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# Evaluation of the PAI–A Anxiety and Depression Scales: Evidence of Construct Validity

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### ABSTRACT

Against the background of a dearth of studies examining the properties of the scale scores of the Personality Assessment Inventory–Adolescent (PAI–A; Morey, 2007), this study was conducted to evaluate evidence of construct validity for the Anxiety (ANX) and Depression (DEP) scales of the PAI–A. Convergent and discriminant validity of the ANX and DEP scale scores were investigated using a sample of adolescents admitted to the adolescent program of a private tertiary care inpatient treatment facility. Multiple methods assessing anxious and depressive symptomology and diagnoses were included. Construct validity of the ANX and DEP scales was mostly supported. Advantages of using the PAI–A for the assessment of anxiety and depression were discussed.

Among adolescents, anxiety disorders are the most common psychological problem, with an estimated 12-month prevalence rate of 24.9%, followed closely by depressive disorders at 10.0% (Kessler et al., 2012). Anxiety and depression both have relatively early ages of onset (Kessler et al., 2005; Merikangas et al., 2010) and are associated with significant functional impairment (Essau, Conradt, & Petermann, 2000; Kendall et al., 2010) and reduced quality of life (Bastiaansen, Koot, Ferdinand, & Verhulst, 2004) among adolescents. Furthermore, anxiety and depression in adolescence are rather persistent (Rapee, Schniering, & Hudson, 2009) with a rapid increase of symptomatology during adolescence (Pine, Cohen, Gurley, Brook, & Ma, 1998) and strong associations with adult anxiety and depression (Olino, Klein, Lewinsohn, Rohde, & Seeley, 2010) highlighting the importance of targeting affective problems in youth. In addition to the independent impact of anxiety or depression, these conditions are frequently comorbid with one another (Axelson & Birmaher, 2001; Cummings, Caporino, & Kendall, 2014; Essau, 2008; Garber & Weersing, 2010) as well as with other forms of psychopathology (e.g., substance use disorders; Lopez, Turner, & Saavedra, 2005) and medical conditions (Kline-Simon, Weisner, & Sterling, 2016).

The accurate assessment of adolescent anxiety and depression symptomology is both important and challenging. The assessment of anxiety and depressive symptoms in adolescents has the potential to be impactful to individuals across stages of life. Although many instruments have been used in the assessment of adolescent anxiety and depression (Brooks & Kutcher, 2001, 2003), the Personality Assessment Inventory–Adolescent version (PAI–A; Morey, 2007) offers several advantages. For example, many adolescent anxiety and depression measures are quite limited in their scope, often focusing only on anxiety (e.g., the Multidimensional Anxiety Scale for Children [MASC]; March, Parker, Sullivan, Stallings, & Conners, 1997) or on depression (e.g., the Beck Depression Inventory–II [BDI–II]; Beck, Steer, & Brown, 1996), without the ability to measure the wide range of psychopathology assessed in the PAI–A. Additionally, the PAI–A, as a direct extension of the adult PAI, benefits from the careful theoretical and empirical development of the adult instrument and the extensive research conducted since its publication (Krishnamurthy, 2010). Finally, the PAI–A, like the adult version, includes scales to assess validity of responses (Meyer, Hong, & Morey, 2015).

Although all of the scales comprising the PAI–A deserve attention, this research focuses exclusively on the Anxiety (ANX) and Depression (DEP) scales, given the high prevalence of these disorders among adolescents and the knowledge that these disorders specifically predict a variety of later psychopathology. Although several research studies have investigated the scale properties of the adult PAI, investigations of the PAI–A are relatively lacking. Most studies of either the PAI or PAI–A have focused on specialized populations (e.g., adolescents with borderline personality disorder; Morey & Meyer, 2014), or on specific scales (e.g., only the Antisocial Features scale; Salekin, 2008). However, the PAI–A does retain the same scale structure, items, and response options of the adult instrument, allowing the adult PAI research to partially inform knowledge of the properties of the PAI–A scales. That being said, there is still a need to empirically evaluate the functioning of the PAI–A to support its use among adolescents.

Therefore, the aim of this study was to examine evidence of construct validity of the ANX and DEP scales using data collected in an adolescent inpatient sample. Instruments used to investigate evidence of construct validity included structured clinical interviews and questionnaires completed by both parents and adolescents, which comprise instruments not previously explored in relation to the PAI–A ANX and DEP scales. First we investigated the convergent validity of ANX and DEP scales with other measures of anxiety and depression, respectively. Next we evaluated discriminant validity by comparing

these convergent relations (PAI–A ANX scale with measures of anxiety and PAI–A DEP scale with measures of depression) with discriminant relations (PAI–A ANX scale with measures of depression and PAI–A DEP scale with measures of anxiety). Although we expected to find some evidence of common method variance (stronger relations between PAI–A ANX and PAI–A DEP scales with other self-report measures, regardless of construct measured), we also expected to find partial evidence of discriminant validity supporting the unique (albeit related) affective domains of anxiety and depression.

