Relations Between Adolescent Ratings of Rothbart’s Temperament Questionnaire and the HEXACO Personality Inventory

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Conventionally, individual differences have been assessed using temperament measures for infants and children, and personality measures for adults. We chose to explore both temperament and personality to see whether a convergence exists specifically during adolescence. A sample of 225 adolescents completed Rothbart’s Early Adolescent Temperament Questionnaire–Revised (EATQ–R), a 4-factor temperament scale, and the HEXACO Personality Inventory–Revised (HEXACO PI–R), a 6-factor personality scale. As hypothesized, we found significant relations between the 2 measures. However, there were some important differences between the 2 measures regarding Honesty–Humility, Openness, and Frustration that highlight the unique contributions of both instruments to understanding and measuring adolescent individual differences. As there is a relatively scant history of measuring temperament or personality in adolescence, it is sometimes difficult for researchers to decide which instrument is most appropriate. The results reported here suggest that either the EATQ–R or the HEXACO PI–R could be appropriate, depending on the specific research questions being asked.

Traditionally, temperament has been used to measure individual differences among infants and children, whereas personality has been used to measure differences among adults (Grist & McCord, 2010). The most common contemporary definition describes temperament as “constitutionally based individual differences in reactivity and self-regulation, in the domains of affect, activity, and attention” (Rothbart & Bates, 2006, p. 100). Reactivity is the speed and intensity of responses to stimuli, and self-regulation is the control of behaviors and emotions (Henderson & Wachs, 2007; Rothbart, Ahadi, & Evans, 2000; Rothbart & Bates, 2006; Shiner et al., 2012). There is a consensus among researchers that although personality includes individual differences in reactive and regulatory tendencies, it encompasses a somewhat wider scope of characteristics in comparison to temperament, including dispositional traits, characteristic adaptations to contexts, and personal narratives that help create identity (McAdams & Pals, 2006). Thus, both temperament and personality measures assess dispositional traits on a spectrum of individual differences, but the latter also taps aspects of cognition, skills, beliefs, morals, and judgments that tend to develop later in life with maturation and experience in combination with biological predispositions (De Pauw & Mervielde, 2010; Grist & McCord, 2010; Shiner & Caspi, 2012). It is not our intention to dichotomize temperament and personality, but we sought to examine the strengths of these similar yet unique approaches to studying individual differences.

An additional difference is that personality trait measures are constructed using a lexical strategy in which ratings of personality-descriptive adjectives, which constitute the domain of personality-related words in a given language, are subjected to factor analysis to determine the factor structure of personality (Ashton & Lee, 2007). However, items for temperament measures are selected with a view to primarily capturing predispositions that are rooted in the basic biological systems that undergird individual differences in behavior, emotion, and motivation (Rothbart, 2012; Rothbart et al., 2000).

Despite the different approaches to test construction, increasing research demonstrates that at the dispositional level, temperament and personality dimensions significantly overlap with one another (Shiner & DeYoung, 2013). Furthermore, researchers agree that temperament and personality both have moderate stability and can change over time (Blandin, 2013; Grist & McCord, 2010; Henderson & Wachs, 2007; Kandler et al., 2012; Rothbart, 2012; Shiner & DeYoung, 2013). For both temperament and personality, stability is often attributed to genetic predispositions, whereas change is attributed to gene–environment interactions. Finally, even animals have been found to display traits similar to human temperament and personality, reinforcing the basic nature and potential interrelationship of these traits (Weinstein, Capitanio, & Gosling, 2008).

An interesting question then becomes this: How similar are personality and temperament and to what degree do they overlap (Shiner & DeYoung, 2013)? In particular, because temperament has been measured traditionally in children and as personality in adults, how do the two overlap in adolescence, which is a developmental period that overlaps with childhood and adulthood? Therefore, the first goal of this study is to investigate the relation between temperament and personality in adolescence, as the link between these two constructs has not previously been studied within this age group. The second goal is to examine the association between an adolescent version of Rothbart’s well-established temperament measure (Capaldi & Rothbart, 1992) with a cross-culturally validated six-factor personality inventory (HEXACO; Ashton & Lee,
2007). Previous studies comparing the two constructs have relied on child- or adult-focused measures of temperament that have different factor structures than adolescent models and the Big Five/Five-factor model of personality (Rothbart et al., 2000; Shiner & Caspi, 2012; Shiner & DeYoung, 2013) that has a different factor structure than the HEXACO.

MODELS OF TEMPERAMENT AND PERSONALITY

Rothbart’s Temperament Model

One of the most influential contemporary models of temperament was created by Rothbart (1981). This model captures the components of temperament that are common to many existing temperament models and is strongly supported by empirical research (Shiner & DeYoung, 2013). One of the most widely used measures of adolescent temperament is the Early Adolescent Temperament Questionnaire–Revised (EATQ–R; Capaldi & Rothbart, 1992; L. K. Ellis & Rothbart, 2001). The components of the measure include Surgency, Frustration, Effortful Control, and Affiliation (Rothbart et al., 2000).

