A Bifactor Model of Negative Affectivity: Fear and Distress Components Among Younger and Older Youth

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The Positive and Negative Affect Schedule for Children (PANAS-C) is a 27-item youth-report measure of positive affectivity and negative affectivity. Using 2 large school-age youth samples (clinic-referred sample: \(N = 662\); school-based sample: \(N = 911\)), in the present study, we thoroughly examined the structure of the PANAS-C NA and PA scales and fit a bifactor model to the PANAS-C NA items. Our exploratory factor analytic results demonstrated that negative affectivity is comprised of 2 main components—NA: Fear and NA: Distress—specifically among older youth. A bifactor model also evidenced the best model fit relative to a unidimensional and second-order factor structure of the PANAS-C NA items. The NA: Fear group factor evidenced significant correspondence with external criterion measures of anxiety. However, the original PANAS-C NA scale evidenced equal (and in some cases greater) correspondence with criterion measures of anxiety. We thus recommend continued usage and interpretation of the full PANAS-C NA scale despite the identification of the fear and distress group factors underlying general negative affectivity. The identification of these fear and distress group factors nonetheless suggest that negative affectivity may be comprised largely of a fear and distress component among older youth. The implications of these findings are discussed in relation to better understanding the structure of psychopathology across childhood development and informing the development of future treatments of negative emotions.

Keywords: PANAS-C, negative affectivity, positive affectivity, anxiety, bifactor

Measures of Negative and Positive Affect

Given that negative affectivity and positive affectivity are viewed as key constructs for understanding certain commonalities and differences between anxiety and depression, developing measures that yield reliable and valid scores of these constructs is an important issue. Several measures have been developed to measure these constructs in youth. The Negative Affectivity Self-Statement Questionnaire (NASSQ; Ronan, & Kendall, Rowe, 1994), for instance, was developed to assess negative affectivity in youth via youths’ self-statements associated with negative affectivity. The Affect and Arousal Scales (AFARS) were also developed to assess negative affectivity and positive affectivity via items that (a) tap personality-related temperament characteristics (e.g., “I don’t like to wait for things”) and that (b) are not specifically related to the symptoms of anxiety and depression (or other internalizing disorders) as seen in the Diagnostic and Statistical Manual of Mental Disorders (4th ed.; DSM–IV; American Psychiatric Association, 1994).
The Development of the PANAS-C

Prior to the development of the PANAS-C (Laurent et al., 1999), which was developed specifically to assess negative affectivity and positive affectivity in youth, other versions of the adult PANAS were previously used to assess positive affectivity and negative affectivity in children. Initially, the 10-item NA and 10-item PA scales of the adult PANAS (originally developed by Watson, Clark, and Tellegen, 1988, for use among adults) were used by researchers interested in measuring these constructs in children (e.g., Lonigan, Hooe, David, & Kistner, 1999). Other researchers also modified items on the adult PANAS to be more easily understood by children (e.g., Laurent, Potter, & Catanzaro, 1994). In a continued effort to make the PANAS more applicable among youth samples, Laurent and colleagues (1999) used a larger sample of 707 children in Grades 4–8 (scale development sample: n = 349; replication sample: n = 358) to create a version that would be developmentally appropriate for use with children (i.e., the PANAS-C). The first step was to identify items on the 60-item PANAS extended adult version (PANAS-X; Watson & Clark, 1991) that were too difficult for children to understand. Specifically, an initial item selection sample used 21 fourth graders and 22 eighth graders to eliminate difficult items on the PANAS-X. Any word that five or more children did not understand was deemed difficult and eliminated; using this criterion, 16 items were eliminated. The remaining items from the PANAS-X were reviewed for uniqueness and to ensure that each was consistent with the theoretical definitions of negative affectivity and positive affectivity. The resulting 30-item PANAS-C scale (Laurent et al., 1994) contained six items from the PANAS PA scale (i.e., active, alert, excited, interested, proud, and strong) and nine items from other scales on the PANAS-X (i.e., happy, energetic, calm, cheerful, joyful, fearless, delighted, daring, and lively). The PANAS-C NA items included seven items from the original PANAS (i.e., afraid, scared, nervous, jittery, guilty, ashamed, and upset) along with eight additional items (i.e., sad, frightened, miserable, lonely, mad, disgusted, blue, and gloomy). Some of the NA items, although not found on the PANAS-X, were replaced with synonyms that were easier for children to understand (e.g., gloomy was included instead of downhearted). Three positive affectivity items (i.e., alert, fearless, and daring) from the 30-item PANAS-C PA scale were later eliminated after evidencing poor item properties in their scale development sample. This process led to the 27-item version of the PANAS-C (comprised of a 12-item PA scale and a 15-item NA scale)—which is the most recent version of the PANAS for children, and the focus of the current study.1

This 27-item PANAS-C and its 12-item PA and 15-item NA scales have since evidenced favorable psychometric properties. Laurent et al.’s (1999) validation study found acceptable alpha reliability estimates for the PANAS-C NA and PA scale scores and a well-defined two-factor structure of negative affectivity and positive affectivity. All the hypothesized PANAS-C PA items loaded significantly on the PANAS-C PA factor (ranging from .44 to .82), and all the hypothesized PANAS-C NA items loaded significantly on the PANAS-C NA factor (ranging from .49 to .78). Based on a subset of 100 participants, they also reported favorable convergent validity (i.e., the PANAS-C scale significantly correlated with self-reports of both anxiety and depression) and divergent validity (i.e., the PANAS-C PA scale correlated significantly and negatively with self-reports of depression), consistent with the tripartite model. Chorpita and Daleiden (2002) also found similar support for the convergent and divergent validity of the PANAS-C PA and NA scale scores among a clinical sample of 226 youth, including the ability of the PANAS-C PA scale to discriminate between anxious youths with and without depression.

The Structure of the PANAS-C Negative Affectivity and Positive Affectivity Items

Although the PA and NA scale scores of the 27-item PANAS-C have evidenced strong psychometric properties, a largely uninvestigated question is how the items measuring the PANAS-C NA and PA factors are structured. Laurent and colleagues (1999) originally posited that the negative affectivity and positive affectivity scales of the PANAS-C are simple unidimensional factors. However, the presence of lower order or group factors was not specifically examined (beyond just a two-factor model of negative affectivity and positive affectivity). It is possible that a second-order (hierarchical) model or a bifactor model represents the data better. A second-order (hierarchical) model is a model that taps both broad, higher order constructs (e.g., negative affectivity) and specific, lower order factors that have distinctive features (e.g., fear, sadness, distress). One reason to look for such a structure in the PANAS-C is that the PANAS adult version has already been found to evidence a hierarchical structure of negative affectivity (Watson & Clark, 1992). Specifically, Watson and Clark (1994) found that the NA scale of the 60-item Positive and Negative Affect Schedule –Expanded version (PANAS-X; Watson & Clark, 1991) measures the higher order construct of negative affectivity but also comprised of four correlated yet distinct lower order negative affectivity subfactors, including the Sadness, Guilt, Hostility, and Fear factors.2 They also found that the PANAS PA scale is a unidimensional construct that is not comprised of lower order subfactors among adults. Watson and Clark (1992, 1994) provided initial support for the hierarchical structure of negative affectivity among adults and reported adequate levels of both convergent and discriminant validity of the lower order PANAS NA subscales. Notably, however, Baggozzi (1993) posited that the hierarchical structure and lower order subscales of the NA factor of the adult PANAS are not substantially

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1 Prior to the development of the 27-item PANAS-C, the 30-item PANAS-C was subjected to principal component analysis, resulting in a 20-item Positive and Negative Affect Scale for Children (PANAS-C), comprising a 10-item NA scale (sad, upset, nervous, guilty, scared, miserable, afraid, lonely, mad, and gloomy) and a 10-item PA scale (excited, happy, strong, energetic, cheerful, active, proud, joyful, delighted, and lively). This 20-item version of the PANAS-C was subsequently examined by Crook, Beaver, and Bell (1998), and its negative affectivity and positive affectivity scale scores evidenced promising psychometric properties among children in Grades 3–5. However, as this 20-item PANAS-C version was derived with a small sample, the same research team developed the final 27-item PANAS-C (Laurent et al., 1999) using a larger sample via the procedures noted above.