## Method

### Participants

The sample consisted of adolescents consecutively admitted to the adolescent program of a private tertiary care inpatient treatment facility ($N = 548$) as part of a larger study. This facility typically treats adolescents who are treatment refractory with an average length of stay ranging from 4 to 6 weeks. Patients who gave consent were included if they were between 12 and 17 years old and spoke English as their first language. Patients were excluded if they displayed active psychosis, had an IQ of less than 70, or were diagnosed with an autism spectrum disorder. Out of $N = 548$, 61 were excluded based on the aforementioned criteria and 44 declined participation. Further, 72 patients had missing data on one or more of the measures collected and were excluded from current analyses; therefore, the final sample consisted of $N = 371$ individuals. Less than 10% of data was missing for any one measure; frequency of missing data for each measure is listed in Table 1 along with demographic data. Interviewers were blind to any known clinical diagnoses during the assessment phase.

**Table 1.** Descriptive statistics for study sample ($N = 371$).

| Variable | Youth | | Parent | |
|---|---|---|---|---|
| | M/n | SD/% | M/n | SD/% |
| Age | 15.35 | 1.42 | | |
| Female | 236 | 63.6% | | |
| PAI–A ANX | 62.34 | 15.48 | | |
| PAI–A DEP | 67.29 | 15.44 | | |
| MASC | 56.30 | 14.33 | | |
| BDI–II | 25.96 | 14.18 | | |
| YSR/CBCL–Affective | 70.25 | 11.52 | 75.88 | 8.32 |
| YSR/CBCL–Anxiety | 62.71 | 9.45 | 68.26 | 33.84 |
| DISC–Any Depressive | 204 | 55.0% | 218 | 58.8% |
| DISC–Any Anxiety | 211 | 56.9% | 195 | 52.7% |
| DISC–Agoraphobia | 80 | 21.6% | 27 | 7.3% |
| DISC–Generalized Anxiety | 139 | 37.5% | 126 | 34.1% |
| DISC–Obsessive Compulsive | 108 | 29.1% | 68 | 18.3% |
| DISC–Panic | 139 | 37.6% | 104 | 28.0% |
| DISC–Post-Traumatic Stress | 72 | 19.5% | 39 | 10.5% |
| DISC–Separation Anxiety | 102 | 27.6% | 105 | 28.3% |
| DISC–Social Anxiety | 194 | 52.3% | 120 | 32.3% |
| DISC–Specific Phobia | 150 | 40.5% | 83 | 22.4% |
| DISC–Dysthymia | 9 | 2.4% | 29 | 7.8% |
| DISC–Major Depressive | 256 | 69.0% | 259 | 69.8% |

*Note.* PAI–A = Personality Assessment Inventory–Adolescent version (5.4% missing); MASC = Multidimensional Anxiety Scale for Children (1.6% missing); BDI–II = Beck Depression Inventory–II (1.6% missing); YSR = Youth Self Report (1.8% missing); CBCL = Child Behavior Checklist (4.3% missing); DISC = Diagnostic Interview Schedule for Children (7.2% missing from youth report; 4.5% missing from parent report).

## Measures

### Personality Assessment Inventory–Adolescent

The PAI–A (Morey, 2007) was administered in full. PAI–A respondents answer items on a 4-point Likert rating scale, recorded as 0 (*not true*), 1 (*slightly true*), 2 (*mainly true*), and 3 (*very true*). Scores on the ANX and DEP subscales have shown good internal consistency in past work (both $\alpha = .86$; Morey, 2007). Internal consistency for the current sample was $\alpha = .81$ for scores on the DEP scale and $\alpha = .87$ for scores on the ANX scale.

### Diagnostic Interview Schedule for Children

The Diagnostic Interview Schedule for Children (DISC; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000) is a structured interview with both a youth form (Y–DISC; for youths age 9–17) and a parent form (P–DISC; for youths age 6–17). The interview asks about symptoms of various disorders in the past 12 months and in the past 4 weeks, and the majority of questions are answered with yes–no responses, which yields either a positive, intermediate, or negative diagnosis in addition to a symptom count. For the purpose of this study, past 12-month diagnoses that were rated as either positive or intermediate were considered present. One-year interrater diagnostic agreement for the parent or youth form was found to be acceptable (ranging from $\kappa = .65–.92$) for anxiety and depression (Shaffer et al., 2000).