Surgency is concerned with seeking out highly pleasurable experiences (De Pauw & Mervielde, 2010; L. K. Ellis & Rothbart, 2001; Henderson & Wachs, 2007; Shiner et al., 2012). In the revised measure, exploratory factor analyses revealed that Surgency is also made up of low levels of shyness and fear in adolescent populations, even though these two subscales often converge with Frustration in a Negative Affect factor in other nonadolescent measures of temperament (L. K. Ellis & Rothbart, 2001). Thus, Frustration in the adolescent measure is a factor unto itself, with items assessing how often and intensely an individual feels irritation and frustration in situations that involve constraint, goal blocking, delays, and difficulties with task completion (Capaldi & Rothbart, 1992; Evans & Rothbart, 2007; Grist & McCord, 2010; Rothbart et al., 2000). Studies support functional differences between fear and Frustration, with the former promoting escape and avoidance and the latter promoting approach behavior such as aggression. Specifically, Davenport, Yap, Simmons, Sheeber, and Allen (2011) found that adolescent Negative Affect, characterized by Frustration, was significantly associated with aggressive interpersonal interactions. Furthermore, Whittle et al. (2008) found that Frustration and fear (Surgency) were associated with activation in different neuroanatomical structures. Thus, these studies support that shyness and fear should be subsumed under Surgency instead of a Negative Affect or Frustration factor.

Effort Control in the EATQ–R is related to emotional and behavioral regulation, and is composed of activation control (performing an action when wishing to avoid it), inhibition control (restraining inappropriate responses), and attention (focusing and directing attention; Grist & McCord, 2010; Henderson & Wachs, 2007; Shiner & DeYoung, 2013). Finally, Affiliation is a trait that is not always included in temperament models, but it is part of the EATQ–R, as it has been found to significantly develop during later childhood and adolescence (Rothbart & Bates, 2006). Affiliation involves desiring emotional closeness and warmth in social situations, including experiencing empathy, grief, and a genuine concern for others (Evans & Rothbart, 2007).

HEXACO Model of Personality

Many models of personality exist, but the most widely used current model of personality is the Five-factor model (Costa & McCrae, 1992; Goldberg, 1990). We chose instead to use the HEXACO because its six-factor structure of personality has been more consistently replicated (within and across cultures) than a five-factor structure of personality (Lee & Ashton, 2004), and it has a strong theoretical foundation (Ashton & Lee, 2007). One of the distinguishing features of the HEXACO is a factor called Honesty–Humility (H) that measures traits related to fairness, sincerity, unpretentiousness, and lack of greed (Ashton & Lee, 2007). In addition, Emotionality (E) differs from the Big Five’s Neuroticism by including emotional bonds, kin altruism, and the sentimentality that mainly defines Big Five’s Agreeableness (A), and excluding anger (Lee & Ashton, 2012a). The HEXACO’s Agreeableness factor relates more to tolerance, forgiveness, and a lack of anger (Lee & Ashton, 2012b). The three remaining factors, Extraversion (X; sociability, leadership, liveliness), Openness to Experience (O; curiosity, imagination), and Conscientiousness (C; organization, planning, self-control), are quite similar to their Big Five counterparts. Thus, examining the HEXACO in relation to Rothbart’s adolescent temperament model represents an important new step in the process of understanding the similarities and differences between temperament and personality approaches to capturing fundamental individual differences in adolescents (Rothbart, 2012).

STUDIES ON TEMPERAMENT AND PERSONALITY

Some research has examined Rothbart’s temperament model with the Big Five and found that infant and child temperament were associated with child and adult personality (Shiner & DeYoung, 2013). For instance, Emotionality, which includes general distress, fear, and anger, has been found to be associated with Neuroticism within children (Hagekull & Bohlin, 2003), and in a similar vein, Negative Affect and Neuroticism were highly associated among adults (Watson & Clarke, 1992). Researchers attributed these associations to the similarities in distress and irritability among these traits. In addition, studies on children by Grist and McCord (2010) and studies on adults by Blau, Fuller, and Vaccaro (2006) support an inverse association between various measures of frustration and Agreeableness, where individuals who are easily irritated might be less tolerant of instances that disrupt their activities. In studies with measures related to effortful control, all three components were most often positively associated with Conscientiousness in preschool-age children (De Pauw, Mervielde, & Van Leeuwen, 2009; Digman & Shmelyov, 1996; Grist & McCord, 2010). This result was credited to the shared characteristics of self-regulation, attention, and persistence (Shiner & DeYoung, 2013). Finally, high Surgency in early childhood was associated with high levels of Extraversion in late childhood and adulthood due to the shared characteristic of a high willingness to approach rewarding stimuli (De Pauw & Mervielde, 2010; Grist & McCord, 2010).

