The Relationship between Temperament and Anxiety

Phase I in the Development of a Risk Screening Model to Predict Stress-related Health Problems

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Abstract

This study of 509 (340 female) undergraduate university students in southern Appalachia who completed the Adult Temperament Questionnaire (ATQ) and the State-Trait Anxiety Inventory (STAI), is the first phase in the development of a model to predict risk for stress-related health problems. Results indicate that high negative affect strongly predicted individuals with above average anxiety (OR = 3.7, 95% CI 2.43, 5.64), while high positive affect, effortful control, and sociability predicted that individuals would be low in reported anxiety (OR = .33 [95% CI .25, .44], .29 [95% CI .19, .45], and .69 [95% CI .56, .86], respectively).

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NUMEROUS studies over several decades have confirmed that individual characteristics and experiences contribute to poor health. Our purpose in this phase of research was to determine whether temperament is predictive of anxiety or stress so that measurement of temperament can eventually be incorporated into an instrument to screen for risk of stress-related health problems. Kiecolt-Glaser, McGuire, Robles, and Glaser (2002) present a compelling review of a variety of physical problems predicted by stress, which range from increased rates of cardiovascular disease (CVD; for a review specific to CVD, see Rozanski, Blumenthal, & Kaplan, 1999) to an increased likelihood of contracting a common cold (Cohen, Doyle, Turner, Alper, & Skoner, 2003; Cohen et al., 1998). Stress has even been implicated in the development of such pregnancy and birth complications as preeclampsia (Klonoff-Cohen, Cross, & Pieper, 1996) and preterm birth (Dole et al., 2003), and in behavioral and cognitive problems of children whose mothers experienced psychological stress during pregnancy (Clements, 1991; Wadhwa, 2005). Dole et al. found that preterm birth was predicted by high pregnancy-related anxiety (OR = 2.1, 95% CI: 1.5, 3.0), experience of stressful life events during pregnancy (OR = 1.8, 95% CI: 1.2, 2.7), and perception of racial discrimination (OR = 1.4, 95% CI: 1.0, 2.0). Moreover, the American Institute of Stress (AIS, 2009, para. 1) estimates that ‘75–90 percent of all visits to primary care physicians are for stress-related problems’.

Not only is stress implicated in health outcomes. Studies have shown that individual personality traits are also associated with both negative and positive health outcomes. Our particular area of interest is in temperament, which, to date, has been investigated as a potential contributor to (or predictor of) health in relatively few studies. The common, defining factor among theories of temperament is they agree that temperament is stable and biologically determined (Fox, Henderson, & Marshall, 2001; Goldsmith et al., 1987; McCrae et al., 2000; Rothbart & Bates, 1998; Strelau, 2008; Strelau & Eysenck, 1987). It is the stability and biological basis of temperament that makes it an appealing variable for risk prediction.

Rothbart and colleagues (Garstein & Rothbart, 2003; Rothbart, Ahadi, & Evans, 2000; Rothbart & Bates, 1998), in their comprehensive theory of temperament, define temperament as ‘constitutionally based individual differences in reactivity and self-regulation, with constitutional referring to the relatively enduring biological make-up of the individual, influenced by heredity, maturation, and experience’ (Garstein & Rothbart, 2003, p. 66, emphasis added). This theory captures most of the common characteristics among contemporary temperament theories and is tied directly to advancements in developmental neurobiology as is Strelau’s (2008) classic theory. Rothbart and Bates (1998) characterize temperament as comprising separable, but highly interactive, biologically based subdimensions that make up global temperament dimensions (described in Table 1).

In studies that have measured temperament or related personality constructs, investigations of the relationship between negative aspects and poor health were more prevalent than investigations between positive aspects and good health. Our ultimate interest is in predicting health outcomes from multiple variables including stress, low and high, and multiple aspects of temperament including both positive and negative aspects. However, this investigation necessitates that we first determine whether temperament predicts the level of anxiety, which is hypothesized to contribute to health status.