### Child Behavior Checklist/6–18

The Child Behavior Checklist (CBCL/6–18; Achenbach, 1991), part of the Achenbach System of Empirically Based Assessment (ASEBA), is a 120-item parent-report inventory for emotional and behavioral difficulties. Responses are rated on a 3-point Likert scale ranging from 0 (*never true*) to 2 (*often true*). The measure yields a number of scales, some empirically derived (the Syndrome Scales) and some theoretically based (the DSM-Oriented Scales). The Affective Problems subscale (e.g., "I am unhappy, sad, or depressed" and "I feel overtired without good reason") corresponds to *Diagnostic and Statistical Manual of Mental Disorders* (4th ed. [*DSM–IV*]; American Psychiatric Association, 1994) symptoms of major depressive disorder (MDD) and dysthymia and has been deemed an adequate screening tool for these disorders (Ferdinand, 2008). Therefore, the Affective Problems subscale was used as an indicator of depression severity in this study. The Anxiety Problems subscale (e.g., "I am afraid of going to school" and "I am afraid of certain animals, situations, or places other than school") corresponds to *DSM–IV* symptoms of generalized anxiety disorder, separation anxiety disorder, and specific phobia, and its scores have been shown to predict the presence of anxiety disorders in adolescents (Ferdinand, 2008). The Anxiety Problems subscale was used as an indicator of anxiety severity for this study.

### Youth Self-Report

The Youth Self-Report (YSR; Achenbach, 1991), also part of the ASEBA, is a self-report measure for use with adolescents from ages 12 to 18. The YSR is a broadband measure of psychopathology (112 items arranged in eight empirically based and six *DSM–IV*-based subscales, comparable to the CBCL/6–18). For

the purpose of this study, empirically derived scales of Affective Problems and Anxiety Problems were included.

### Multidimensional Anxiety Scale for Children

The MASC (March et al., 1997) is a 39-item self-report anxiety measure for respondents ages 8 to 19. Responses are rated on a 4-point Likert scale from 0 (*never true*) to 3 (*often true*). The MASC is made up of four empirically derived factor scales: Physical Symptoms (e.g., "My heart races or skips beats"), Harm Avoidance (e.g., "I stay away from things that upset me"), Social Anxiety (e.g., "I worry about what other people think of me"), and Separation/Panic (e.g., "The idea of going away to camp scares me"). The MASC includes an Inconsistency Index to account for careless responses. Subscales on the MASC can be combined to yield a total anxiety score, which has been reported to display properties of good concurrent and predictive validity (March et al., 1997). Total MASC scores were used in this study, which displayed excellent internal consistency ($\alpha = .93$).

### Beck Depression Inventory–II

The BDI–II (Beck et al., 1996) is a 21-item self-report inventory of depressive symptoms, based on the last 2 weeks. Each item includes four options to indicate severity. Total scores are calculated by summing the highest score for each item (range = 0–63) and severity levels are as follows: 0 to 13 = normal to minimal depression; 14 to 19 = mild; 20 to 28 = moderate; and 29 to 63 = severe. Scores on the BDI–II have demonstrated excellent reliability and validity when used in samples of adolescent inpatients (Osman, Kopper, Barrios, Gutierrez, & Bagge, 2004). Internal consistency was excellent for this sample ($\alpha = .93$).

### Data analytic strategy

The focus of this research was to evaluate convergent and discriminant evidence of construct validity of the PAI–A ANX and DEP scores. For convergent evidence of construct validity, we evaluated the relations between the PAI–A ANX and DEP scores with scores from the other measures of anxiety (MASC, CBCL/YSR–Anxiety Problems, DISC–P/Y–Anxiety Disorder) and depression (BDI–II, CBCL/YSR–Affective Problems, DISC–P/Y–Depressive Disorder), respectively. Specifically, we examined parallel self- and parent-report questionnaires and self- and parent-report interviews. Discriminant evidence of construct validity was evaluated by examining relations between the PAI–A DEP and ANX scales and measures of anxiety and depression, respectively. Given strong evidence for shared method variance across self-report questionnaires as well as a well-documented overlap in the anxiety and depressive syndromes over and above monomethod assessment (Clark & Watson, 1991), some level of dependence was expected among these variables. As such, we examined the pattern of correlations to determine whether scores obtained from measures of the same construct (e.g., PAI–A DEP with other depression measures; referred to as *convergent correlations*) correlated more highly than scores from measures of different constructs (e.g., PAI–DEP with anxiety measures; referred to as *discriminant correlations*). We evaluated whether each convergent correlation was significantly larger in magnitude than the

discriminant correlation using Fisher's *r*-to-*z* transformation coupled with Lee and Preacher's (2013) implementation of Steiger's (1980) equations to evaluate the statistical significance of the difference between two dependent correlations. To control for Type I error from multiple comparisons, Bonferroni corrections were applied to the critical alpha level based on the number of comparisons made (.05/number of comparisons).

