher order model in that affiliativeness (a strong correlate of Big Five agreeableness [Evans & Rothbart, 2007]) would have been expected to load on the alpha factor, with loadings from negative affect (a correlate of Big Five neuroticism) and effortful control (a correlate of Big Five conscientiousness). Instead, in the two-factor model found here, the affiliativeness content loaded with orienting sensitivity (a correlate of Big Five intellect/openness) and extraversion/positive emotionality (a correlate of Big Five extraversion). In Study 2, we attempt to replicate this alternative model using CFA in a notably older community sample.

Study 2

Method

Participants and Measures—Seven hundred participants from a Eugene-Springfield, Oregon community sample completed a 100-item version of the ATQ. The majority of these participants also completed a large number of questionnaires during the past decade, including questionnaires associated with prominent models of personality. The Eugene-Springfield Community Sample is managed by Goldberg (2003); it originally included 1,062 participants, 700 of whom completed this version of the ATQ. Participants were originally recruited by mail solicitation in 1993 from lists of local homeowners. Data was collected by mail. Age and gender data was known for 693 of the 700 people. Participants included 296 men, 397 women, and 7 of unknown gender, and ranged in age from 26- to 91-years-old with a median age of 57 and a mean age of 58.7 years. Only 30 participants were younger than 40 years of age.

Short form of the ATQ—A 100-item ATQ questionnaire was adapted from the version of the ATQ used in Study 1, as described previously. Subscales included 6 to 8 items each, and only 14 of the 18 subscales were included, as was the case in reporting of the more diversified five and six factor models (see Evans & Rothbart, 2007). To be consistent with other questionnaires completed by the community sample, this version of the ATQ used a 5-point Likert-scale instead of the previously used 7-point scale. Of the 700 subjects who completed this short version of the ATQ, 635 had completed Costa and McCrae's (1992) NEO-PI-R (i.e., this latter measure is relevant to some correlations noted in the general discussion).

Results

The hypothesized model included the addition of affiliativeness content to the factor with content from the extraversion and orienting sensitivity domains (i.e., hypothesized replication of Study 1 alternative model findings derived from EFA). The hypothesized model did not initially fit the data well, but was substantially closer in range relative to Study 1. Structural equation modeling theorists (e.g., Anderson and Gerbings, 1988) have noted that statistical considerations should not be the sole determinant of model modifications intended to improve model fit, as this approach may capitalize on sampling error, and may therefore result in models that are less replicable. We explain each of our allowances for model respecifications below.

First, it is not realistic to assume that personality measures are likely to load on one and only one factor (i.e., with zero loadings on other than hypothesized factors), especially in the case of complex models that include diversified content. Some of the badness of fit in a personality model is likely to be the result of measures loading on additional factors, even if apparently trivial in magnitude. However, random addition of parameters as additional indicators of a latent variable may capitalize on chance, and is therefore less likely to be replicable. Modifications that involved including dual indicators/loadings were limited to the most substantive secondary loadings found in the Study 1 EFA model. Of the subscales included in both studies, this resulted in allowing for dual loadings from positive affect, sadness, associative sensitivity, and social anger (i.e., loadings greater than .15 magnitude).

Second, theory driven considerations restricted the pool of candidate parameter modifications that allow error terms to covary. Error terms associated with subscales that previously loaded on the same common factor from the five-factor model previously found in this data set (see Evans & Rothbart, 2007) were allowed to covary. The rationale for this approach was that covariances among these subscales was also accounted for by this lower level five factor model, thereby indicating that the covariances among subscales associated with the same factor have higher covariances than could be accounted for by the broader higher level common factor to which they were assigned in the current two-factor modeling of the data. In addition, we allowed the error terms between empathic guilt and social anger and between positive affect and emotional empathy subscales because these pairs of subscales included substantive overlapping content independent of factor indicator/loading assignments.

Using the modification indices, we then proceeded to add parameters one at a time from the pool of 20 potential modifications justified above. This resulted in the addition of 12 parameters, including adding parameters for the four candidate dual loadings, and allowing eight error terms to covary. Error terms associated with the following pairs of subscales were allowed to covary: emotional empathy and empathic guilt, frustration and anger, effortful attention and activation control, sociability and high intensity pleasure, positive affect and high intensity pleasure, sociability and positive affect, empathic guilt and social anger, and emotional empathy and positive affect.

The modified model was a good fit across indices, with a GFI of .94, CFI of .90, and an RMSEA of .07. Chi-square for rejecting the null hypothesis was significant, $\chi^2(63, 700) = 312.5$, $p <$.

001. The correlation between factors was small (r = .−15). Table 3 presents the factor loadings (i.e., standardized regression coefficients) for the final CFA model. Three out of four of these secondary loadings were small (.25 or less absolute value), as well as being considerably smaller than the original hypothesized model that did not include secondary loadings. The other dual loading (positive affect) essentially replicated the only secondary loading from the Study 1 EFA, except that this loading was actually slightly greater in magnitude than the loading on the hypothesized factor (−.39 versus .29). That is, in addition to loading on the hypothesized factor, positive affect also loaded in the direction of effortful control on the effortful control versus negative affect factor.