Negative Affect is associated with such varied outcome measures as the development of CVD (Puttonen et al., 2008), Alzheimer’s (Wilson et al., 2003), the speed of skin healing (Robles, Brooks, & Pressman, 2009), and with self-reported poor health (Klainin, 2009). Puttonen and colleagues found that aspects of negative affect including fear and worry predicted an Autonomic Nervous System (ANS) profile reflecting higher CVD risk. Conversely, positive personality characteristics such as positive affect are associated with good health. Marsland, Cohen, Rabin, and Manuck (2006) found that positive affect predicts antibody response to hepatitis B vaccination and high negative affect, which was confirmed as an independent construct from positive affect, predicted low antibody response to vaccination. Characteristics such as happiness and psychological well-being are associated with reduced risk of disability, physical morbidity, and increased longevity (for a review, see Pressman & Cohen, 2005). Steptoe and Wardle (2005) found that ambulatory systolic blood pressure was inversely associated with positive affect, and longitudinal studies have demonstrated that positive affect predicts a lower
### Table 1. Zero-order correlations between measures of temperament and anxiety ($N = 509$)

<table>
<thead>
<tr>
<th>Temperament dimension/subdimension</th>
<th>Description from ATQ manual</th>
<th>ANX</th>
<th>ANXI</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STAI</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative affect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear</td>
<td>Negative affect related to anticipation of distress</td>
<td>.48***</td>
<td>.39***</td>
<td>.47***</td>
</tr>
<tr>
<td>Frustration</td>
<td>Negative affect related to interruption of ongoing tasks or goal blocking</td>
<td>.34***</td>
<td>.28***</td>
<td>.33***</td>
</tr>
<tr>
<td>Sadness</td>
<td>Negative affect and lowered mood and energy related to exposure to suffering, disappointment, and object loss</td>
<td>.41***</td>
<td>.38***</td>
<td>.42***</td>
</tr>
<tr>
<td>Discomfort</td>
<td>Negative affect related to sensory qualities of stimulation, including intensity, rate, or complexity of visual, auditory, smell/taste, and tactile stimulation</td>
<td>.22***</td>
<td>.15***</td>
<td>.20***</td>
</tr>
<tr>
<td>Effortful control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activation control</td>
<td>Capacity to perform an action when there is a strong tendency to avoid it</td>
<td>−.41***</td>
<td>−.36***</td>
<td>−.41***</td>
</tr>
<tr>
<td>Attentional control</td>
<td>Capacity to focus attention as well as to shift attention when desired</td>
<td>−.37***</td>
<td>−.36***</td>
<td>−.39***</td>
</tr>
<tr>
<td>Inhibitory control</td>
<td>Capacity to suppress inappropriate approach behavior</td>
<td>−.15**</td>
<td>−.13**</td>
<td>−.15**</td>
</tr>
<tr>
<td>Extroversion/surgency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sociability</td>
<td>Enjoyment derived from social interaction and being in the presence of others</td>
<td>−.40***</td>
<td>−.27***</td>
<td>−.35***</td>
</tr>
<tr>
<td>High intensity pleasure</td>
<td>Pleasure related to situations involving high stimulus intensity, rate, complexity, novelty, and incongruity</td>
<td>−.03</td>
<td>−.04</td>
<td>−.04</td>
</tr>
<tr>
<td>Positive affect</td>
<td>Latency, threshold, intensity, duration, and frequency of experiencing pleasure</td>
<td>−.48***</td>
<td>−.35***</td>
<td>−.44***</td>
</tr>
<tr>
<td>Orienting sensitivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral perceptual sensitivity</td>
<td>Detection of slight, low intensity stimuli from both within the body and the external environment</td>
<td>.04</td>
<td>.05</td>
<td>.05</td>
</tr>
<tr>
<td>Affective perceptual sensitivity</td>
<td>Spontaneous emotionally valenced, conscious cognition associated with low intensity stimuli</td>
<td>−.11*</td>
<td>.06</td>
<td>−.09*</td>
</tr>
<tr>
<td>Associative sensitivity</td>
<td>Spontaneous cognitive content that is not related to standard associations with the environment</td>
<td>.06</td>
<td>.06</td>
<td>.06</td>
</tr>
</tbody>
</table>

*Note: Adult Temperament Questionnaire (ATQ) (Evans & Rothbart, 2007)*

* $p < .05$; ** $p < .01$; *** $p < .001$
incidence of mortality (Ostir, Markides, Black, & Goodwin, 2000), stroke (Ostir, Markides, Peek, & Goodwin, 2001, and onset of disability independently of negative affect and other risk factors (Steptoe, O’Donnell, Marmot, & Wardle, 2008).