To examine the construct validity of the PAI–A ANX and DEP scales further, point-biserial correlations with specific DISC (both parent and youth) diagnoses for specific anxiety and depressive disorders were examined with positive correlations indicating that higher scores on either of the PAI–A scales were associated with a greater likelihood of meeting positive or intermediate diagnosis on the DISC. Because the PAI–A scales were not developed with the intent to identify the presence of any specific anxiety or depressive disorder, but rather to be a broad index of either the anxiety or depressive syndrome, it was expected that relations between PAI–A scales and specific diagnoses would be small to moderate. In a similar manner as described previously, we used Fisher's *r*-to-*z* transformations to evaluate whether correlations with each DISC diagnosis were statistically different between PAI–A ANX and DEP scales. Additionally, due to particularly high comorbidity between MDD and generalized anxiety disorder (GAD), findings of discriminant validity might represent this diagnostic overlap (Mennin, Heimberg, Fresco, & Ritter, 2008) rather than actual discriminant validity. Therefore, we evaluated the correlation between the PAI–A scales and the respective depressive or anxiety disorder, partialing out shared variance with the other disorder (e.g., correlation between PAI–A DEP with MDD while controlling for shared variance with GAD, and the correlation between PAI–A DEP with GAD controlling for shared variance with MDD).

## Results

### PAI–A DEP scale

#### Convergent validity

Table 2 presents correlational results between the PAI–A DEP scale and self-report questionnaires (BDI–II, YSR–Affective Problems), self-report interviews (DISC–Y Depressive Disorder), parent-report questionnaire (CBCL-Affective Problems), and parent-report interviews (DISC–P Depressive Disorder). Convergent validity for the PAI–A DEP scale score was evidenced by statistically significant correlations with scores from these measures of depression that ranged from small correlations ($r = .19$ with DISC–P Depressive Disorder) to large correlations ($r = .82$ and .79 with self-reports of depression on BDI–II and YSR, respectively). The mean correlation for all convergent relations was $r = .53$, reflecting strong evidence for convergent validity.

#### Discriminant validity

Table 2 presents correlational results between the PAI–A DEP scale scores and scores from measures of anxiety, specifically with self-report questionnaires (MASC, YSR–Anxiety Problems), self-report interviews (DISC–Y Anxiety Disorder), parent-report questionnaire (CBCL–Anxiety Problems), and parent-report interviews (DISC–P Anxiety Disorder). We

**Table 2.** Convergent and discriminant correlations with PAI–A DEP.

| PAI–A DEP with | r | Comparison | z score |
|---|---|---|---|
| Convergent correlations | | | |
| 1. BDI–II | .82* | | |
| 2. YSR–Affective | .79* | | |
| 3. DISC–Y Depressive | .55* | | |
| 4. CBCL–Affective | .32* | | |
| 5. DISC–P Depressive | .19* | | |
| Discriminant correlations | | | |
| 6. MASC | .52* | 1 > 6 | 9.51^ |
| | | 2 > 6 | 8.20^ |
| | | 3 > 6 | 0.55 |
| | | 4 < 6 | −3.55^ |
| | | 5 < 6 | −5.37^ |
| 7. YSR–Anxiety | .53* | 1 > 7 | 8.98^ |
| | | 2 > 7 | 8.20^ |
| | | 3 > 7 | 0.34 |
| | | 4 < 7 | −3.80^ |
| | | 5 < 7 | −5.55^ |
| 8. DISC–Y Anxiety | .38* | 1 > 8 | 11.80^ |
| | | 2 > 8 | 10.66^ |
| | | 3 > 8 | 3.35^ |
| | | 4 < 8 | −0.93 |
| | | 5 < 8 | −2.80 |
| 9. CBCL–Anxiety | .04 | 1 > 9 | 15.23^ |
| | | 2 > 9 | 14.07^ |
| | | 3 > 9 | 7.91^ |
| | | 4 > 9 | 4.05^ |
| | | 5 > 9 | 2.02 |
| 10. DISC–P Anxiety | .02 | 1 > 10 | 15.77^ |
| | | 2 > 10 | 14.67^ |
| | | 3 > 10 | 8.03^ |
| | | 4 > 10 | 4.79^ |
| | | 5 > 10 | 2.63 |

*Note.* Numbers 1 through 10 refer to correlations of Personality Assessment Inventory–Adolescent–Depression scale (PAI–A DEP) with each measure listed. For the comparisons column, correlations are indicated by their corresponding number.
*$p < .01$. Critical alpha for z scores corrected with Bonferroni adjustment for multiple comparisons: ^$p < .002$.

examined each of the convergent correlations between PAI–A DEP and each of the five measures of depression (BDI–II, YSR/CBCL–Affective Problems, DISC–P/Y–Depressive Disorder) compared to each of the discriminant correlations between the PAI–A DEP and each of the five measures of anxiety (MASC, YSR/CBCL–Anxiety Problems, DISC–P/Y–Anxiety Disorder) for a total of 25 comparisons. Bonferroni corrections were used to adjust the critical alpha level with a new cutoff of $\alpha = .002$ (.05/25) for z tests of dependent correlations. Of the 25 comparisons, 19 convergent correlations were higher than the discriminant correlations. However, of these 19 comparisons, 15