Although there is a paucity of studies linking Affiliation and personality, owing in part to its development over the course of adolescence (Shiner & DeYoung, 2013), Affiliation has been positively associated with Agreeableness in adults.
(Evans & Rothbart, 2007). This relation has been attributed to the shared characteristics of empathy and prosocial behavior. In addition, a study by Rothbart, Ahadi, and Hershey (1994) found a significant association between traits that are encompassed by Affiliation and Emotionality, insofar as elementary-school-age children’s experiences of empathy and guilt were related to experiences of Negative Affect. In sum, studies conducted on temperament and personality show some convergence, but this convergence is not complete. Given that most of these data come from children and adults, there is a paucity of data drawn from adolescents.

**THIS STUDY**

This study investigates whether a convergence exists between temperament and personality during adolescence, a time of crucial cognitive, emotional, and social development (Nielsen, 1996), which has not been examined in previous studies on temperament and personality. Second, by investigating temperament–personality links among adolescents using Rothbart’s adolescent temperament model and the HEXACO, we offer potentially unique, novel data on the relations among the constructs of Affiliation, Frustration, Honesty–Humility, Emotionality, and Agreeableness. Based on previous empirical research and consideration of overlapping content in the temperament and personality traits, we made the following predictions (see Table 1 for a summary of predictions).

First, we expected Effortful Control and Conscientiousness to be strongly positively associated given their mutual focus on self-regulation. In addition, we hypothesized a large positive association between Surgency and Extraversion in light of their common emphasis on positive affect and approach motivation. With respect to negative emotional reactivity, we anticipated that Surgency and Emotionality would be highly and negatively associated due to overlap in item content tapping fear and anxiety, and that the temperament and personality traits focused on anger and frustration—Frustration and Agreeableness—would be inversely associated. Finally, significant positive relations among Affiliation, Emotionality, and Agreeableness were predicted given their common focus on emotional reactivity pertaining to social connectedness, including empathy, grief, trust, friendliness, and a desire for emotional closeness and support. No predictions were made regarding links between the temperament traits and the personality dimensions of Honesty–Humility and Openness to Experience due to their lack of explicit attention to the constructs of self-regulation or emotional reactivity.

**METHOD**

**Participants**

The sample for the study was made up of 225 adolescents—121 boys (53.8%) and 104 girls (46.2%)—who were recruited through extracurricular clubs, sports teams, or youth groups in southern Ontario, Canada. Adolescents were between the ages of 11 and 17 (M = 14.05, SD = 1.5). The ethnicity of the sample was 49.6% Canadian, 15.3% European, 3.6% Asian, 2.2% African, 1.8% Native Canadian, 1.3% American, 0.4% South American, and 25.8% unidentified. For socioeconomic status (SES), the majority of the participants (69.3%) reported perceiving themselves at about “the same in richness” as the average Canadian, and a minority reported being “a lot less rich” (1.3%), “less rich” (11.1%), or “more rich” (17.3%). The remaining participants (0.9%) did not report any SES.

**Measures**

Participating adolescents completed questionnaires on various demographic characteristics, including ethnicity, age, and SES, followed by questionnaires on temperament and personality. The measures were presented in random order for each package to prevent bias and order effects.

**Temperament.** Participants completed a short form of Rothbart’s EATQ–R self-report, which consisted of 44 items (Capaldi & Rothbart, 1992; L. K. Ellis & Rothbart, 2001). The short form is highly correlated (r = .94) with the long form of the scale. The scale consists of four broad factor-level scales, where subscales commonly used for these factors are calculated using scoring methods described by L. K. Ellis and Rothbart (2001). The Surgency dimension is made up of 16 items from the subscales for Surgency (α = .71; e.g., “I would not be afraid to try a risky sport, like deep sea diving”), reverse-coded fear (α = .65; e.g., “I worry about my family when I am not with them”), and reverse-coded shyness (α = .82; e.g., “I feel shy with kids of the opposite sex”). The Affiliation dimension includes five items (α = .75; e.g., “It is important to me to have close relationships with other people”). The Frustration dimension is made up of seven items (α = .70; e.g., “It bothers me when I try to make a phone call and the line is busy”). Finally, the Effortful Control dimension is made up of 16 items from the subscales for activation control (α = .76; e.g., “If I have a hard assignment to do, I get started right away”), inhibition control (α = .69; e.g., “When someone tells me to stop doing something it is easy for me to stop”), and attention (α = .67; e.g., “It is easy for me to really concentrate on homework problems”). Items were rated on a 5-point scale ranging from 1 (almost always untrue) to 5 (almost always true).