Theoretical models and research findings have additionally suggested that these types of individual temperamental characteristics can impact the experience of stress, and may interact with stressors to influence numerous health problems (Turk, 1996). Indeed, individual characteristics either place individuals at risk for or buffer them from the ill effects of experiencing stress. Decades ago, Berkman and Syme (1979) found stress-buffering effects of size of social network and its implied sociability, and as recently as 2009 Robles et al. found positive affect buffers the effects of stress on skin barrier recovery. Thus, any conceptualization of the impact of stress on health outcomes should necessarily include a consideration of the role of individual temperamental characteristics in the association. In this vein, Seligman (2008, p. 3) has called for ‘a new field: positive health, which describes a state beyond the mere absence of disease’. Positive health would focus on characteristics, behaviors, and experiences that contribute to physical healthiness. Identifying these factors, and how they work separately and together to impact health, would then be key to determining ways to intervene to improve health. Individual temperament and the experience of stress seem to be two important components in a risk profile for poor health outcomes.

Stress predicts health outcomes and temperament predicts health outcomes. Some of the differences in susceptibility to stress-related illnesses appear to be tied to underlying psychological differences such as temperament. In this study we will establish the association between aspects of temperament and stress leading to later phases of this research that will include large scale assessment of relevant aspects of temperament, salient dimensions of the experience of stress, and multiple health outcomes. These studies taken together will enable us to model significant aspects of temperament and stressful experiences against outcomes to determine which aspects of temperament, stress, and health are most associated with each other so that a risk profile to test against health outcomes can be developed.

Based on previous research, we specifically predicted that negative affect would be positively associated with the experience of anxiety, while positive affect would be negatively associated, but that other aspects of temperament may also be associated with anxiety. For example, self-control, including the ability to inhibit desired activities, perform unpleasant activities, and control one’s attention, has been shown to reduce the perception of stress (i.e. anxiety) or lessen the ill effects of stress (Lazarus & Folkman, 1984). Thus, this as well as other temperament dimensions (list and description in Table 1) were examined in relation to anxiety in the current study.

**Method**

**Participants**

After receiving study approval from the university’s institutional review board, 561 undergraduate students at a regional university in the south-eastern USA responded to our set of surveys, which were administered online through the *Sona Systems* web-based participant pool management system. Students were given extra credit that could be applied toward the grade in a psychology course of the student’s choice. Responses of participants who spent less than 10 minutes completing the survey set were eliminated from analyses, as this was not adequate time to answer questions meaningfully. The participants eliminated did not differ significantly from the retained participants on any demographic variables. The remaining 509 (340 female) participants ranged in age from 18 to 53 years, with 81 percent between 18 and 22 years of age. Within the subset of 61 students who were 25 years or older, most ages between 25 and 53 were represented. Additionally, 82 percent were currently unmarried and not co-habiting, 8 percent were married, and 10 percent were unmarried but co-habiting with a partner.

**Measures**

The survey set was comprised of several instruments, only some of which were part of the current investigation. The two instruments analyzed for this study were the *State-Trait Anxiety Inventory* (STAI; Spielberger, 1983) and the *Adult Temperament Questionnaire* (ATQ; Evans & Rothbart, 2007).

**Stress**

Measurement of stress (or anxiety) can be accomplished by counting distinct stressors, often called life events (Holmes & Rahe, 1967), such as illnesses, natural disasters, divorce, job loss, and so forth. However, what is experienced as highly
anxiety-provoking to one individual may not be to another. Physiological measures of stress are also available such as heart rate and concentrations of hormones including cortisol; however these have repeatedly been found to be predicted by less invasive, self-report measures of anxiety.