2 The lower order Fear factor of the adult PANAS-X is comprised of the following six items: afraid, scared, frightened, nervous, jittery, and shaking (Watson & Clark, 1994). Although this subscale has been called the Fear scale by Watson and Clark (1994), it is important to note that several researchers contend that fear and anxiety represent different, albeit related, constructs. Throughout this article, we refer to this scale as the NA: Fear subscale, although it may be more closely related to anxiety than fear.
meaningful due to inadequate levels of discriminate validity associated with the lower order NA subscales. Bagozzi (1993) thus recommended that the full NA scale of the adult PANAS only be used to “measure negative affect at the global level of overall valence” (p. 849). In the context of these equivocal findings on the hierarchical nature of the PANAS, Laurent and colleagues (1999) in their initial scale development of the PANAS-C posited only a single-order (unidimensional) measure of negative affectivity and positive affectivity without testing for the presence of lower order NA or PA factors. They also did not test a bifactor model of negative affectivity, for example, which has been shown more recently to be helpful for resolving issues of multidimensionality among psychological constructs (e.g., Reise, Morizot, & Hays, 2007; see below in the Data Analytic Approach section for more details on the bifactor model).

### Utility of Other NA Subfactors

Examining the alternative structures to the unidimensional factor structure of negative affectivity and positive affectivity (i.e., second-order, bifactor models) and identifying possible lower order or group factors comprising the PANAS-C negative affectivity and positive affectivity scales is important, given that, for example, lower order subscales of other negative affectivity youth measures have shown to be clinically useful (e.g., Ronan et al., 1994). The 70 items comprising the NASSQ (Ronan et al., 1994), for example, are divided into three sets of items: Anxiety Specific items (the AS scale; e.g., “I feel frightened”), Depression Specific items (the DS scale; e.g., “I am not happy at all”), and Negative Affect items (the NA scale; items common to both anxiety and depression; e.g., “What’s wrong with me?”). Importantly, Ronan, Kendall, and Rowe (1994) used the AS subscale of the NASSQ-NA scale to track anxiety-related therapeutic change following a cognitive-behavioral treatment for anxiety. Significant improvements were evidenced on this AS subscale of the NASSQ-NA scale following their anxiety treatment, demonstrating one way in which such subscales may be useful to the field. Further, given new efforts to develop and test treatments that target negative affectivity directly (e.g., Barlow, Allen, & Choate, 2004), increased precision in measurement of this construct and its possible structure across different groups or developmental levels is likely to be of increased importance.

In addition to having the potential for clinical utility in these ways, the identification of possible lower order scales of the PANAS-C may also have utility for research purposes. For example, Laurent, Catanzaro, and Joiner (2004) recently developed the Physiological Hyperarousal Scale for Children (PH-C) and found three PANAS-C NA items (i.e., frightened, nervous, afraid) with unexpectedly high and significant cross-loading on the PH factor. Importantly, they recommended that future research be conducted to better understand the ways in which such negative affectivity items (related to fear) might account for and influence the relation between physiological hyperarousal and negative affectivity.

Anthony and colleagues (Anthony, Lonigan, Hooe, & Phillips, 2002) also pursued understanding the hierarchical structure of temperament in youth as measured on the Emotionality, Activity, and Sociability Self-Report Temperament Survey for Children (EAS-K). Using 290 community-based youth ages 10-17, Anthony and colleagues found support for a hierarchical structure of temperament, with negative temperament consisting of fearful, nervous, and hostile behavior and with positive temperament consisting of active and socially enthusiastic behavior. Lastly, the ways in which the structure of temperament differs across younger and older youth remains largely unexplored. It is possible, for example, that the underlying structure of negative affectivity differs between younger and older youth, given previous research showing that anxiety and depression are less differentiated among younger youth and become increasingly more differentiated later in child development (Cole, Truglio, & Peeke, 1997; Lonigan et al., 1999).

### The Present Study

In the present study, we explored whether subfactors are present among the PANAS-C NA and PA scales (via exploratory factor analysis [EFA]) and whether a unidimensional, second-order, or bifactor model best fit our data. We also conducted confirmatory factor analysis, regression (using structural equation modeling), and receiver operating characteristic (ROC) analyses to determine whether interpretation of the PANAS-C NA group factors is warranted beyond interpretation of the original PANAS-C NA scale. To increase the generalizability of the present findings, we used both a clinic-referred and a community youth sample. We hypothesized that a lower order PANAS-C NA: Fear factor would emerge as underlying the PANAS-C NA scale, given that the PANAS-C NA scale contains five of the six items as seen on the lower order NA: Fear factor of the adult version of the PANAS-X (Watson & Clark, 1994). However, given that internalizing problems, such as anxiety and depression, have been found to be less differentiated among younger children (Cole et al., 1997; Lonigan et al., 1999), we hypothesized that this PANAS-C NA: Fear factor would be less pronounced, if not completely absent, among younger youth and more clearly present among our older youth sample. Regarding the PANAS-C PA factor, we did not expect lower order factors to emerge, given that positive affectivity has been found to be unidimensional on the PANAS-X (Watson et al., 1994). We did not make any specific a priori hypotheses regarding whether the PANAS-C NA: Fear subscale would evidence greater correspondence with criterion measures of anxiety than the original PANAS-C NA scale. These particular analyses were largely exploratory in nature, and they were conducted to inform future usage of these subfactors relative to the original PANAS-C NA scale.

### Method

#### Participants

Participants were selected from 959 consecutively clinic-referred youths (referred from elementary, junior high, and high schools across Hawaii) who received mental health assessments at the University of Hawaii’s Center for Cognitive Behavioral Therapy (CBT; a specialty clinic for school-age children) and from 966 youths who consented to participate in a large scale school-based study (called the Depression, Anxiety, and Youth Self-Consciousness [DAYS] Project) conducted in the state of Hawaii. Inclusion in the current study required having available PANAS-C and age data. Of the 966 school-based and 959 clinic-referred youths who consented to participate, 964 (99.8%) school-based and 704 (73.4%) clinic-referred children and adolescents had
available PANAS-C data. 3 To ensure the inclusion of valid responses, inclusion into the present study also required each PANAS-C form to have 90% or more completed data (cf. Ebesutani, Bernstein, Nakamura, Chorpita, & Weisz, 2010). Eighteen (2.6%) clinic-referred and eight (0.8%) school-based youth were thus excluded due to having less than 90% completed data. Each Revised Child Anxiety and Depression Scales (RCADS; Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000) form also needed 90% or more completed data to be included in analyses. Further, as we conducted analyses on younger and older subsamples, we excluded youths for whom age data were missing. There were 18 (2.6%) clinic-referred youth and 36 (3.8%) school-based youth whom we excluded due to having missing age data. Last, given that the PANAS-C has been examined among youths aged 6 –17 years in previous studies (e.g., Chorpita & Daleiden, 2002), we excluded youths outside of this age range from both samples, which included six (0.9%) clinic-referred youths and nine (1.0%) school-based youths. This left a final sample size of 662 youths (clinic-referred sample) and 911 youths (school-based sample). All children spoke English at school. Youth and caregiver demographic information appears in Table 1. The diagnostic data for the clinical sample (based on the Anxiety Disorders Interview Schedule for DSM–IV, Child Version [ADIS–IV–C; Silverman & Albano, 1996]) appear in Table 2.