**Personality.** Participants completed the 100-item self-report of the HEXACO Personality Inventory–Revised (HEXACO PI–R; Lee & Ashton, 2004). The scale consists of six broad factor analytically derived scales as described by

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**Table 1.—Predicted associations between personality factors and temperament dimensions.**

<table>
<thead>
<tr>
<th>Temperament dimension</th>
<th>Personality Factor</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>H</td>
</tr>
<tr>
<td>Frustration</td>
<td>Positive</td>
</tr>
<tr>
<td>Effortful Control</td>
<td>Positive</td>
</tr>
<tr>
<td>Surgency</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Note. Blank cells indicate no significant relationship was hypothesized between the temperament dimension and personality factor. H = Honesty–Humility; E = Emotionality; X = Extraversion; A = Agreeableness; C = Conscientiousness; O = Openness to Experience.

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1Participants were classified as unidentified if they did not complete this question.
Lee and Ashton (2004). Based on the typical computation methods for calculating the mean for each factor, 96 items were used. The remaining 4 items were not used, as they load onto multiple personality factors. Honesty–Humility contains 16 items (α = .83; e.g., “I am an ordinary person who is no better than others”). Emotionality includes 16 items (α = .84; e.g., “I sometimes can’t help worrying about little things”). Extraversion includes 16 items (α = .85; e.g., “I enjoy having lots of people around to talk with”). Agreeableness is made up of 16 items (α = .84; e.g., “I rarely hold a grudge, even against people who have badly wronged me”). Conscientiousness includes 16 items (α = .82; e.g., “I clean my office or home quite frequently”). Openness to Experience includes 16 items (α = .81; e.g., “I am interested in learning about the history and politics of other countries”). Items are rated on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Procedure

After extracurricular clubs were contacted, written consent to recruit adolescents for the study was given by adult supervisors. To reduce bias, adolescents were told by researchers that the study was about adolescent peer relationships. Adolescents who decided to participate were given two envelopes. The first envelope contained a parental information sheet on the study and an informed parental consent form, and the second envelope contained an adolescent assent form and questionnaires. Participants were informed that both the consent and assent forms needed to be signed for the completed data to be used for analyses. Participants were also told to complete the questionnaires in private. At a later arranged time, researchers returned to the extracurricular clubs, picked up completed envelopes, and fully debriefed participants on the true nature of the study. After the debriefing, adolescents completed a second assent form and received $20 in compensation. All methods were approved by Brock University’s Research Ethics Board.

Data Analysis

First, missing data were assessed, as described in detail later. Next, composite scores for Rothbart’s four temperament dimensions were created in accordance with previous scoring instructions (L. K. Ellis & Rothbart, 2001). Scores for the six HEXACO factors were created through typical methods for computing the six factor scales as described by Lee and Ashton (2004). Zero-order correlations were computed between all variables. Then, univariate and multivariate assumptions were assessed. This was followed by four hierarchical linear regressions conducted with each temperament dimension as the dependent variable. The first step included sex and age as predictors and the second step included the HEXACO factors entered simultaneously. Finally, six hierarchical linear regressions were conducted with each personality factor as the dependent variable. In the first step, sex and age were entered as predictors and in the second step, the temperament traits were entered simultaneously. Squared semipartial correlations (i.e., effect size) were used to determine the percent strength of the unique relation between a significant predictor and the outcome variable, while controlling for other variables in the model (Field, 2013). Effect sizes were small, medium, or large based on convention (.02, .15, and .35, respectively; Cohen, 1988; Field, 2013), and were reported only for significant predictors. To preserve statistical power, SES and ethnicity were excluded from the regression analyses, as the initial zero-order correlations of these two variables with the temperament dimensions and personality factors were not significant.

RESULTS

Missing Data

Assessment of missing data revealed that there were three participants who did not complete the measures of temperament and personality, and they were omitted from all analyses (Tabachnick & Fidell, 2007). Independent samples t tests revealed no significant differences in the mean age or percentage of males and females between participants with missing data and participants without missing data.

Correlations Within Temperament Dimensions and Personality Factors

Zero-order correlations among the four dimensions of temperament and correlations among the six dimensions of personality ranged from small to medium (see Table 2). Within the temperament dimensions, Frustration was significantly negatively correlated with Surgency and Effortful Control, and significantly positively correlated with Affiliation. Affiliation was significantly positively correlated with Effortful Control. Finally, Effortful Control was significantly positively correlated with Surgency. These correlations were consistent with previous literature, with the exception of the correlation between Affiliation and Effortful Control, which has previously been found to be negative (L. K. Ellis & Rothbart, 2001).

Within the personality factors, Honesty–Humility was significantly positively correlated with Emotionality, Agreeableness, Conscientiousness, and Openness, consistent with previous literature (Lee & Ashton, 2004). Also consistent with the literature, Extraversion, Conscientiousness, and Openness were all significantly correlated with one another, whereas Agreeableness was significantly positively correlated with Extraversion. Surprisingly, Emotionality and Openness were significantly positively correlated, and Agreeableness and Conscientiousness were significantly positively correlated.