were found to be statistically significantly different from one another (see Table 2). Specifically, discriminant validity was demonstrated with the self-report questionnaires of depression (BDI–II, YSR–Affective Problems) and the self-report interview of depression (DISC–Y); only two convergent correlations with each of parent-report questionnaire and interview measures were higher than discriminant correlations. For the other six comparisons, discriminant correlations were higher than convergent correlations (inconsistent with evidence of discriminant validity). Specifically, convergent correlations between PAI–A DEP and CBCL–Affective Problems as well as between PAI–A DEP and DISC–P Depressive Disorder were smaller in magnitude than discriminant correlations between PAI–A DEP and self-report measures of anxiety (MASC, YSR–Anxiety Problems, and DISC–Y Anxiety Disorder), which is suggestive of method variance such that youth reports (questionnaire and interview) correlated highly with one another, even when measuring different constructs. However, only four of these were significant. In total, we found 15 comparisons in support of discriminant validity and four comparisons inconsistent with discriminant validity for the PAI–A DEP.

### Validity with specific diagnoses

Results of point-biserial correlations with DISC diagnoses for specific anxiety and depressive disorders are displayed in Table 3. There was a strong and significant correlation between PAI–A DEP and a diagnosis of MDD on the DISC–Y ($r = .56$) and a small significant correlation with a diagnosis of MDD on the DISC–P ($r = .24$) suggesting evidence for criterion validity. PAI–A DEP did not correlate with a diagnosis of dysthymia from either parent or youth interviews; however, this is likely due to the low prevalence of dysthymia in the current sample. PAI–A DEP scores correlated moderately and significantly with diagnoses of GAD and social phobia (youth interviews) with small, but significant relations with diagnoses of agoraphobia (youth interview), obsessive–compulsive disorder (OCD; youth and parent interview), panic disorder (youth interview), post-traumatic stress disorder (youth interview), separation anxiety (youth interview), social phobia (parent interview), and specific phobia (youth interview). We examined differences in correlations between the two PAI–A scales and the two depressive disorders (dysthymia and MDD). After applying a Bonferroni adjustment to correct the critical alpha level (.05/10 = .005; 10 comparisons within each type of interview), we found that for

**Table 3.** Correlations between PAI–A scores and DISC diagnoses on specific diagnoses.

| | Agoraphobia | Generalized anxiety | Obsessive–compulsive | Panic | Posttraumatic stress | Separation anxiety | Social phobia | Specific phobia | Dysthymia | Major depressive |
|---|---|---|---|---|---|---|---|---|---|---|
| Youth interview | | | | | | | | | | |
| PAI DEP | .21* | .41* | .29* | .27* | .08 | .20* | .43* | .22* | .05 | .56* |
| PAI ANX | .36* | .51* | .34* | .41* | .16* | .32* | .47* | .27* | −.02 | .42* |
| z-score comparison | −3.84^ | −2.84^ | −1.15 | −3.82^ | −1.98 | −3.13^ | −1.15 | −1.32 | 1.57 | 3.89^ |
| Parent interview | | | | | | | | | | |
| PAI DEP | .11* | .06 | −.11* | .08 | −.01 | .01 | .14* | .02 | −.02 | .24* |
| PAI ANX | .19* | .18* | −.02 | .21* | −.04 | .13* | .22* | .07 | −.06 | .13* |
| z-score comparison | −1.83 | −3.03^ | −2.36 | −7.42^ | .64 | −2.96^ | −1.91 | −1.09 | 1.12 | 2.85^ |

*Note.* z-score comparisons were conducted to compare correlations between Personality Assessment Inventory–Adolescent–Depression scale (PAI–A DEP) and Personality Assessment Inventory–Adolescent–Anxiety scale (PAI–A ANX) with Diagnostic Interview Schedule for Children (DISC) diagnosis.
*$p < .01$. Critical alpha for z scores corrected with Bonferroni adjustment for multiple comparisons: ^$p < .005$.

both parent and youth interview reports of MDD only, correlations with the PAI–A DEP were statistically larger in magnitude than correlations with the PAI–A ANX. Correlations with dysthymia were not statistically different from one another. Therefore diagnoses of MDD correlated significantly higher with the relevant PAI–A scale. Finally, we examined the association between PAI–A DEP and MDD while controlling for shared variance with GAD as well as the association between PAI–A DEP and GAD while partialing out shared variance with MDD to control for the strong comorbidity between these disorders. The partial correlation between PAI–A DEP and MDD controlling for GAD (i.e., convergent correlation) was $r = .48$ for youth report and $r = .23$ for parent report ($ps < .001$), which were higher than the partial correlation between PAI–A DEP and GAD controlling for MDD (i.e., discriminant correlation) which was $r = .27$ ($p < .001$) for youth report and $r = .00$ ($p = .98$) for parent report. These results demonstrated stronger evidence for discriminant validity after accounting for the comorbidity between GAD and MDD.