Measures

ADIS–IV–C (Silverman & Albano, 1996). The ADIS–IV–C (Silverman & Albano, 1996) is a semistructured diagnostic child-based interview, designed for the assessment of DSM–IV diagnoses of childhood anxiety, mood, behavioral, and attentional disturbances. Chorpita, Plummer, and Moffitt (2000) previously reported a kappa of .77 for interrater agreement (between two independent clinicians) for a principal diagnosis based on 16 randomly selected families from a subset of the present dataset.

Table 1
Youth and Caregiver Demographic Information

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Clinic-referred sample</th>
<th>School sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Youth gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>433</td>
<td>65.4</td>
</tr>
<tr>
<td>Girls</td>
<td>227</td>
<td>34.3</td>
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<tr>
<td>Missing</td>
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<td>0.3</td>
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<tr>
<td>Youth ethnicity</td>
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<td></td>
</tr>
<tr>
<td>Multiethnic</td>
<td>306</td>
<td>46.2</td>
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<tr>
<td>White</td>
<td>81</td>
<td>12.2</td>
</tr>
<tr>
<td>African American</td>
<td>10</td>
<td>1.5</td>
</tr>
<tr>
<td>Asian American</td>
<td>129</td>
<td>19.5</td>
</tr>
<tr>
<td>Latino/Hispanic</td>
<td>8</td>
<td>1.2</td>
</tr>
<tr>
<td>Other</td>
<td>89</td>
<td>13.4</td>
</tr>
<tr>
<td>Missing</td>
<td>39</td>
<td>5.9</td>
</tr>
<tr>
<td>Caregiver marital status</td>
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<td></td>
</tr>
<tr>
<td>Married</td>
<td>285</td>
<td>43.1</td>
</tr>
<tr>
<td>Divorced, separated</td>
<td>179</td>
<td>27.0</td>
</tr>
<tr>
<td>Widowed</td>
<td>17</td>
<td>2.6</td>
</tr>
<tr>
<td>Single</td>
<td>91</td>
<td>13.7</td>
</tr>
<tr>
<td>Missing</td>
<td>90</td>
<td>13.6</td>
</tr>
<tr>
<td>Family income</td>
<td></td>
<td></td>
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<tr>
<td>$0–$30,000</td>
<td>399</td>
<td>60.3</td>
</tr>
<tr>
<td>$30,001–$60,000</td>
<td>114</td>
<td>17.2</td>
</tr>
<tr>
<td>$60,001–$90,000</td>
<td>67</td>
<td>10.1</td>
</tr>
<tr>
<td>$90,001 or more</td>
<td>53</td>
<td>8.0</td>
</tr>
<tr>
<td>Missing</td>
<td>29</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Table 2
Number of Anywhere and Primary Diagnoses Among the Clinic-Referred Youth

<table>
<thead>
<tr>
<th>Diagnoses</th>
<th>Anywhere</th>
<th>Primary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressive disorders</td>
<td>61</td>
<td>40</td>
</tr>
<tr>
<td>Major depressive disorder</td>
<td>37</td>
<td>26</td>
</tr>
<tr>
<td>Dysthmic disorder</td>
<td>18</td>
<td>11</td>
</tr>
<tr>
<td>Depressive disorder NOS</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Anxiety disorders</td>
<td>298</td>
<td>146</td>
</tr>
<tr>
<td>Panic disorder and/or agoraphobia</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>Specific phobia</td>
<td>49</td>
<td>10</td>
</tr>
<tr>
<td>Generalized anxiety disorder</td>
<td>42</td>
<td>20</td>
</tr>
<tr>
<td>Separation anxiety disorder</td>
<td>32</td>
<td>18</td>
</tr>
<tr>
<td>Social phobia</td>
<td>99</td>
<td>54</td>
</tr>
<tr>
<td>Obsessive-compulsive disorder</td>
<td>21</td>
<td>12</td>
</tr>
<tr>
<td>PTSD/ASD</td>
<td>32</td>
<td>19</td>
</tr>
<tr>
<td>Anxiety NOS</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>ADHD</td>
<td>185</td>
<td>122</td>
</tr>
<tr>
<td>ADHD–Combined type</td>
<td>84</td>
<td>52</td>
</tr>
<tr>
<td>ADHD–Predominantly inattentive type</td>
<td>85</td>
<td>62</td>
</tr>
<tr>
<td>ADHD–Predominantly hyperactive-impulsive type</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>ADHD–NOS</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Disruptive behavior disorders</td>
<td>280</td>
<td>209</td>
</tr>
<tr>
<td>Oppositional defiant disorder</td>
<td>148</td>
<td>93</td>
</tr>
<tr>
<td>Conduct disorder</td>
<td>97</td>
<td>86</td>
</tr>
<tr>
<td>Disruptive behavior disorder NOS</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>Schizophrenia</td>
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<td>0</td>
</tr>
<tr>
<td>Bipolar</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Substance abuse/dependence</td>
<td>37</td>
<td>10</td>
</tr>
<tr>
<td>PDD</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Adjustment disorders</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Other</td>
<td>71</td>
<td>31</td>
</tr>
<tr>
<td>No diagnosis</td>
<td>122</td>
<td>122</td>
</tr>
<tr>
<td>Missing</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Note. N = 662. Anywhere = a diagnosis that appears anywhere in a child’s diagnostic profile; Primary = a child’s primary diagnosis; NOS = not otherwise specified; PTSD = post-traumatic stress disorder; ASD = acute stress disorder; ADHD = attention-deficit/hyperactivity disorder; PDD = pervasive developmental disorder.