Correlations Between Temperament Dimensions and Personality Factors

There were many significant small to large zero-order correlations between the Rothbart’s temperament dimensions and the HEXACO personality factors (see Table 2). As expected, Frustration was significantly negatively correlated with Agreeableness. Surprisingly, Frustration was also significantly positively correlated with Emotionality. As expected, Affiliation was significantly positively correlated with Emotionality, and Agreeableness, although surprising, also positively correlated with Honesty–Humility, Extraversion, Conscientiousness, and Openness. As expected, Effortful Control was significantly positively correlated with Conscientiousness. Unexpectedly, Effortful Control was also positively correlated with Agreeableness, Honesty–Humility, Extraversion, and Openness. Finally, as expected, Surgency was significantly positively correlated with Conscientiousness.
correlated with Extraversion, and negatively correlated with Emotionality. Additionally, Surgency was surprisingly inversely correlated with Honesty–Humility.

**Regressions With Temperament Dimensions as the Dependent Variables**

All variables met the assumptions of normality with the exception of Frustration, which was leptokurtic. Subsequent regressions run with a transformed Frustration variable yielded the same pattern of results and, thus, the original variable was kept in our analyses (Tabachnick & Fidell, 2007). Both Emotionality and the inverse of Agreeableness uniquely predicted variance in Frustration. Extraversion and Emotionality uniquely predicted variance in Affiliation, and Agreeableness, Conscientiousness, and a younger age significantly predicted unique variance in Effortful Control. Finally, Extraversion and the inverse of Emotionality uniquely accounted for variance in Surgency. These effect sizes were in the small to medium ranges (see Table 3).

**Regressions With Personality Factors as the Dependent Variables**

The hierarchical linear regression for Honesty–Humility revealed that Affiliation, Effortful Control, the inverse of Surgency, and being a female uniquely predicted variance in Honesty–Humility. Affiliation, the inverse of Surgency, and being a female uniquely predicted variance in Emotionality. Extraversion was uniquely predicted by Affiliation and Surgency. Affiliation, Effortful Control, Frustration, and being a male uniquely predicted variance in Agreeableness. Effortful Control and Frustration uniquely predicted variance in Conscientiousness. Finally, Openness was uniquely predicted by Affiliation and Effortful Control. These effect sizes were in the small to large ranges (see Table 4).

**DISCUSSION**

The primary goals of this study were to investigate the convergence between temperament and personality within the period of adolescence, and to specifically investigate the overlap between the EATQ–R temperament traits and the HEXACO PI–R personality factors. As hypothesized (see Table 1), we found that there are indeed significant relations between the two measures, although there remain some important differences that highlight the potentially unique contributions of both instruments to understanding and measuring adolescent individual differences.

**Traits Involving Self-Regulation**

Effortful Control and Conscientiousness were strongly associated with each other. Of all the relations between temperament and personality traits, this association involved the highest degree of common explained variance (see Tables 3 and 4). This association between Effortful Control and Conscientiousness is consistent with many previous studies on children (e.g., Digman & Shmelyov, 1996; Evans & Rothbart, 2007; Grist & McCord, 2010). This finding was expected (see Table 1) given the overlap with respect to self-regulation and organization tendencies between this temperament dimension and personality factor (Ashton & Lee, 2007; Grist & McCord, 2010; Henderson & Wachs, 2007). Apart from these strong, mutual relations, Effortful Control and Conscientiousness had only weak, unique relations with Agreeableness and Frustration, respectively, further demonstrating that these two traits

**Table 2.—Zero-order correlations between age, sex, personality factors, and temperament traits in adolescents.**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Frustration</th>
<th>Affiliation</th>
<th>Effortful Control</th>
<th>Surgency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>.02</td>
<td>.28**</td>
<td>.48**</td>
<td>.08</td>
</tr>
<tr>
<td>Age</td>
<td>−.07</td>
<td>.16*</td>
<td>−.11</td>
<td>−.18**</td>
</tr>
<tr>
<td>H</td>
<td>−.25**</td>
<td>.29**</td>
<td>.21**</td>
<td>.18**</td>
</tr>
<tr>
<td>E</td>
<td>−.06</td>
<td>−.01</td>
<td>.06</td>
<td>.17**</td>
</tr>
<tr>
<td>X</td>
<td>.21**</td>
<td>.23**</td>
<td>.16*</td>
<td>.02</td>
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<tr>
<td>A</td>
<td>.19**</td>
<td>.27**</td>
<td>.01</td>
<td>−.20**</td>
</tr>
<tr>
<td>O</td>
<td>.10</td>
<td>.15*</td>
<td>.31**</td>
<td>.12</td>
</tr>
<tr>
<td>Frustration</td>
<td>.09</td>
<td>.12</td>
<td>.26**</td>
<td>.09</td>
</tr>
<tr>
<td>Affiliation</td>
<td>.11</td>
<td>.12</td>
<td>.30**</td>
<td>−.31**</td>
</tr>
<tr>
<td>Effortful Control</td>
<td>.12**</td>
<td>.10**</td>
<td>.31**</td>
<td>.10</td>
</tr>
<tr>
<td>Surgency</td>
<td>−.31**</td>
<td>.10</td>
<td>.38**</td>
<td>.10</td>
</tr>
</tbody>
</table>