## PAI–A ANX scale

### Convergent validity

The first column of Table 4 displays the correlations of the PAI–A ANX scores with scores obtained from the other

**Table 4.** Convergent and discriminant correlations with PAI–A ANX.

| PAI–A ANX with | $r$ | Comparison | $z$ score |
|---|---|---|---|
| Convergent correlations | | | |
| 1. MASC | .73[*] | | |
| 2. YSR–Anxiety | .73[*] | | |
| 3. DISC–Y Anxiety | .49[*] | | |
| 4. CBCL–Anxiety | .09[*] | | |
| 5. DISC–P Anxiety | .19[*] | | |
| Discriminant correlations | | | |
| 6. BDI–II | .65[*] | 1 > 6 | 2.43 |
| | | 2 > 6 | 2.33 |
| | | 3 < 6 | −3.97[^] |
| | | 4 < 6 | −9.61[^] |
| | | 5 < 6 | −8.06[^] |
| 7. YSR–Affective | .62[*] | 1 > 7 | 3.25[^] |
| | | 2 > 7 | 3.31[^] |
| | | 3 < 7 | −3.09[^] |
| | | 4 < 7 | −8.71[^] |
| | | 5 < 7 | −7.25[^] |
| 8. DISC–Y Depressive | .41[*] | 1 > 8 | 7.46[^] |
| | | 2 > 8 | 7.44[^] |
| | | 3 > 8 | 1.53 |
| | | 4 < 8 | −4.83[^] |
| | | 5 < 8 | −3.22[^] |
| 9. CBCL–Affective | .24[*] | 1 > 9 | 10.07[^] |
| | | 2 > 9 | 10.16[^] |
| | | 3 > 9 | 4.17[^] |
| | | 4 < 9 | −2.23 |
| | | 5 < 9 | −0.80 |
| 10. DISC–P Depressive | .11[*] | 1 > 10 | 11.72[^] |
| | | 2 > 10 | 11.68[^] |
| | | 3 > 10 | 5.89[^] |
| | | 4 < 10 | −0.26 |
| | | 5 > 10 | 2.33 |

*Note.* Numbers 1 through 10 refer to correlations of Personality Assessment Inventory–Adolescent–Anxiety scale (PAI–A ANX) with each measure listed. For the comparisons column, correlations are indicated by their corresponding number.
[*]$p < .01$. Critical alpha for $z$ scores corrected with Bonferroni adjustment for multiple comparisons: [^]$p < .002$.

measures of anxiety (MASC, CBCL, YSR, DISC–P, DISC–Y). The correlations ranged from small ($r = .19$ with DISC–P Anxiety Disorder) to large ($r = .73$ with self-report questionnaires of anxiety: MASC, YSR–Anxiety Problems). Interestingly, there was a statistically nonsignificant correlation with the parent questionnaire of anxiety ($r = .09$ with CBCL–Anxiety Problems). Mean correlation for all convergent relations was $r = .45$, reflecting moderate evidence for convergent validity.

### Discriminant validity

Table 4 presents correlational results between the PAI–A ANX scale and measures of depression, specifically with self-report questionnaires (BDI–II, YSR–Affective Problems), self-report interviews (DISC–Y Depressive Disorder), parent-report questionnaire (CBCL–Affective Problems), and parent-report interviews (DISC–P Depressive Disorder). We examined the correlations between PAI–A ANX scores and scores from each of the five measures of anxiety (MASC, YSR/CBCL–Anxiety Problems, DISC–Y/P Anxiety Disorder) compared to each of the correlations between the PAI–A ANX scores and each of the five measures of depression (BDI–II, YSR/CBCL–Affective Problems, DISC–Y/P Depressive Disorder) using $z$ tests for dependent correlations. Of the 25 comparisons, only 14 convergent correlations were higher than the discriminant correlations, with discriminant validity demonstrated with the self-report questionnaires of anxiety (MASC, YSR–Anxiety Problems) as well as partially for interview measures of anxiety (both youth- and parent report). Bonferroni corrections were applied to the critical alpha level ($.05/25 = .002$). Of these 14 comparisons, 10 were found to be significantly different (see Table 3). For the most part, convergent correlations between PAI–A ANX and other self-report anxiety questionnaires were greater in magnitude than all discriminant correlations. Additionally, convergent correlations between PAI–A ANX and the self-report interview of anxiety was stronger than correlations between PAI–A ANX and parent report questionnaires and interviews of depression. However, evidence for discriminant validity was not robust; convergent correlations between PAI–A ANX and parent reports of anxiety (questionnaire and interview) were actually smaller in magnitude than discriminant correlations, with the exception of the correlation between PAI–A ANX and parent-report interview for any depressive disorder. Additionally, correlations between scores from the PAI–A ANX and self-report interview for any anxiety disorder were smaller in magnitude than correlations between PAI–A ANX and self-report questionnaires of depression (BDI–II, YSR–Affective Problems), which is evidence for shared method variance of self-report. Of these comparisons that are inconsistent with evidence of discriminant validity, only seven were statistically significant. Therefore, in total, we found 10 comparisons in support of discriminant validity and seven that were inconsistent with discriminant validity.