For these reasons, it is as useful if not more so to evaluate an individual’s perception of an event or emotional response to it, as is done with the State-Trait Anxiety Inventory (STAI, Spielberger, 1983) which is the most often used anxiety or stress assessment instrument. The STAI measures both transient responses to stressful events (State Anxiety) and general, long-standing feelings of anxiety (Trait Anxiety), which are valuable measures of individual responses to stress, and could be very useful in the development of a stress-risk temperament profile.

The STAI is a self-report measure with 40 items. Half of the items assess State Anxiety, defined as an unpleasant emotional arousal in the face of threatening demands or dangers characterized by temporary feelings of anxiety that tend to be situational. The remaining 20 items assess Trait Anxiety, which reflects the existence of stable individual differences in the tendency to respond with state anxiety in the anticipation of threatening situations. Each item is evaluated on a four-point Likert scale, yielding a possible Trait Anxiety score from 20 to 80, a possible State Anxiety score from 20 to 80, and a possible total anxiety score from 40 to 160. Although no cut-off indicating clinically significant levels of anxiety is established in the technical or administration materials for the STAI, cut-offs of 39/40 (Kvaal, Macijauskiene, Engedal, & Laake, 2001) and 44/45 (Himmelfarb & Murrell, 1984) have been used in prior studies.

The STAI has been shown to have excellent internal consistency (average $\alpha = .89$) and test–retest reliability (average $r = .88$, Barnes, Harp, & Jung, 2002). Thus, the STAI was used in the current investigation because of generalizability due to its widespread use, its excellent psychometric properties, and the promise of the Trait Anxiety subscale reflecting a stable individual characteristic.

Temperament Recently Evans and Rothbart (2007, 2009) have taken the temperament dimensions that have been repeatedly supported in infants, children, and adolescents and developed an adult measure of temperament, the Adult Temperament Questionnaire (ATQ). Although other measures of temperament exist (e.g. Buss & Plomin, 1975; Cloninger, Przybeck, Svrakic, & Wetzel, 1994; Strelau & Zawadzki, 1993), a large and noteworthy body of empirical evidence supports the reliability and validity of the ATQ (Evans & Rothbart, 2007, 2009; Rothbart et al., 2000). Additionally, this tool allows for the measurement of the same temperament constructs at all ages.

This 77-item self-report instrument yields scores on four dimensions of temperament, each of which is comprised of three to four subdimensions offering a fine-grained assessment of an individual’s temperament characteristics. The four primary temperament dimensions are Negative Affect, Extraversion/Surgency, Effortful Control, and Orienting Sensitivity. Negative Affect is the degree to which an individual is fearful, sad, frustrated, or bothered by physical discomforts. Extraversion/Surgency is the degree to which an individual is social, displays positive affect, and enjoys high intensity activities such as parties and amusement park rides. Effortful Control refers to self-control, including the ability to perform undesired activities and control impulses. Finally, Orienting Sensitivity is the degree to which an individual is sensitive to cues in his or her environment. The ability to measure subdimensions of temperament has been found to be beneficial in studies such as this in which a subdimension, Positive Affect, was of interest (see descriptions in Table 1).

Each ATQ item was scored on a seven-point Likert scale with anchors from ‘extremely untrue of you’ to ‘extremely true of you’. Participants chose ‘not applicable’ and the score was omitted for items that did not apply, and several items were reverse-scored to avoid response bias. A mean score (from 1 to 7) was calculated for each subdimension and dimension scores were determined by calculating the mean of the subdimension scores making up that dimension, also resulting in a score from 1 to 7. The ATQ is known to have good internal validity and convergent validity with other measures of temperament and personality (Evans & Rothbart, 2007; Rothbart et al., 2000).