Note. n = 222. H = Honesty–Humility; E = Emotionality; X = Extraversion; A = Agreeableness; C = Conscientiousness; O = Openness to Experience.

*Sex was coded with 1 = male, 2 = female.

*p < .05. **p < .01.

**Table 3.—Hierarchical multiple regression analyses predicting temperament traits from sex, age, and personality factors.**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Frustration</th>
<th>Affiliation</th>
<th>Effortful Control</th>
<th>Surgency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>.03*</td>
<td>.08**</td>
<td>.10**</td>
<td>.12**</td>
</tr>
<tr>
<td>Age</td>
<td>.12</td>
<td>.26**</td>
<td>.07</td>
<td>.08</td>
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<td>H</td>
<td>.13</td>
<td>.12</td>
<td>−.30**</td>
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<td>A</td>
<td>−.19**</td>
<td>.10</td>
<td>.15*</td>
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<td>C</td>
<td>.04</td>
<td>.01</td>
<td>.47**</td>
<td>.18</td>
</tr>
<tr>
<td>O</td>
<td>.03</td>
<td>.12</td>
<td>.03</td>
<td>−.08</td>
</tr>
</tbody>
</table>

Note. n = 222. Only χ2 for significant predictors are reported. H = Honesty–Humility; E = Emotionality; X = Extraversion; A = Agreeableness; C = Conscientiousness; O = Openness to Experience.

*Sex was coded with 1 = male, 2 = female.

*p < .05. **p < .01.
are primarily concerned with self-regulation and organization, as opposed to emotional reactivity in the domain of frustration and anger.

Unexpectedly, younger age was significantly associated with Effortful Control. Traditionally, Effortful Control has been found to increase with age (Hagekull & Bohlin, 2003). Although we are confident that our items on Effortful Control in the temperament measure are valid (L. K. Ellis & Rothbart, 2001), we recognized that a substantial number of items were about completing homework. Considering our participants ranged in age from 11 to 17, our finding suggests there might be differences in homework completion between younger adolescents and older adolescents. There are increasing competing emotional and social demands placed on older adolescents regarding socializing with friends, extracurricular activities, and part-time work, in addition to homework (Zuzanek, 2009). Older adolescents likely have greater autonomy and less monitoring by parents to complete homework, and might therefore have greater difficulty with activation control or attention to focus on homework with competing demands (Shiner & DeYoung, 2013). In sum, homework completion could mean different things for different stages of adolescent development that could explain the relationship between younger age and Effortful Control in our data. Future research could test this explanation by including alternate measures of Effortful Control that are not so strongly related to homework, or use a sample with a smaller age range.

**Emotional Reactivity Involving Positive Affect**

The findings of our study supported the predicted relations between Surgency and Extraversion (see Table 1), both of which are concerned with positive emotions such as enthusiasm, high-intensity pleasure, excitement, and approach behavior. Surgency and Extraversion mutually explained the largest amount of variance in each other (see Tables 3 and 4). These results replicate previous findings that examined the associations between temperament and personality in elementary school children (e.g., De Paauw & Mervielde, 2010; Digman & Shmelyov, 1996; Grist & McCord, 2010; Hagekull & Bohlin, 2003; Muris, Meesters, & Blijlevens, 2007). Therefore, our results in combination with the results of previous studies demonstrate that these two traits are both rooted in positive emotional reactivity.

**Emotional Reactivity Involving Fear**

As predicted (see Table 1), Surgency was inversely and moderately related to Emotionality, and the reverse relation was in the same direction and had the same magnitude (see Tables 3 and 4). This was expected because Surgency is specifically made up of reverse-coded fear, and fear is a subscale of HEXACO Emotionality. Similarly, Kandler and colleagues (2012) suggested fearlessness and low anxiety are associated with an ability to approach high-sensation and novel situations, which helps explain the relation between low Emotionality and high Surgency. Previous research has also demonstrated similar relations in an adult population; temperamental Negative Affect (including fear) was correlated with the Big Five measure of Neuroticism (Rothbart et al., 2000). However, the Surgency and Emotionality scales represent a narrower range of negative affect than does Neuroticism, insofar as the former scales exclude frustration, anger, sadness, depression, and discomfort. Thus, the overlap between these two traits could be a result of the shared negative affect of fear and anxiety.