### Validity with specific diagnoses

Results of point-biserial correlations with DISC diagnoses for specific anxiety and depressive disorders are displayed in Table 3. There were strong relations between PAI–A ANX scores and presence of GAD (youth interview; $r = .51$), moderate relations between PAI–A ANX and youth interview reports

of social phobia ($r = .47$), agoraphobia ($r = .36$), OCD ($r = .34$), panic disorder ($r = .41$), separation anxiety disorder ($r = .32$), and small relations between PAI–A ANX and the presence of specific phobia (youth interview; $r = .27$), posttraumatic stress disorder (youth interview; $r = .16$), and parent reports of agoraphobia, GAD, panic disorder, separation anxiety disorder, and social phobia. Additionally, although correlations with a diagnosis of dysthymia (parent and youth interview) were not significant, PAI–A ANX scores correlated significantly at a moderate level with self-reports of a diagnosis of MDD ($r = .42$) and significantly at small magnitude with parent reports of a diagnosis of MDD ($r = .13$). As we did previously, we examined whether correlations with the different anxiety disorders were statistically different between the PAI–A DEP and ANX scales. After Bonferroni adjustment for multiple comparisons, we found that among youth interviews, correlations with the PAI–A ANX were statistically larger in magnitude than with the PAI–A DEP for agoraphobia, GAD, panic disorder, and separation anxiety disorder, whereas among parent interviews, comparisons were significant in the expected direction for GAD, panic disorder, and separation anxiety disorder. Therefore, four of the youth interview diagnoses and three of the parent interview diagnoses correlated significantly higher with the relevant PAI–A scale, whereas none of the youth interview diagnoses had significantly higher correlations with the dissimilar PAI–A scale. Finally, we examined the association between PAI–A ANX and GAD while partialing out shared variance with MDD as well as the association between PAI–A ANX and MDD while partialing out shared variance with GAD to control for the strong comorbidity between these disorders. The partial correlation between PAI–A ANX and GAD while controlling for MDD (convergent correlation) was $r = .43$ for youth report and $r = .16$ for parent report ($p$s $< .01$), and the partial correlation between PAI–A ANX and MDD while controlling for GAD (discriminant correlation) was $r = .30$ ($p < .001$) for youth report and $r = .09$ ($p = .10$) for parent report. Results of partial correlations suggest that although bivariate correlations were inflated due to comorbidity between GAD and MDD, there is still a moderate correlation between PAI–A ANX and a diagnosis of MDD, although evidence for discriminant validity was stronger once accounting for comorbidity.

## Discussion

The reliable and valid assessment of psychopathology in adolescents is crucial for choices regarding treatment planning; anxiety and depression, specifically, are arguably the most prevalent and the most difficult to disentangle (Dobson & Cheung, 1990). The adult PAI has shown specific strengths in the properties of its scales, including convergent and discriminant validity (Morey, 1991; Morey & Hopwood, 2008), although for the PAI–A, very little research beyond that which is presented in the professional manual has investigated its construct validity. Although these validity studies are quite promising, this research extends the validity evidence for the ANX and DEP scales to multiple additional measures and samples (most notably, an inpatient sample of treatment-refractory adolescents).

Specifically, correlations were examined in an inpatient sample of adolescents demonstrating high psychiatric severity and extensive comorbidity across anxiety and depressive disorders. Overall, findings for construct validity were promising in that ANX and DEP scale scores were largely more related to the convergent scales relative to the discriminant scales despite the use of different methods of assessment and informants.

Several aspects of findings are noteworthy. First, evidence for convergent validity was demonstrated by strong and moderate correlations between PAI–A scales and parallel broad measures of anxiety and depression across methods of measurement (interview and questionnaire) and informant (parent and self-report). Despite mostly consistent relations, the PAI–A scales only correlated to a small degree with parent-report interviews of anxiety and depression, respectively. Additionally, the correlation between PAI–A ANX and parent questionnaires of anxiety problems was not significant. This finding is not surprising given that correlations between parent and child reports of child emotional and behavioral problems are low to moderate, particularly when examining reports of internalizing problems (Achenbach, McConaughy, & Howell, 1987; Duhig, Renk, Epstein, & Phares, 2000). In fact, in this sample, kappa statistics for the presence of any anxiety disorder across parent and youth interviews were .18 and .27, respectively, for the presence of any depressive disorders, suggesting less than moderate concordance across these reports (Landis & Koch, 1977).