3 As indicated, a considerable number of youths in the clinic-referred sample (n = 255) were excluded from the present study due to not having PANAS-C data available (due to a variety of reasons, including the child refusing to complete the PANAS-C and child measures not being administered at the mental health assessment). We thus examined for differences in the characteristics between the clinic-referred youths for whom PANAS-C data were available (n = 704) and unavailable (n = 255). Results revealed that youths with and without PANAS-C data did not differ on the total number of comorbid diagnoses (M = 1.5, SD = 1.2; M = 1.5, SD = 1.1, respectively), Child And Adolescent Functional Assessment Scale (CAFAS) Internalizing score (M = 13.1, SD = 5.2; M = 13.1, SD = 16.7, respectively), CAFAS Externalizing score (M = 43.9, SD = 31.5; M = 49.1, SD = 33.5, respectively), and clinical severity ratings of primary diagnosis (M = 4.2, SD = 2.2; M = 4.1, SD = 2.3, respectively). However, youths with PANAS-C data available were significantly older than youths without PANAS-C data (M = 13.0, SD = 3.0; M = 12.1, SD = 4.0, respectively).
PANAS-C (Laurent et al., 1999). The PANAS-C is a 27-item self-report scale designed to measure positive affectivity and negative affectivity in children and adolescents. The PANAS-C asks children to rate individual adjectives with respect to how often they felt that way in the past few weeks. Items are scored on a 5-point Likert scale ranging from 1 (very slightly or not at all) to 5 (extremely). In a series of factor analyses across two school samples \((n = 349; n = 358)\), Laurent et al. (1999) reported well-defined factors for PA (loadings ranged from .44 to .82) and NA (loadings ranged from .49 to .78), negative affectivity and positive affectivity factors were also found to be correlated at \(r = .20\). Validity tests in a subset of these participants \((n = 100)\) showed that the NA scale correlated positively with anxiety and depression measures, and the PA scale correlated only with depression measures, when controlling for anxiety. The present study is the first to examine the presence of the NA: Fear and NA: Distress group factors. Based on the structural equation modeling (SEM) analyses, below, the NA: Fear and NA: Distress scales correlated at .68.

RCADS (Chorpita, Yin, et al., 2000). The RCADS is a 47-item questionnaire designed to assess for \(DSM-IV\) depression and anxiety disorders in youth. The RCADS is comprised of subscales that index the main features of five prominent \(DSM-IV\) anxiety disorders (separation anxiety disorder, social phobia, generalized anxiety disorder, obsessive-compulsive disorder, panic disorder) and major depressive disorder. The RCADS also yields an Anxiety Total subscale score. The RCADS has been shown to have good internal consistency, high convergent and discriminant validity, and a well-defined factor structure in both community and clinical samples (Chorpita et al., 2000; Chorpita et al., 2005).

Procedure

All participants and their legal guardians in both the clinic-referred and school sample underwent standardized institutional review board–approved notice of privacy and consent procedures prior to any data collection. The school-based youths completed the PANAS-C and RCADS in school as part of the DAYS project. The clinic-referred youths completed the PANAS-C and RCADS as part of their mental health assessment at the Center for CBT. All clinic-referred youths also participated in a semistructured diagnostic interview (i.e., the \(ADIS-C\)) as part of their mental health assessment.

Data Preparation

Missing data levels were low in both the clinic-referred and school-based samples. Specifically, in the clinic-referred and school-based samples, respectively, 83.9% and 87.6% of youths had no missing PANAS-C items. Of the remaining 16.1% and 12.4% of youths with some missing data, 10.8% and 7.7%, respectively, had only one missing PANAS-C item; and 2.7% and 3.9%, respectively, had two missing PANAS-C items. Given the categorical (ordinal) nature of our data, it was inadvisable to impute continuous (interval) data. To handle missing data, we thus (a) excluded cases with more than 10% missing items (i.e., more than 2 missing items) to help ensure the inclusion of forms with adequate amounts of completed data (cf. Ebesutani et al., 2010). This led to the exclusion of a very small number of youths from the clinic-referred \((n = 18; 1.7\%)\) and school-based \((n = 8; 0.8\%)\) sample. Given the low amounts of missing data of the included youth, we also (b) conducted EFA and CFA analyses using \(Mplus\)’ commonly employed procedure for handling missing data (i.e., pairwise deletion). Although pairwise deletion is generally not advisable under scenarios whereby the missing completely at random (MCAR) assumption is not met (Allison, 2003), Muthén, Kaplan, & Hollis (1987) argued that applying pairwise deletion is a reasonable approach under slight deviations from the MCAR condition when missing data levels are low and when using the mean- and variance-adjusted weighted least square (WLSMV) estimation method. As noted above, missing data levels were low in the present study, and as noted below, we used the WLSMV estimation method in the present study (as this estimator has been found to be most appropriate for handling categorical data; B. Muthén, du Toit, & Spisic, 1997; Flora & Curran, 2004).

Data Analytic Approach

We first split our full combined sample (including data from both the school-based and clinic-referred samples) into two random subsamples to conduct exploratory factor analysis (EFA) and confirmatory analysis (CFA) on separate (random) samples.

Exploratory Factor Analysis

Prior to conducting EFA on the 27 PANAS-C items, we split our EFA sample into two subsamples: (a) a younger EFA subsample (ages 6–11 years; \(N = 282\)) and (b) an older EFA subsample (12–17 years; \(N = 512\)) to examine the structure of negative affectivity (and positive affectivity) specifically among younger and older youths, given that some researchers have suggested that the structure of psychopathology (e.g., anxiety, depression) might be less differentiated among younger children (e.g., Cole et al., 1997; Lonigan et al., 1999)). As the PANAS-C data are arguably categorical (ordinal) in nature due to being based on a Likert scale (Brown, 2006), we conducted these EFAs using polychoric correlation matrices (Holgado-Tello, Chacón-Moscósco, Barbero-García & Vila-Abad, 2010) and the robust weighted least squares estimator available in \(Mplus\) (B. Muthén et al., 1997). We also used oblimin rotation (Tabachnick & Fidell, 2007), given the accumulating evidence that negative affectivity and positive affectivity are somewhat (negatively) correlated in youth (e.g., Jacques & Mash, 2004; Chorpita & Daleiden, 2002; Laurent et al., 1999). Lastly, although factor loadings \(\geq .40\) are often considered significant for interpretation (cf. Laurent et al., 1999), such guidelines are most applicable when evaluating results based on continuous (interval) data. Given the categorical nature of our data (due to being based on Likert scale responses), we also reported standard errors which may be used to examine the significance of the loadings.

Confirmatory Factor Analysis

Given that the EFA results suggested that the PANAS-C NA: Fear and NA: Distress factors might underlie the PANAS-C NA items specifically among older youth, we conducted confirmative factor analysis (CFA) on the 15 PANAS-C NA items based on our randomly generated CFA sample (older youth only; \(N = 506\)) using \(Mplus\) version 4.21 (B. Muthén & Muthén, 2007) with
polychoric correlations and the robust weighted least-squares with
mean and variance adjustment (WLSMV) estimator (recommended for
categorical data; B. Muthén, DuToit, & Spisic, 1997; Flora & Curran, 2004).

Figure 1 depicts the three competing models we tested via CFA
to examine the ways in which the 15 PANAS-C NA items may be
structured. Model A (the unidimensional model) represents the
originally posited (unidimensional) structure of the PANAS-C NA
items (see Laurent et al., 1999), whereby all 15 NA items comprise
a single, unidimensional negative affectivity factor, with no lower
order sub-factors. Model B (the second-order/hierarchical model)
postits that NA: Fear and NA: Distress are subsumed under a higher
order dimension (negative affectivity) accounting for any covari-
ation between the lower order NA: Fear and NA: Distress factors.4
Lastly, Model C (the bifactor model) is yet another alternative
structural model for the 15 PANAS-C NA items. The bifactor
approach assumes a general factor underlying all variables (e.g.,
negative affectivity) as well as a specific factor for each variable;
in addition, however, the bifactor model includes uncorrelated
group factors (e.g., Fear, NA: Distress). Although the bifactor
model was introduced several decades ago in the context of cog-
nitive ability research (Holzinger & Swineford, 1937), researchers
have more recently begun to apply the bifactor model to psycho-
logical constructs and have recently found that bifactor models
represent certain psychological constructs well (e.g., Reise,
Morizot, & Hays, 2007). The bifactor model differs from the
second-order (hierarchical) model in that the group variables in a
bifactor model are not subsumed by the general factor (e.g.,
negative affectivity), and group factors in bifactor models are
conceptualized as uncorrelated and distinct, given the presence of
the general factor accounting for all covariance among items in the
model (Gustafsson & Balke, 1993).