Hypothesized associations Negative Affect, shown to correlate with physical illness, was hypothesized to correlate positively with measures of anxiety. We further hypothesized that subdimensions of Negative Affect (fear, frustration, sadness, discomfort), if related to anxiety, would be positively related.

Although there is currently little literature to support a relationship between anxiety and Effortful
Control or its subdimensions, intuitively some relationships were hypothesized. Activation Control was hypothesized to be negatively related to anxiety because individuals with high scores on this subdimension should be able to will themselves to manage their lives in such a way as to avoid stressful events (e.g., save money, pay bills, exercise; Lazarus & Folkman, 1984). Attentional Control was hypothesized to be negatively related to anxiety because individuals scoring highly on this subdimension tend to listen to supervisors, study when appropriate, and obey authority, perhaps preventing stressful situations (Lazarus & Folkman, 1984). Individuals who score highly on Inhibitory Control have the capacity to avoid negative behaviors that could lead to the presence of stressors and negatively impact health (e.g., overeating, drinking to excess, having extramarital affairs; Lazarus & Folkman, 1984), thus it was hypothesized to be negatively related to anxiety. Because all Effortful Control subdimensions are hypothesized to be negatively related to anxiety, it would follow that the dimension itself would be negatively related to anxiety.

The relationship between anxiety and Extroversion/Surgency has not been well studied, except for some investigation of Positive Affect, which is hypothesized to be negatively correlated with anxiety. Because there is some evidence that social connectedness can serve as a stress buffer, we hypothesized that Sociability would be negatively related to anxiety, if related at all. No reported directional relationships exist in the literature that would indicate that High Intensity Pleasure, Extroversion/Surgency, or Orienting Sensitivity are related to anxiety, so no relationships were hypothesized.

**Data analysis**

Preliminary analysis involved the calculation of the zero-order correlation between Negative Affect and Positive Affect to ensure they could be considered separate constructs as some studies have suggested. At $r = -0.11$, they were subsequently considered unique constructs rather than opposite ends of the same continuum. Initial analysis involved the calculation of zero-order correlations between temperament variables (i.e., four temperament dimensions, 13 temperament subdimensions) and anxiety variables (i.e., two anxiety subscales, total anxiety) to determine which variables should be included in the subsequent hierarchical multiple regression analysis. Regression analysis controlled for age and gender, and Trait Anxiety was used as the dependent variable as it has been shown to be the most stable of the anxiety variables measured by the STAI. Logistic regression was subsequently performed to evaluate the ability of the significant temperament variables to predict individuals who reported high levels of anxiety.

**Results**

Both subscales of the STAI were highly correlated with each other and with the total score ($rs$ ranged from .75 to .94). Magnitude of correlations among the temperament dimensions ranged from $r = .03$ to $-.42$, while correlations among the subdimensions ranged from $r = .01$ between Frustration and two different subdimensions (Associative Sensitivity and Sociability) to $r = .51$ between Associative Sensitivity and Perceptual Sensitivity.

Bivariate correlations between the temperament dimensions and subdimensions and anxiety scores are presented in Table 2. As can be seen, Negative Affect, Executive Control, and all subdimensions of Extroversion/Surgency and two of its three subdimensions were also significantly associated with all three anxiety scores. Orienting Sensitivity was not significantly associated with any of the anxiety scores, but two of the three subdimensions were weakly associated with some, but not all, measures of anxiety.

Because our primary interest was in predicting Trait Anxiety specifically, we further analyzed significant dimensions/subdimensions of the ATQ in subsequent analyses (see Table 2). To avoid the overlapping of temperament dimensions and subdimensions within analyses, we included a temperament dimension in our model if all of its subdimensions had significant zero-order correlations with Trait Anxiety. If all subdimensions were not significantly related to Trait Anxiety, then only the temperament subdimensions with a significant zero-order correlation with Trait Anxiety were entered into the hierarchical multiple regression model. This resulted in six measures (Negative Affect, Effortful Control, Sociability, Positive Affect, Neutral Perceptual Sensitivity, Associative Sensitivity), which included two dimensions and four subdimensions.