**Emotional Reactivity Involving Anger or Frustration**

Relations among the temperament and personality traits that address reactivity in the form of anger and frustration were largely consistent with our hypotheses (see Table 1). However, these associations had a smaller effect size relative to those dealing with fear or positive affect, and the pattern of relations was more complex. Specifically, Frustration and Agreeableness had small, unique, reciprocal negative relations (see Tables 3 and 4). Using an adapted version of the Five-factor model and Rothbart’s Child Behavior Questionnaire, Grist and McCord (2010) found a significant inverse correlation between Negative Affect (including anger and frustration) and Agreeableness in children. Likewise, Blau and colleagues (2006) conducted a study on adults using measures from the Five-factor model and an adapted adult temperament model (i.e., the Ellis Emotional Efficiency Inventory, which included
a frustration tolerance subscale; A. Ellis, 1992) and found a significant correlation in which adults who were more agreeable were also more “frustration tolerant.” Taken together, these findings highlight a significant, negative relation between Agreeableness and Frustration that might be due to the shared characteristic of anger reactivity.

Frustration also had a small, positive, independent relation with Emotionality in this study, although the reverse was not true (see Tables 3 and 4). Previous research has shown positive associations between the temperament trait of Negative Emotionality (including anger, a component of Frustration) and the Five-factor personality trait of Neuroticism (similar to Emotionality in the HEXACO) in a sample of infants and children (Hagekull & Bohlin, 2003). However, the association between Frustration and Emotionality in this study is somewhat surprising and unexpected (see Table 1). This is because the HEXACO separates fearful or anxious reactivity (Emotionality) from angry reactivity (Agreeableness), which would explain the inverse association found between Frustration and Agreeableness that we discussed earlier. Therefore, considering findings from previous studies in combination with our results, we suggest that the common ground between the Frustration domain on the EATQ–R and the Emotionality domain on the HEXACO PI–R in this study could be attributed to a tendency toward general Negative Affect, as opposed to specific negative emotions such as anger. Nonetheless, conclusions about these relations must be tempered by the overriding finding that the six personality traits together accounted for only 6% of the unique variance in Frustration. Thus, this temperament dimension appears to capture a somewhat unique aspect of emotional reactivity.

Emotional Reactivity Involving Social Connectedness

We also found the expected relations (see Table 1) between temperament and personality traits that assess emotional reactivity pertaining to social connectedness. Specifically, Emotionality and Affiliation had the strongest relationship with each other. This finding is in accord with a similar finding by Rothbart and colleagues (1994). Consequently, our finding in combination with previous findings suggests that these two traits share characteristics of social connectedness including empathy, sympathy, grief, trust, friendliness, and desire for emotional closeness or support.

Affiliation was also found to explain a relatively small amount of unique variance in Agreeableness, whereas Agreeableness did not have a significant, independent relation with Affiliation. This lack of a bidirectional association is not entirely surprising, as Affiliation and Agreeableness are related to social connectedness, including facets such as forgiveness (e.g., trusting, friendly) and gentleness, but Agreeableness alone also is related to aspects of self-regulation like patience and flexibility.

Affiliation and Extraversion mutually accounted for a modest degree of unique variance in each other. Although unpredicted (see Table 1), the positive link between Affiliation and Extraversion is consistent with previous research in which children and adults high in prosocial Affiliation sought, experienced, and enjoyed more contact with their peers (Buunk, Nauta, & Molleman, 2005; Fabes, Hanish, Martin, Moss, & Reesing, 2012). Therefore, Affiliation and Extraversion might share the element of sociability.

Over and above the regression analyses, Affiliation was the only temperament trait that had significant zero-order correlations with all six personality factors. Although previous studies with child and adult samples have found few associations between Affiliation and personality dimensions (e.g., Evans & Rothbart, 2007; Shiner & DeYoung, 2013), the number of significant correlations we report among our adolescent sample might support Rothbart and Bates’s (2006) notion that Affiliation is a temperament trait that begins to develop during adolescence. This could explain why we were able to find associations with personality traits that previous studies on younger samples did not (Shiner & DeYoung, 2013). Putnam, Ellis, and Rothbart (2001) explained that during adolescence, Affiliation becomes differentiated from affiliative behaviors associated with temperamental shyness and extraversion, and instead begins to focus directly on a desire for emotional warmth and closeness with others. Therefore, Rothbart’s temperament measures for infants and children include affiliative behaviors under various temperament dimensions, whereas the adolescent measure (EATQ–R) includes Affiliation as an independent temperament dimension. It is important to note that although we suggest Affiliation might develop during adolescence, we found that the association between Affiliation and age only approached significance ($p = .057$), potentially due to insufficient power.