We used the comparative fit index (CFI) and the root mean
square error of approximation (RMSEA) as the main statistics to
evaluate model fit for these various models (unidimensional,
second-order, bifactor models). CFI values of .90 or greater
(Bentler, 1990) and, more recently, CFI values of .95 or greater
(Hu & Bentler, 1999) have been deemed cutoffs for good model
fit. RMSEA values of .08 or lower (Browne & Cudeck, 1993) also
suggest good model fit.5 To distinguish general variance from
specific variance, we also examined the factor loadings of the
bifactor model relative to the hierarchical and unidimensional
models. A significant drop in loadings of the NA: Fear and NA:
Disgust indicators in the bifactor model (once accounting for the
general negative affectivity dimension) relative to the loadings
of the NA: Fear and NA: Disgust indicators in the hierarchical model
(which does not posit a general factor) would indicate that the
majority of variance is accounted for by the general negative
affectivity dimension, as opposed to the specific group factors.

Chi-square difference tests. We compared model fit be-
tween competing models (e.g., the bifactor model vs. the unidi-
men$ional model) using the chi-square difference test. Notably,
with limited information estimators (e.g., WLSMV), the nested
chi-square difference tests must be handled in a special way given
that (a) degrees of freedom are estimated under such conditions
and (b) the differences between chi-square values are not distrib-
uted as chi-square (as noted explicitly in the Mplus output). The
difflest command must therefore be employed within Mplus to
obtain the appropriate chi-square difference test statistics in these
situations. This difflest procedure, as well as the method employed
by Mplus to estimate degrees of freedom, are described in the
Mplus Technical Appendices (at http://www.statmodel.com/
download/webnotes/webnote10.pdf; Asparouhov & Muthén, 2006)

Multisample analyses. Given that there were more boys than
girls in our sample, we conducted multisample analyses to ensure
that the best-fitting structure of the 15 PANAS-C NA items (i.e.,
the model with the most favorable fit indices) fit equally well
across boys and girls in our combined clinic-referred and school-
based older youth CFA sample. We also tested for metric invari-
ance across our clinic-referred and school-based samples, given
that clinic-referred and school-based samples are known to differ
on important variables such as symptom severity (Goodman et al.,
1997).

Convergent/Concurrent Validity—Correspondence
With an External Criterion

We conducted additional analyses (SEM regression and ROC
analyses, see below) to examine whether the NA group factors
identified and supported in the present study via our EFA and CFA
procedures evidenced meaningful correspondence to an external
criterion measure of anxiety above that already achieved by the
original PANAS-C NA scale. These were particularly important
tests given that Bagozzi (1993) found support for the lower order
NA factors of the adult PANAS but that they evidenced negligible
discriminative properties, thereby rendering the lower order
PANAS NA factors substantively meaningless.

SEM regression. We conducted regression analyses in an SEM
framework to examine (a) the amount of variance in anxiety scores
explained by the unidimensional negative affectivity model relative to
the bifactor model of negative affectivity and NA: Fear and NA:
Distress group factors and (b) the degree to which the NA: Fear factor
predicts anxiety scores6 relative to the original PANAS-C NA scale
(see Figure 2). If the NA: Fear factor evidences greater correspon-
dence with “anxiety” than the original PANAS-C NA scale (i.e.,
greater gamma path coefficients), this would support the NA: Fear

4 When modeling the second-order hierarchical structure of NA with
NA: Fear and NA: Distress subsuming negative affectivity (Model B in
Figure 1), we constrained the paths from negative affectivity to NA: Fear
and from NA to NA: Distress to be equal so that the model would be
identified.

5 It is notable that these cutoffs for “good model fit” were derived from
simulation studies based on continuous data. Therefore, although these
cutoffs are currently the best guidelines available to follow when conduct-
ing analyses on categorical data, the degree to which these cutoffs are
applicable to categorical-based results (as in the present study) is largely
unknown.

6 We used the RCADS items comprising the Anxiety Total scale as
indicators of anxiety in these analyses. Each RCADS item was combined
into item parcels in the same procedures described in Chorpita (2002), so
that the anxiety factor in the SEM model had three indicators. We utilized
this strategy given that this (a) improves the distribution properties of each
indicator and (b) minimizes the contribution of measurement effects to
model fit.
scale providing substantively meaningful scores that correspond with anxiety above that achieved by the original PANAS-C NA factor.

Analysis of variance (ANOVA) and ROC area under the curve (AUC) analyses. In addition to examining correspondence with RCADS anxiety scores using SEM, we also examined the relative performance of the PANAS-C NA: Fear scale and the original PANAS-C NA scale with respect to corresponding with child-based diagnoses derived from a structured interview (the ADIS–C). Specifically, we examined the correspondence of the PANAS-C NA: Fear scale and the PANAS-C NA scale with the “any anxiety diagnoses” diagnostic group via ANOVA and ROC analyses, using Analyse-It for Microsoft Excel (Version 2.12, Analyse-It Software, 2008). ROC analyses result in AUC values which, in the present study, indicate the degree to which a scale predicts the presence or absence of a clinical diagnostic profile (i.e., “having any anxiety diagnosis”). Larger AUC values are indicative of better prediction power of diagnostic status. AUC values significantly greater than .50 indicate that the scale can perform the binary classification better than chance. AUC values may also be interpreted according to the following: .50 – .70, poor; .70 – .80, fair; .80 – .90, good; and .90 – 1.00, excellent (cf. Ferdinand, 2008). The comparative performance of the NA: Fear and NA scales with respect to corresponding with anxiety diagnoses was evaluated via z-test comparisons of AUC values (DeLong et

Figure 1. A: Unidimensional model; B: Second-order (hierarchical) model; C: Bifactor model. PA = Positive Affectivity; NA = Negative Affectivity.

7 Any anxiety disorder included separation anxiety disorder, generalized anxiety disorder, specific phobia, obsessive-compulsive disorder, posttraumatic stress disorder, panic disorder, social phobia, and anxiety disorder not otherwise specified.
al., 1988). Given the number of ANOVAs and AUC z-tests conducted in the present study, we set our alpha level to .01 based on the Bonferroni correction (i.e., .05/5) to help correct for Type-I error rates.

**Results**

**EFA**

The factor loadings for the PANAS-C two-factor solution (of PA and NA) among the younger and older youth samples appear in Table 3. As predicted and identified by the original authors of the PANAS-C (Laurent et al., 1999), these results revealed a strong and coherent two-factor structure of PA and NA among both younger and older youths. Notably, the calm item of the PANAS-C PA factor and the jittery item of the PANAS-C NA factor loaded the weakest on their respective factors relative to the other items (although they both still met the cutoff of .40).