Hierarchical multiple regression results, presented in Table 3, show the ability of the six temperament
variables to predict levels of Trait Anxiety, after controlling for the influence of age and gender. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity. Age and gender were entered in Step 1, explaining less than 1 percent of the variance in Trait Anxiety (a non-significant amount). After entry of the six temperament variables in Step 2, an additional 49 percent of the variance in Trait Anxiety was accounted for. In the final model, only five temperament variables were statistically significant, with Negative Affect and Positive Affect most highly predictive of Trait Anxiety after controlling for the demographic variables as well as the other dimensions of temperament.

Since our ultimate goal is to develop a profile, using a combination of temperament and stress (or anxiety resulting from stress) measures, to predict risk for poor health outcomes, logistic regression was performed next to assess the impact of the five significant temperament factors on the likelihood that respondents would score above the median on Trait Anxiety. Forced entry produced a full model containing all predictors that was statistically significant, making a unique statistically significant contribution to the model (Positive Affect, Negative Affect, Effortful Control, Sociability). The strongest predictor, indicated by the highest odds ratio, was Negative Affect, confirming that high Negative Affect predicts anxiety. Significant odds ratios were also seen for Effortful Control and Positive Affect, indicating that high Effortful Control and Positive Affect predict a significantly lower likelihood of above-average anxiety levels.

Predicting outcomes such as anxiety is often done, as we have presented, using a median split, which is precisely what occurs when clinical cut-off scores are used. Our median split resulted in the split occurring at 40/41, only one point above the cut-off endorsed by Kvaal et al. (2001). However, such analysis will by definition place into different groups many individuals about the median who are separated by only a few points on the scale, and truly have little functional difference in their experience of anxiety. Therefore, we performed a follow-up logistic regression using a quintile split, eliminating the fifth of respondents closest to the median, and predicting ‘high’ anxiety (top two quintiles) versus ‘low’ anxiety (bottom two quintiles) using the five significant temperament factors. Forced entry produced a full model containing all predictors that was statistically significant, making it possible to distinguish between respondents with ‘high’ anxiety and those with ‘low’ anxiety. The model correctly classified 84 percent of cases. Sensitivity of this model to correctly classify participants ‘high’ in anxiety was 87 percent, and specificity to identify those who reported ‘low’ anxiety was

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**Table 2. Hierarchical regression of ATQ temperament dimensions and subdimensions on trait anxiety score from the STAI**

<table>
<thead>
<tr>
<th></th>
<th>$R^2$ change</th>
<th>$p$</th>
<th>$\beta$</th>
<th>$sp^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td>.00</td>
<td>.318</td>
<td>.03</td>
<td>.00</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>.06</td>
<td>.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td>.50</td>
<td>&lt;.0001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive affect</td>
<td>–.36</td>
<td>–.31**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative affect</td>
<td>.29</td>
<td>.25**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effortful control</td>
<td>–.25</td>
<td>–.22**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sociability</td>
<td>–.18</td>
<td>–.15**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associative sensitivity</td>
<td>.12</td>
<td>.10*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral perceptual sensitivity</td>
<td>–.03</td>
<td>–.03</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: Two-tailed tests of significance, $sp^2$ – semipartial correlation squared

*p < .01; **p < .001


81 percent. All predictors, with the exception of Associative Sensitivity, again made unique and statistically significant contributions to the model.

Discussion

Our goal in this study was to contribute to the development of a profile that may be used in the future to identify individuals who are likely to experience anxiety and thus be at risk for developing stress-related physical illnesses. In the first phase of this research, presented here, we examined two key aspects of this profile, temperament and Trait Anxiety, and how they fit together. It is clear that in this sample, Negative Affect, Positive Affect, Effortful Control, and to a lesser extent Sociability, all significantly predict reported anxiety. The magnitude of these relationships supports our proceeding with investigations into additional risk variables and the inclusion of health outcome variables.