Honesty–Humility and Openness to Experience

Given that the Honesty–Humility and Openness to Experience personality factors do not explicitly assess aspects of emotional reactivity or self-regulation, we did not predict significant relations with the four temperament traits (see Table 1). Consistent with this view, the temperament dimensions collectively accounted for the least unique variance in these two personality traits, only 7% and 8%, respectively, and neither of these personality dimensions was a significant, independent correlate of any of the temperament characteristics (see Table 3). However, Affiliation and Effortful Control accounted for a significant, albeit relatively small degree of unique variance in both Honesty–Humility and Openness to Experience. Surgency was also independently and negatively related to Honesty–Humility, accounting for 2% in variance (see Table 4). Therefore, although there is minimal overlap with the temperament dimensions, Honesty–Humility and Openness to Experience do seem to tap into aspects of social connectedness and self-regulation abilities, with the former also including elements of fear, shyness, and less interest in high-intensity pleasure.

Limitations

There were several limitations to these findings. The predominately White and middle-class sample might limit the generalizability of the results. Although the HEXACO offers cross-cultural validity, future studies could benefit from collecting data from more diverse samples. In addition, self-reports were used to measure both temperament and personality. Inclusion of other methods or multiple informants, such as teachers, parents, and peers, might be beneficial (Blatny, Jelinek, & Osecka, 2007). Finally, this study was concurrent, so we therefore cannot draw conclusions about causality.
Theoretical Implications

The results reported here support the contention that temperament and personality overlap at the level of dispositional traits in adolescence, albeit to varying degrees. Patterns of relations among individual temperament and personality traits further suggest that the domains of overlap include self-regulation abilities, and aspects of positive and negative emotional reactivity, including excitement and enthusiasm in social, novel, or high-intensity situations; empathy; desire for interpersonal closeness; and fearfulness. In contrast, there was much less overlap in other domains, with personality traits accounting for relatively little variance in temperamental proneness to frustration, and temperament traits explaining relatively little variability in Openness to Experience and Honesty–Humility. Overall, the substantial degree of unexplained variance across the spectrum of these measures is consistent with the contention that although temperament and personality share a core of reactive and regulatory tendencies, personality indexes encompass a broader domain of specific cognitions relating to attitudes, goals, values, adaptations, self-concept, and perceptions of others (Rothbart, 2011, 2012). However, although personality measures are generally acknowledged to sample a broader domain of individual differences that extend beyond core temperamental tendencies, the data reported here suggest that their breadth does not render measures of temperament redundant. Notably, the personality (up to 32%) and temperament (up to 31%) measures account for similar amounts of unique variance in each other, and thus both instruments assess dispositions that are beyond the scope of the other.

Practical Implications

From a practical perspective, considering there were more similarities than differences between the two measures, combining the two approaches of measuring individual differences among adolescents would be a significant step forward for integrating data from both fields. However, the results still demonstrate differences in measurement, implying that researchers can choose which measure best addresses their research questions, rather than assuming that one or the other is more appropriate for this age group. For example, the personality domain of Honesty–Humility, which is largely independent of the temperament measure used in this study, is negatively correlated with bullying, sexual harassment, workplace antisocial behavior, premeditated revenge, psychopathy, narcissism, and Machiavellianism (Book, Volk & Hosker, 2012; Lee & Ashton, 2012a, 2012b; Lee et al., 2013; Lee, Gizzarene, & Ashton, 2003; Oh, Lee, Ashton & de Vries, 2011). As such, this personality measure might be well suited to studies of proactive antisocial behavior. On the other hand, proneness to frustration, which is weakly related to the personality domains of the HEXACO, is associated with reactive, emotional, impulsive subtypes of aggression (Xu, Farver, & Zhang, 2009), and might thus be well suited to studies of emotionally dysregulated aggressive behavior. When the research question relates to dispositional traits that are assessed by both temperament and personality measures, such as self-regulation abilities (e.g., Effortful Control, Conscientiousness), anxiety or fearfulness (low pole of Surgency, Emotional), and positive emotionality and approach motivation (high pole of Surgency and Extraversion), the researcher might consider a temperament measure to be the best option when there is an interest in assessing traits that are a psychological proxy for biologically based predispositions that appear early in development, and are rooted in neural networks relating to emotion, motivation, and attention (Rothbart, 2011). Conversely, if a broader, more complex measure of individual differences that encompasses specific cognitions such as attitudes, goals, values, and self-concepts would best facilitate understanding of the phenomenon under study, a personality measure might be most useful. In conclusion, both the HEXACO PI–R and the EATQ–R could both make unique and meaningful contributions to the study of individual differences in adolescents, giving researchers the opportunity to tailor their choice of measure to their specific research questions.

REFERENCES

Buunk, B. P., Nauta, A., & Molleman, E. (2005). In search of the true group opportunity to tailor their choice of measure to their specific research questions.

RELATIONS BETWEEN ADOLESCENT RATINGS