The factor loadings for the three-factor solution among the younger and older youth samples appear in Table 4. Among the older sample, all PANAS-C NA items loaded on both the NA: Fear and NA: Distress factors. As predicted, afraid, scared, nervous, jittery, and frightened loaded the highest on the NA: Fear factor (appearing in bold), supporting the presence of the NA: Fear factor among older youth. Among the younger youth sample, nearly all PANAS-C NA and PA items loaded uniquely on the single NA and PA factors, respectively, supporting negative affectivity and positive affectivity as unidimensional dimensions among younger youth. Notably, upset, mad and disgusted cross-loaded on the third factor among the younger youth; however, only one of these items (mad) loaded primarily (with a greater loading) on this third factor—the upset and disgusted items loaded more on the NA factor. Given that factors with fewer than three items are generally considered weak, unstable, and negligible (Costello & Osborne, 2005), we considered these loadings trivial and disregarded this third factor among the younger youth sample.

Together, these results suggest that (a) positive affectivity is a unidimensional construct across both younger and older youth and that (b) the structure of negative affectivity varies across child development, such that negative affectivity is unidimensionally structured among younger youth and comprised of NA: Fear and NA: Distress subfactors among older youth.

**Confirmatory Factor Analysis**

The fit statistics of the competing models (Model A: unidimensional model; Model B: hierarchical model; and Model C: bifactor model) appear in Table 5. The bifactor model evidenced the most
favorable fit statistics (i.e., Tucker Lewis index [TLI] = .96, CFI = .90), although the RMSEA fit statistic was not particularly strong (i.e., RMSEA = .10). The chi-square difference (diff) tests also showed that the bifactor model fit the data significantly better than did the unidimensional model of positive and negative affectivity (χ²_diff = 206.83, Δdf = 12, p < .001), as well as significantly better than the hierarchical model which posited positive and negative affectivity as higher order factors and NA: Fear and NA: Distress as lower order NA factors (χ²_diff = 119.05, Δdf = 11, p < .001). These results collectively favored the bifactor model as the best model representing the PANAS-C data among older youth. The factor loadings associated with each of the three models also appear in Table 6. These results showed that once accounting for the general negative affectivity factor in the bifactor model, the loadings on the NA: Fear and NA: Distress groups factors in the bifactor model dropped substantially relative to the loadings on the NA: Fear and NA: Distress factors in the hierarchical model that did not posit a general negative affectivity factor. Although all loadings in the bifactor model were still significant (with the exception of the jittery item of the NA: Fear group factor), these results suggest that the majority of the variance is accounted for by the general negative affectivity factor.

### Multisample Invariance Analysis Across Gender and Sample Type

Given that the bifactor model evidenced the best model fit among our younger youth sample, we tested the invariance of this model across (a) gender (boys versus girls) and (b) sample type (clinic-referred versus school-based youth). The bifactor model evidenced support for equal form across our clinic-referred (n = 204) and school-based (n = 302) older youths, as evidenced by supportive fit statistics (RMSEA = .059; CFI = .91). The bifactor model also evidenced support for equal form across older boys (n = 256) and older girls (n = 243), as evidenced by adequate fit statistics (RMSEA = .062; CFI = .89).

### Correspondence With an External Criterion

**SEM: Regression.** We first examined the one-factor model (negative affectivity predicting anxiety scores) and found that the PANAS-C NA scale scores accounted for 47.4% of the variability in anxiety scores. Upon subsequently adding in the two group factors (NA: Fear and NA: Distress) to examine how much additional variance is accounted for by the bifactor model, we found that the three factors in combination accounted for 62.4% of the

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**Table 3**

Factor Loadings for the PANAS-C Two-Factor Model Among Younger and Older Youths

<table>
<thead>
<tr>
<th>PANAS-C</th>
<th>Younger sample</th>
<th>Older sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joyful</td>
<td>PA 0.82</td>
<td>NA 0.87</td>
</tr>
<tr>
<td>Proud</td>
<td>PA 0.80</td>
<td>NA 0.75</td>
</tr>
<tr>
<td>Cheerful</td>
<td>PA 0.82</td>
<td>NA 0.82</td>
</tr>
<tr>
<td>Happy</td>
<td>PA 0.76</td>
<td>NA 0.84</td>
</tr>
<tr>
<td>Excited</td>
<td>PA 0.83</td>
<td>NA 0.68</td>
</tr>
<tr>
<td>Active</td>
<td>PA 0.61</td>
<td>NA 0.75</td>
</tr>
<tr>
<td>Lively</td>
<td>PA 0.59</td>
<td>NA 0.85</td>
</tr>
<tr>
<td>Delighted</td>
<td>PA 0.58</td>
<td>NA 0.76</td>
</tr>
<tr>
<td>Strong</td>
<td>PA 0.60</td>
<td>NA 0.66</td>
</tr>
<tr>
<td>Energetic</td>
<td>PA 0.55</td>
<td>NA 0.76</td>
</tr>
<tr>
<td>Interested</td>
<td>PA 0.51</td>
<td>NA 0.59</td>
</tr>
<tr>
<td>Calm</td>
<td>PA 0.44</td>
<td>NA 0.44</td>
</tr>
</tbody>
</table>

### Table 4

Factor Loadings for the PANAS-C Three-Factor Model Among Younger and Older Youths

<table>
<thead>
<tr>
<th>PANAS-C</th>
<th>Younger sample</th>
<th>Older sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joyful</td>
<td>PA 0.82</td>
<td>NA_fear 0.87</td>
</tr>
<tr>
<td>Proud</td>
<td>PA 0.80</td>
<td>NA_fear 0.75</td>
</tr>
<tr>
<td>Cheerful</td>
<td>PA 0.82</td>
<td>NA_fear 0.82</td>
</tr>
<tr>
<td>Happy</td>
<td>PA 0.76</td>
<td>NA_fear 0.84</td>
</tr>
<tr>
<td>Excited</td>
<td>PA 0.83</td>
<td>NA_fear 0.69</td>
</tr>
<tr>
<td>Active</td>
<td>PA 0.61</td>
<td>NA_fear 0.75</td>
</tr>
<tr>
<td>Lively</td>
<td>PA 0.59</td>
<td>NA_fear 0.85</td>
</tr>
<tr>
<td>Delighted</td>
<td>PA 0.59</td>
<td>NA_fear 0.76</td>
</tr>
<tr>
<td>Strong</td>
<td>PA 0.60</td>
<td>NA_fear 0.67</td>
</tr>
<tr>
<td>Energetic</td>
<td>PA 0.54</td>
<td>NA_fear 0.76</td>
</tr>
<tr>
<td>Interested</td>
<td>PA 0.51</td>
<td>NA_fear 0.59</td>
</tr>
<tr>
<td>Calm</td>
<td>PA 0.44</td>
<td>NA_fear 0.44</td>
</tr>
</tbody>
</table>

**Note.** For the younger sample, N = 282; For the older sample, N = 512. All factor loadings smaller than .40 were suppressed and thus do not appear in this table. PANAS-C = Positive and Negative Affect Schedule for Children; PA = Positive Affect scale; NA = Negative Affect scale.
variability in anxiety scores—an increase in variability accounted for by the bifactor model. These results further support the utility of the bifactor model that includes the NA: Fear and NA: Distress group factors to help account for additional variability in anxiety outcomes. In terms of comparing gamma path coefficients, we evaluated additional SEM models as appearing in Figure 2. As seen in the figure, the (significant) path coefficient from NA to anxiety was .69 (SE = .27; p < .01), which is substantially greater than the (significant) path coefficients from NA: Fear to anxiety (γ = .40, SE = .28, p < .01) and from NA: Distress to anxiety (γ = .34, SE = .27, p < .01). Although the path coefficient from NA: Fear to anxiety was significant, the original PANAS-C NA scale evidenced greater correspondence with anxiety symptoms compared with the NA: Fear scale. Further, comparison of the residual variances (ξ) of anxiety (i.e., percentage variance of anxiety not explained by the NA: Fear/NA: Distress and NA factors) across both models in Figure 2 (.54 and .53, respectively) revealed that the NA: Fear and NA: Distress subfactors did not account for more variance in anxiety scores than did the original NA factor. Collectively, these results support the bifactor model as accounting for the most amount of variability in anxiety outcomes; however, the NA: Fear group factor does not appear to account for more variability in anxiety scores relative to the general negative affectivity factor.