General Discussion

In the two-factor model emerging from this research, negative affect is inversely related to effortful control in a first higher order factor, and extraversion/positive emotionality, orienting sensitivity, and affiliativeness are positively related in a second. Support for this model was found at the exploratory level of analysis in Study 1 among college students, and then tested and confirmed with CFA in the second larger, substantially older community sample. The only deviation from the model was the slightly higher loading from positive affect on the negative affect versus effortful control factor than on the hypothesized factor. Nevertheless, positive affect also loaded substantially on the hypothesized factor, and the model was overall supported. We are not suggesting that the two-factor structures are more optimal than the differentiated factor structure, but the two-factor structure fits the data well, and may be informative concerning the higher order organization of temperament dimensions.

Experimental and clinical findings are consistent with these results. Research with tasks such as the emotional Stroop has found that negative affect-related information interferes with executive attention (e.g., Mogg, Bradley, & Williams, 1995). Research with other experimental tasks suggests that cognitive breadth and more inclusive categorization (consistent with openness and orienting sensitivity) are associated with positive emotions (Ashby, Isen, & Turken, 1999). Research on psychopathological disorders is also relevant. Anxiety and unipolar depressive disorders (expressions of negative emotionality) are associated with poor concentration (i.e., low effortful control), and the manic phase of bipolar disorder involves extreme positive emotional experiences accompanied by diffuse and imaginative cognitions (see American Psychiatric Association, 1994). Posner et al. (2002) found that borderline personality disorder is characterized by low effortful control and high negative affect, and that individuals with borderline personality disorder also score lower on experimental reaction time measurement of executive attention. The emotional instability reflected in this disorder may result from poor emotion regulation stemming from deficient executive attentional control, and/or high intensity negative affect may overtax the executive system, leaving fewer attentional resources to cope efficiently with current task demands.

Convergence between the higher order model of temperament that we have examined and Digman's higher order two-factor model derived from Big Five traits suggests that Digman's higher order structure may reflect temperament as well (with the exception of affiliativeness-agreeableness content). Building on Digman's interpretation of alpha and beta as involving socialization and personal growth, DeYoung, Peterson, and Higgins (2002) suggested the alternative labels stability and plasticity, respectively, would better reflect neural substrates. *Stability* (alpha) refers to the capacity to maintain established routines, and *plasticity* (beta) to the capacity to adapt and process novel information. The authors posited biological substrates for these factors, with an emphasis on serotonin and dopamine as neurochemical substrates of stability and plasticity, respectively.

Divergence between the Digman and ATQ Two-Factor Models—Divergence between the Digman and ATQ two-factor models could reflect subtle differences between temperament and character. In a temperament interpretation of agreeableness, Big Five agreeableness involves separable temperament processes (affiliation and aggression) rather than affiliativeness only. In the ATQ data, aggressive negative affect (frustration and social anger subscales combined) correlates with affiliativeness modestly ($r = -.21$), whereas NEO-PI agreeableness with ATQ aggressive negative affect more substantially ($r = -.45$). The ATQ negative affect scale was also uncorrelated with temperamental affiliativeness ($r = .01$), whereas NEO-PI neuroticism and agreeableness (Big Five correlates of ATQ negative affect and affiliativeness, respectively) were negatively correlated ($r = -.21$), suggesting that negative affect, but not affiliativeness variance contributes to low agreeableness scores. This pattern contributed to the difference of patterns in loadings between Digman's and the alternative model. In a second interpretation, positive emotionality includes approach and pleasure to appetitive stimuli. Since affiliativeness is an appetitive system (i.e., the presence of attachment figures is rewarding), it could follow that it would be positively related to extraversion/surgency.

Summary

In this paper, a higher-level hierarchical analysis of the ATQ was explored. The two-factor solutions from these studies were similar to the higher-order factor structure that Digman (1997) found in a meta-analysis of Big Five scales, but also pointed to possible heterogeneity of content in Big Five agreeableness. In these self-report studies of nearly 1,000 subjects, data suggested that negative affect and effortful control (an executive attention construct) are negatively related, and positive emotionality, affiliativeness, and orienting sensitivity are positively related. We interpret these findings as suggesting interactions between emotional and attentional processes as bases for both temperament and personality.

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Appendix

General Constructs and Definitions of Scales with Sample Items

AFFILIATIVENESS

Emotional Empathy—Affective response congruent with what others are perceived to feel. *I am rarely bothered by the apparent suffering of strangers* (reverse coded).

Empathic Guilt—Distress in response to negatively affecting other people. *Whenever I believe that I have hurt someone's feelings, I feel guilty*.

Social Closeness—Feelings of warmth, closeness, interest, and involvement with others. *There are some people that I feel very close to*.

EFFORTFUL CONTROL

Activation Control—Capacity to perform an action when there is a strong tendency to avoid it. *I hardly ever finish things on time* (reverse coded).

Effortful Attention—Capacity to focus attention as well as to shift attention when desired. *It's usually hard for me to alternate between two different tasks*.