The findings of this study have important implications. If future samples confirm these relationships, temperament measures would be cost effective, non-invasive screening tools that could be used to assess risk of experiencing stress or reporting anxiety. The benefit of assessing temperament rather than only stress or anxiety lies in the fact that temperament is a stable, more complex construct than stress or anxiety, and thus could be measured in advance of experiencing stressors or anxiety. The next phase will be to include measures of physical health and illness along with temperament and anxiety in a community sample, as the current findings have revealed clusters of anxiety and temperament dimensions that appear to occur together. At that point anxiety and temperament dimensions can be modeled to determine how well they predict physical outcomes. For example, we might hypothesize that individuals with high levels of Trait Anxiety, combined with high Negative Affect, low Positive Affect, low Effortful Control, and low Sociability, are at greatest risk for physical illness. Thus, these findings give us a starting point for a possible risk profile from a potentially endless combination of temperament characteristics and anxiety measures. Subsequent phases of this research will investigate the ability of temperament and stress, as well as behaviors such as smoking and substance use to predict health outcomes in pregnant women and their infants as well as in other at-risk populations.

Early prediction of individuals who might be at greatest risk of experiencing health-impacting stress will allow a larger window of time for intervention or prevention efforts to be employed, which, if stress-related health problems are reduced in number or severity, could save healthcare costs and improve quality of life for those individuals. Additionally, being able to screen out individuals who are statistically less likely to experience stress or report anxiety should aid in targeting those in most need of intervention or prevention efforts, saving intervention cost and time. Although an examination of anxiety reduction interventions was beyond the scope of this article, there is ample evidence of their benefit, making these findings all the more valuable.

While the current study sample did include some mature adults, 61 participants in the 25 to 53 year old age range, it was largely made up of 18- to 22-year-old undergraduate university students from a fairly rural area of southern Appalachia, thus the generalizability of the findings is somewhat limited. Replication of these findings with a more diverse sample will obviously strengthen our understanding.

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>Wald</th>
<th>p</th>
<th>OR</th>
<th>95.0% CI for odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive affect</td>
<td>-1.10</td>
<td>57.74</td>
<td>.00</td>
<td>.33</td>
<td>.25 - .44</td>
</tr>
<tr>
<td>Negative affect</td>
<td>1.31</td>
<td>36.92</td>
<td>.00</td>
<td>3.70</td>
<td>2.43 - 5.64</td>
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<td>Effortful control</td>
<td>-1.25</td>
<td>30.89</td>
<td>.00</td>
<td>.29</td>
<td>.19 - .45</td>
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<tr>
<td>Sociability</td>
<td>-.37</td>
<td>10.68</td>
<td>.00</td>
<td>.69</td>
<td>.56 - .86</td>
</tr>
<tr>
<td>Associative sensitivity</td>
<td>.19</td>
<td>2.37</td>
<td>.12</td>
<td>1.20</td>
<td>.95 - 1.52</td>
</tr>
<tr>
<td>Constant</td>
<td>5.09</td>
<td>13.69</td>
<td>.00</td>
<td>362.91</td>
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</tbody>
</table>
of the associations between aspects of temperament and reported anxiety. Emotional reactions due to stress have been shown repeatedly to be associated with physical illness, but because most studies including the present one have been correlational and cross-sectional, we have limited verification of mechanisms or direction of causation (Schwarzer, 1990, 1996). It could be that poor health contributes to reports of anxiety, rather than anxiety resulting in poor health. In that same vein, it could be that constitutionally negative people report more anxiety or even seek situations that are stressful and conversely those who are more affectively positive, either do not assess events as being anxiety-provoking or gravitate toward nonstressful situations. Whatever the direction of these relationships or the mechanisms involved, the ability to predict those at highest risk for stress-related health problems would be a valuable tool in efforts to advance positive health.

Conclusions

We can conclude from this study that some dimensions of temperament predict trait anxiety quite robustly, and, therefore findings support the further investigation of the relationship between temperament and health outcomes. If temperament is ultimately found to predict health outcomes, non-invasive screenings could identify individuals at greatest need for interventions to prevent future health problems, as well as prevent over-treating individuals with little risk for such outcomes.

References


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