The second major finding was that despite strong evidence for convergent validity between PAI–A ANX and DEP scales and both broad and specific measures of anxiety and depression, results clearly demonstrated that PAI–A scales correlated strongest with youth self-report questionnaires of anxiety and depression, followed by youth interviews, then parent questionnaires and interviews. Thus, construct validity evidence was tempered by shared method variance due to the assessment instrument (questionnaire or interview) and respondent (self-report or parent report). The presence of shared method variance is not unlikely (Podsakoff, MacKenzie, & Podsakoff, 2012) given the similarities in item structure and wording, similarities in the medium, and response tendencies that raters might apply across measures (Edwards, 2008). However, the fact that associations between the PAI–A ANX and DEP scales held across methods for both broad and specific measures of anxiety and depression is satisfactory as evidence for convergent validity.

A third finding of this study was that relations with specific diagnoses yielded clear differential patterns of associations across disorders; specifically, PAI–ANX did not demonstrate consistent relations with posttraumatic stress disorder and specific phobia whereas relations with other disorders were small to moderate, depending on whether the assessment method was self-report or parent report. Less consistent relations were also found with OCD. This might be due to the fact that OCD is a heterogeneous disorder in regard to symptom presentation (Bloch, Landeros-Weisenberger, Rosario, Pittenger, & Leckman, 2008). Additionally, in the change to *DSM-5* (American Psychiatric Association, 2013), OCD was moved from its classification as an anxiety disorder based on research demonstrating more common threads of symptoms presented in a range of OCD-related disorders. Overall, the fact that relations with specific anxiety disorders were smaller in magnitude than those

with broad anxiety scales was not surprising and in line with our expectations. The PAI–A ANX scale was developed to measure tension and negative affect as general indexes of anxiety rather than to provide any specific diagnostic information. In fact, in original validation studies, clinical samples with anxiety disorders did not demonstrate marked elevations on the PAI–A ANX scale (Morey, 2007). The PAI–A DEP scale demonstrated clear and consistent relations with MDD with slightly smaller relations for parent reports. However, PAI–A DEP was not related to dysthymia, likely due to the low prevalence in this sample (2.4%–7.8%).

Finally, in evaluating evidence for discriminant validity, we found that the PAI–A DEP was more likely to discriminate between depression and anxiety despite shared method variance, whereas the PAI–A ANX scale showed less consistent evidence for discriminant validity when using broadband measures of anxiety and depression. Relations between PAI–A ANX and MDD across parent- and self-report interviews were similar in magnitude to relations between PAI–A ANX and specific anxiety disorders, whereas relations between PAI–A DEP and major depressive disorder were much stronger in magnitude than relations with any specific anxiety disorder. However, when controlling for the comorbidity between MDD and GAD, discriminant validity was observed. Additionally, the PAI–A DEP demonstrated consistent relations with GAD and social phobia, when not accounting for comorbidity. It is not surprising that GAD and social phobia were more strongly related to PAI–A DEP relative to other anxiety disorders. First, beyond comorbidity, MDD and GAD share a number of symptoms (e.g., difficulty concentrating and sleep difficulties), which has even sparked debate both over the uniqueness of a GAD diagnosis and its placement as an anxiety or depressive disorder (Mennin et al., 2008). In line with this, once the comorbidity between GAD and MDD was accounted for, discriminant correlations were reduced. Regarding social phobia and depression, these two domains share deficits in positive affect, not reflected in other anxiety domains (e.g., Brown, Chorpita, & Barlow, 1998). Overall, the less consistent evidence for discriminant validity in this study is in line with research that has demonstrated a strong overlap between anxiety and depression. Indeed, growing work points to a transdiagnostic conceptualization of anxiety and depressive symptoms and disorders (see Norton & Paulus, 2016 for a review) highlighting that although differences can be identified between anxiety and depression, there is greater commonality linking them together.

## Limitations

Although this study provides valuable information regarding the functioning of the PAI–A ANX and DEP scales among an inpatient sample of adolescents, this study was solely correlational. To truly show predictive validity of these scales, especially for use in clinical settings, it will be important to conduct longitudinal studies to determine whether scores on the PAI–A ANX and DEP scales predict response to treatment or symptom change over time. Additionally, the current validation sample consisted of a group of treatment refractory adolescents with severe psychiatric problems and extensive comorbidity. Future validation studies should consider broader samples, including outpatient

and adjudicated samples of youth in addition to community samples to determine generalizability of the PAI–A.

Despite these limitations, this study adds to a growing literature demonstrating the construct validity of the PAI–A ANX and DEP scales. Additionally, because research on the construct validity of the PAI–A ANX and DEP scales is mostly limited to studies described in the professional manual, we build on the evidence for the construct validity of these two scales with the use of a wide range of methods, including questionnaires and diagnostic interviews as reported by both parents and youth. This study furthers our knowledge of the assessment of anxious and depressive symptoms in adolescents and supports the use of the PAI–A to this extent. Given the advantages of the PAI–A, including the assessment of multiple syndromes within a single instrument, the inclusion of validity indexes, as well as treatment response indicators, this evidence for construct validity of these scales provides one more reason to use this measure for both clinical and research purposes.

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