ANOVA and ROC AUC. The 163 (older) youths in our clinic-referred sample with an anxiety disorder scored significantly higher on the original PANAS-C NA scale (M = 36.59; SD = 13.38) compared to the 246 (older) youths without an anxiety disorder (M = 25.91; SD = 11.09), F(1, 407) = 77.03, p < .01. These youths’ PANAS-C NA scores also evidenced “fair” correspondence with anxiety diagnostic status based on their ROC AUC statistics (AUC = .74; SE = .025), and the AUC value was significantly greater than chance (p < .01). These 163 youths with an anxiety disorder also scored significantly higher on the NA: Fear scale (M = 11.69; SD = 5.19) compared with the 246 youths without an anxiety disorder (M = 7.82; SD = 3.70), F = 77.49, p < .01. These youths’ NA: Fear scores also evidenced “fair” correspondence with anxiety diagnostic status (AUC = .73; SE = .025), and the AUC value was significantly greater than chance (p < .01). Importantly, however, the original PANAS-C NA scale performed just as well as the NA: Fear scale with respect to predicting anxiety diagnostic status, as their AUC values did not significantly differ (z = 0.63, p = .53).

Table 5
Fit Statistics for the Confirmatory Factor Analytic Models Among the Older (Clinic-Referred and School-Based Combined) Youth Sample

<table>
<thead>
<tr>
<th>Model</th>
<th>χ²</th>
<th>df</th>
<th>p</th>
<th>RMSEA</th>
<th>CFI</th>
<th>TLI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model A: Unidimensional model (PA, NA)</td>
<td>582.17</td>
<td>64</td>
<td>&lt;.001</td>
<td>.13</td>
<td>.86</td>
<td>.94</td>
</tr>
<tr>
<td>Model B: Second-order, hierarchical model (PA, NA, lower-order NA_fear–NA_distress)</td>
<td>461.53</td>
<td>64</td>
<td>&lt;.001</td>
<td>.12</td>
<td>.89</td>
<td>.95</td>
</tr>
<tr>
<td>Model C: Bifactor model (PA, NA, orthogonal NA_fear–NA_distress)</td>
<td>450.44</td>
<td>76</td>
<td>&lt;.001</td>
<td>.10</td>
<td>.90</td>
<td>.96</td>
</tr>
</tbody>
</table>

Note. For the youth sample, N = 506. PA = Positive Affect scale; NA = Negative Affect scale. RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker Lewis index.

Table 6
Factor Loadings and Standard Errors (in Parentheses) for the Latent Factor Indicators of the Unidimensional, Hierarchical, and Bifactor Models

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Unidimensional NA</th>
<th>NA: Distress</th>
<th>NA: Fear</th>
<th>General</th>
<th>NA: Distress</th>
<th>NA: Fear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sad</td>
<td>.75 (.02)</td>
<td>.78 (.02)</td>
<td>.56 (.04)</td>
<td>.57 (.04)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ashamed</td>
<td>.67 (.03)</td>
<td>.70 (.02)</td>
<td>.65 (.04)</td>
<td>.26 (.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upset</td>
<td>.77 (.02)</td>
<td>.79 (.02)</td>
<td>.60 (.04)</td>
<td>.52 (.04)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guilty</td>
<td>.60 (.03)</td>
<td>.62 (.02)</td>
<td>.54 (.04)</td>
<td>.29 (.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miserable</td>
<td>.75 (.03)</td>
<td>.77 (.02)</td>
<td>.52 (.05)</td>
<td>.61 (.04)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lonely</td>
<td>.71 (.03)</td>
<td>.73 (.02)</td>
<td>.53 (.04)</td>
<td>.53 (.04)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mad</td>
<td>.75 (.02)</td>
<td>.77 (.02)</td>
<td>.60 (.04)</td>
<td>.49 (.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disgusted</td>
<td>.65 (.03)</td>
<td>.67 (.02)</td>
<td>.59 (.04)</td>
<td>.32 (.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue</td>
<td>.72 (.03)</td>
<td>.74 (.02)</td>
<td>.62 (.04)</td>
<td>.41 (.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gloomy</td>
<td>.70 (.03)</td>
<td>.73 (.02)</td>
<td>.63 (.06)</td>
<td>.36 (.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frightened</td>
<td>.76 (.02)</td>
<td>.83 (.02)</td>
<td>.73 (.05)</td>
<td>- .41 (.08)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nervous</td>
<td>.63 (.03)</td>
<td>.72 (.02)</td>
<td>.66 (.03)</td>
<td>- .27 (.06)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scared</td>
<td>.83 (.02)</td>
<td>.90 (.02)</td>
<td>.82 (.04)</td>
<td>- .38 (.07)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jittery</td>
<td>.36 (.04)</td>
<td>.41 (.03)</td>
<td>.45 (.04)</td>
<td>.04 (.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afraid</td>
<td>.80 (.02)</td>
<td>.87 (.02)</td>
<td>.77 (.04)</td>
<td>- .43 (.08)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. NA = Negative Affect scale.
Discussion

The present study was the first to identify the NA: Fear and NA: Distress group factors comprising the general NA factor of the PANAS-C among older youth. Importantly, these group factors were only present among older youth and were not found to be present among younger youths based on our exploratory factor analyses. These results are consistent with previous findings that internalizing constructs such as anxiety and depression become more differentiated among older youth (Lonigan et al., 1999) and with Weems’s (2008) model of the development of anxiety in childhood, in which he argued that the primary features of anxiety (i.e., negative affectivity) are relatively stable across development, whereas disorder-specific symptomatology change over time. In other words, there is heterotypic continuity with the same underlying pathology being expressed differently at different stages of development (Holmbeck, Devine, & Bruno, 2010).

Although we found a distinct NA: Fear group factor among the 15 PANAS-C NA items that was supported via factor analysis and significant correspondence with external criteria (i.e., self-reported anxiety scores and clinician-derived anxiety diagnostic status), the original PANAS-C NA scale evidenced just as much (and in some cases greater) correspondence with these criteria. These results are consistent with Baggozzi’s (1993) findings that the lower order NA factors found underlying the PANAS adult version were not substantively meaningful beyond the full PANAS-C NA scale. Just as Baggozzi recommended interpreting only the full NA scale (as opposed to the lower order NA subfactors of the adult PANAS), we offer the same recommendation based on the present findings for the child PANAS-C. Although the NA: Fear group factor evidenced significant correspondence with criterion measures of anxiety, so too did the original PANAS-C NA scale. This recommendation to interpret only the original full PANAS-C NA scale is also in line with Emons, Sijtsma, and Meijer (2007) recommendation to use tests with more items to increase classification consistency. Although Emons and colleagues (2007) recommended that tests ideally include at least 20 items, they found that items with 6–12 items evidenced unacceptable levels of random measurement error and that results improved when a greater number of items were included. In light of Emons and colleagues’ (2007) findings, the fact that the original 15-item PANAS-C NA scale includes three times as many items as the five-item NA: Fear group factor further supports interpretation of the original full-item PANAS-C NA scale over the NA subfactors. This is an important recommendation to guide the use of the PANAS-C given that other youth NA measures have been found to be comprised of subscales that have been recommended for interpretation, such as when tracking changes to anxiety with the NASSQ (Ronan et al., 1994).