Inhibitory Control—Capacity to inhibit inappropriate behavior. *It is easy for me to hold back my laughter in a situation where it is not appropriate.*

EXTRAVERSION/SURGENCY

High Intensity Pleasure—Pleasure related to situations involving high stimulus intensity, rate, complexity, novelty, and incongruity. *I would not enjoy the sensation of listening to loud music with a laser light show* (reverse coded).

Positive Affect—Latency, threshold, intensity, duration, and frequency of experiencing pleasure. *It doesn't take much to evoke a happy response in me*.

Sociability—Enjoyment derived from social interaction and being in the presence of others. *I usually enjoy being with people*.

NEGATIVE AFFECT

Aggression Control—Capacity to inhibit the behavioral expression of anger. *I do not have a problem in controlling hostile impulses*.

Discomfort—Unpleasant affect resulting from the sensory qualities of stimulation. *I find loud noises to be very irritating*.

Fear—Unpleasant affect related to anticipating pain or distress. *Loud noises sometimes scare me*.

Frustration—Unpleasant affect related to the interruption of tasks and behavior. *I seldom become irritated when someone is late* (reverse coded).

Sadness—Unpleasant affect and lowered mood and energy related to object or person loss, disappointment, and exposure to suffering. *I rarely feel sad after saying good-bye to friends or relatives* (reverse coded).

Social Anger—Hostility felt toward other people. *I rarely feel angry at people* (reverse coded).

ORIENTING SENSITIVITY

Affective Perceptual Sensitivity—Spontaneous emotionally valenced explicit cognition associated with low intensity stimuli. *I am often consciously aware of how the weather seems to affect my mood.*

Associative Sensitivity—Spontaneous cognitive content that is not related to standard associations with the environment. *When I am resting with my eyes closed, I sometimes see visual images*.

General Perceptual Sensitivity—Awareness of slight, low intensity stimulation arising from either within the body or from the environment. *I often notice visual details in the environment.*

Table 1

General Constructs and Associated Scales

General Constructs	Associated Scales
Affiliativeness	Social Closeness (Study 1 only), Emotional Empathy, Empathic Guilt
Negative Affect	Aggression Control (Study 1 only), Frustration, Social Anger, Discomfort (Study 1 only), Fear, Sadness
Effortful Control	Inhibitory Control (Study 1 only), Activation Control, Effortful Attention
Extraversion/Surgency	High Intensity Pleasure, Positive Affect, Sociability
Orienting Sensitivity	Affective Perceptual Sensitivity, Associative Sensitivity, General Perceptual Sensitivity

Table 2

Study 2: Varimax Rotated Matrix for Two-Factor Solution of Adult Temperament Subscales

	Factor Loadings	
Adult Temperament Scales	**Factor I**	**Factor II**
Social Closeness (Aff)	**.84**	−.04
Emotional Empathy (Aff)	**.68**	−.03
Empathetic Guilt (Aff)	**.48**	−.11
Affective Perceptual Sensitivity (OS)	**.62**	.02
Associative Sensitivity (OS)	**.59**	.17
General Perceptual Sensitivity (OS)	**.58**	−.07
Sociability (E/PE)	**.59**	−.07
Positive Affect (E/PE)	**.57**	−.35
High Pleasure (E/PE)	**.56**	.07
Social Anger (NA)	−.15	**.72**
Frustration (NA)	.09	**.68**
Aggression Control (NA)	.16	**−.65**
Fear (NA)	.02	**.64**
Sadness (NA)	.16	**.56**
Discomfort (NA)	−.21	**.42**
Effortful Attention (EC)	−.05	**−.67**
Inhibitory Control (EC)	−.14	**−.59**
Activation Control (EC)	.04	**−.40**

Note: Loadings .40 or greater listed in bold print. Aff = Affiliativeness, OS = Orienting Sensitivity, E/PE = Extraversion/Positive Emotionality, NA = Negative Affect, EC = Effortful Control. Abbreviations in Parentheses refer to general constructs with which subscales are associated.

Table 3

Study 2: CFA Standardized Regression Weights for Two-Factor Solution of Adult Temperament Subscales

	Factor Loadings	
Adult Temperament Scales	**Factor I**	**Factor II**
Affective Perceptual Sensitivity (OS)	**.74**	—
General Perceptual Sensitivity (OS)	**.73**	—
Associative Sensitivity (OS)	**.54**	.09
High Pleasure (E/PE)	**.45**	—
Positive Affect (E/PE)	.29	**−.39**
Sociability (E/PE)	**.23**	—
Emotional Empathy (Aff)	**.37**	—
Empathic Guilt (Aff)	**.14**	—
Fear (NA)	—	**.79**
Sadness (NA)	.25	**.81**
Social Anger (NA)	.11	**.52**
Frustration (NA)	—	**.50**
Effortful Attention (EC)	—	**−.39**
Activation Control (EC)	—	**−.24**

Note: Highest loading for subscale listed in bold print. Aff = Affiliativeness, OS = Orienting Sensitivity, E/PE = Extraversion/Positive Emotionality, NA = Negative Affect, EC = Effortful Control. Abbreviations in Parentheses refer to general constructs with which subscales are associated. Dash indicates parameter set to zero.