Although the present results do not support specific use of the NA: Fear and NA: Distress group factors (due to a lack of incremental validity afforded above and beyond that of the original PANAS-C NA scale), the present study provided another demonstration of the utility of the bifactor model for characterizing the structure of psychopathology. As noted above, the bifactor model was introduced several decades ago primarily for researching cognitive ability that supported the existence of a general intelligence factor that explains variation among all items of a test, with particular item sets uniquely tapping subdomains (e.g., verbal and quantitative ability). More recently, Reise, Moore, and Haviland (2010) and others have been advocating for researchers to turn their attention back to bifactor models for explaining the relations among psychological constructs. Although bifactor models do not always best account for the structure of factors under examination, the bifactor model has been shown to be particularly useful in some contexts for resolving issues of multidimensionality (e.g., Reise et al., 2007). This certainly was the case in the present study, as the bifactor model was the only model that led to adequate model fit of our data, positing a general negative affectivity factor, and two distinct fear and distress group factors.

One interesting implication of the present findings in relation to the fit of the bifactor model is what this suggests regarding the structure of negative affectivity (specifically among older youth, and likely among adults as well). Specifically, although the bifactor model suggests that there is a general, overarching negative affectivity factor accounting for much of the variance in item responses, the supported bifactor model suggests that negative affectivity may largely be comprised of fear and distress components. Historically, the specific components of negative affectivity have not been well understood beyond that of a general cluster of negative emotions. Wolfe and colleagues (1987) stated, for example, that “the construct [of negative affectivity] must more clearly define those emotional states that childhood negative affectivity encompasses and those it does not” (p. 249).

The present study speaks to this issue and provides suggestion that NA may be made up of a fear and distress component (among other components not examined in the present study) specifically characterizing negative affectivity. It is worth mentioning, however, that the distress factor was examined to a lesser extent in the present study relative to the fear factor. More research is needed to examine further the components of negative affectivity, including the purported distress factor and, for example, to determine whether distress is in fact the best label and representation of that group factor, instead of another related negative emotional state.

There were also limitations of the present study and areas for future research worth noting. First, although the bifactor model demonstrated a significantly better fit relative to the hierarchical and unidimensional models, the goodness of fit for these models (including the bifactor model) were not supported by all fit indices (e.g., $RMSEA_{one-factor} = .10; RMSEA_{unidimensional} = .13$). This is surprising, given that previous studies have found supportive RMSEA fit indices (i.e., $RMSEA < .08$) for the unidimensional model of negative and positive affectivity (e.g., Lonigan, Hooe, David, & Kistner, 1999; Phillips, Richey, & Lonigan, 2002). One differences with our study that may account for the discrepant findings pertaining to the fit of these models could be that we treated our Likert-scale data as categorical, whereas the other studies treated their Likert-scale data as continuous. It is worth noting that Likert-scale data are technically categorical (ordinal) in nature and should be treated as such (e.g., base matrices on polychoric correlations, use appropriate estimators) given that treating Likert-scale data as continuous may lead to biased parameter estimates (Brown, 2006). Related to this issue, given that we treated our data as categorical and obtained, for example, an RMSEA fit statistic of .10 for the bifactor model, it is not entirely clear whether this suggests adequate or poor model fit, given that CFA cutoffs for good model fit have been derived thus far from studies focusing on continuous data.

Although the present 27-item version of the PANAS-C allowed for the identification of the NA: Fear and NA: Distress group factors, it is notable that Watson and Clark (1994) identified four lower order factors underlying the NA scale of the 60-item PANAS-X adult...
version (fear, sadness, guilt, and hostility). Having only 15 NA items on the PANAS-C (Laurent et al., 1999) precluded the ability to examine additional group factors that might also potentially comprise negative affectivity in youth (e.g., guilt, hostility). In the future, researchers should thus examine the structure of negative affectivity (among both younger and older youths) using an extended version of the PANAS-C which includes more items to adequately tap other hypothesized components and dimensions of negative affectivity, such as sadness, guilt, and hostility. Including more items to tap negative affectivity would also be in line with Emons and colleagues’ (2007) recommendation to increase the number of test items to reduce overall measurement error and increase classification consistency. As evidenced in the present study, the full 15-item PANAS-C NA scale corresponded with clinical diagnoses at the “fair” level; including additional items may increase its classification accuracy.

The jittery item should also be further examined to better understand its relation to the PANAS-C NA factor and the NA: Fear subscale. Specifically, jittery evidenced relatively weak factor loadings in the two- and three-factor EFA models. Further research is needed to clarify the appropriateness and utility of including this item as a negative affectivity marker. Along these lines, our results suggest that positive affectivity also needs to be more clearly defined and operationalized. Specifically, the calm item did not load as strongly on the PANAS-C PA factor as did the other positive affectivity items. This is consistent, however, with the observation that calm previously appeared on the hypothesized lower order Serenity subscale of the adult PANAS PA scale (Watson & Clark, 1994). Importantly, this Serenity subscale was not categorized as part of the basic positive affectivity states by Watson and Clark (1994), but as part of other affective states. Further, given that Watson, Clark, and Tellegen (1988) asserted that positive affectivity “reflects the extent to which a person feels enthusiastic, active, and alert” (p. 1063), calm lacks face validity as relating to feeling enthusiastic, active, and alert and should thus be examined further to determine how well it serves as an indicator of positive affectivity and whether it should remain a PA item on the PANAS-C. Another area worth of future exploration is the way in which the structure of the negative affectivity items may vary across ethnic groups. This may be particularly relevant given that differences have been found across certain ethnicities with respect to the ways in which the PANAS-C scales have evidenced correspondence with the tripartite model (Austin & Chorpita, 2004).

Despite the noted limitation and areas for future research, the present study identified unique group factors (NA: Fear and NA: Distress factors) that—although do not appear to provide incremental information above and beyond that afforded by the full PANAS-C NA scale—provide insight into the potential constituent parts of negative affectivity over the course of child development. If in fact future research corroborates the present findings (that negative affectivity is an overarching general dimension with specific subdomains related to fear and distress, consistent with the bifactor model), future research may focus on these particular areas to enhance treatment interventions. Barlow, Allen, and Choute (2004), for example, have recently developed a unified treatment for emotional disorders which targets three components believed to be universally related to emotional disorders: (a) erroneous cognitive reappraisals, (b) excessive emotional avoidance, and (c) impairing action tendencies, such as behavioral inactivity. Based on the present results related to the bifactor representation of negative affectivity, it is possible that fear may also be universally related to emotional disorders. If so, fear may also be a construct worth targeting in treatments for emotional disorders to reduce overall impairment and distress.

References


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