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# Test Score Stability and the Relationship of Adult Manifest Anxiety Scale–College Version Scores to External Variables Among Graduate Students

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A sample of 79 individuals participated in the present study to evaluate the test score stability (8-week test-retest interval) and construct validity of the scores of the Adult Manifest Anxiety Scale–College Version, a new measure used to assess anxiety in college students, for application to graduate-level students. Results of the study indicated for a sample of graduate students that the AMAS-C test scores have adequate to good temporal stability ( $r_s = .70$  to  $.87$ ). Evidence supporting the construct validity of the AMAS-C test scores was found. Validity coefficients ranged from  $-.67$  to  $.88$ . Implications of the findings are discussed.

**Keywords:** *reliability; validity; graduate students; Adult Manifest Anxiety Scale–College Version (AMAS-C)*

Across college campuses nationwide, graduate and undergraduate students are reporting more mental health concerns (O'Connor, 2001). Since the 1950s, college students have experienced increasingly higher levels of anxiety (National Mental Health Association, 2002). Today's college students are feeling more overwhelmed and stressed than students who attended college in years past (e.g., Astin, Parrott, Korn, & Sax, 1997; O'Connor, 2001). Some stressors are associated with living in a complex society (Dean & Meadows, 1995) and affect individuals of all ages, whereas other stressors such as course demands and examinations (e.g., Frazier & Schauben, 1994; Santrock, 1998), career decisions and preparation (e.g., Santrock, 1998), finances, and social concerns (e.g., Powers, Wisocki, & Whitbourne, 1992) are either unique or more prevalent in the college student population. To assist those college students who are experiencing high levels of stress or anxiety, early detection and therapeutic support are needed.

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Techniques used to assist in the early detection of high levels of stress or anxiety in college students may include clinical interviews, psychophysiological measures, behavioral observations, behavioral rating scales, and self-reports. Self-report is efficacious and one of the most common methods used to assess anxiety (e.g., James, Reynolds, & Dunbar, 1994; Krause, 1961). Self-report measures are available to assess anxiety in the college student population. However, few self-report “measures exist that were designed specifically to assess anxiety in the college student population (i.e., items selected based on college students’ responses, scales developed based on factor analysis of college attendees’ responses, and the availability of college student norms)” (Lowe, Papanastasiou, DeRuyck, & Reynolds, 2005, p. 220). Moreover, no known self-report measure of chronic, manifest anxiety designed specifically for college students has been available until recently (Lowe et al., 2005).

The Adult Manifest Anxiety Scale–College Version (AMAS-C; Reynolds, Richmond, & Lowe, 2003b) is a new, multidimensional, self-report measure used to assess chronic, manifest anxiety in college students. Manifest anxiety is a form of trait anxiety (Reynolds, 1985). The AMAS-C is, conceptually, an upward extension of the Revised Children’s Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978), a common measure used to assess anxiety in children and adolescents. However, the AMAS-C items were written specifically to target college-age students in a collegiate setting and item selection was based on the responses of college attendees (detailed information on item derivation and selection can be found in Reynolds, Richmond, & Lowe, 2003d); the RCMAS is a downward extension of the original version of the Taylor Manifest Anxiety Scale (TMAS; Taylor, 1953).

The AMAS-C and RCMAS are unique because these two measures are part of a series of measures that are used to assess common manifestations of anxiety found among individuals of different age groups across the life span as well as the developmental variations in anxiety symptoms found among individuals of different ages. That is, the RCMAS and AMAS-C along with two other versions of the AMAS, the Adult Manifest Anxiety Scale–Adult Version (AMAS-A; Reynolds, Richmond, & Lowe, 2003a) and the Adult Manifest Anxiety Scale–Elderly Version (AMAS-E; Reynolds, Richmond, & Lowe, 2003c) are used to assess common and uncommon manifestations of anxiety in the child and adolescent, college student, young and middle-age adult, and older adult populations, respectively.

The AMAS-C is designed specifically to assess anxiety in college undergraduate and graduate students and consists of five anxiety scales and a Lie scale. The Total Anxiety scale provides a global measure of chronic, manifest anxiety and consists of 42 items (i.e., all of the items from the anxiety subscales). In addition to the Total Anxiety scale, the AMAS-C also has four anxiety subscales: Physiological Anxiety, Social Concerns/Stress, Test Anxiety, and Worry/Oversensitivity. The Worry/Oversensitivity subscale (12 items) reflects excessive worrying, nervousness, or hypersensitivity to stress. The Test Anxiety subscale (15 items) assesses anxiety associated with taking college exams. The Physiological Anxiety subscale (8 items) evaluates physical responses to one’s anxiety. The Social Concerns/Stress subscale (7 items) assesses one’s concerns about the views of others. The AMAS-C has a Lie scale (7 items). The Lie scale describes ideal behavior and serves as a validity index on the AMAS-C (Reynolds et al., 2003d).

Because the AMAS-C is a new self-report measure, limited information is available on the reliability and construct validity of the AMAS-C test scores. Thus, the purpose of the present

study was to assess the temporal stability and construct validity of the AMAS-C test scores with a graduate student population. The measures used for contrast and comparison were the Endler Multidimensional Anxiety Scales (EMAS; Endler, Edwards, & Vitelli, 1991a), the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1977), and the Tennessee Self-Concept Scale, 2nd edition–Adult Form (TSCS:2; Fitts & Warren, 1996a). The authors hypothesized that (a) the AMAS-C anxiety scale and subscale scores would be related to the STAI scores and the EMAS-T (i.e., Social Evaluation, Ambiguous, and Daily Routines) subscale scores, (b) the AMAS-C anxiety scale and subscale scores would not be related to the EMAS-T Physical Danger subscale scores and TSCS:2 Conflict scale scores, and (c) the AMAS-C anxiety scale and subscale scores would correlate more highly with the STAI-Trait scale scores than the STAI-State scale scores.

## Method

### Subjects

Participants for the present study consisted of 79 volunteer graduate students, 60 women and 19 men, from a Midwestern university. The mean age of the graduate students was 34.28 years ( $SD = 9.53$  years). Students had completed an average of 18.24 years ( $SD = 2.06$  years) of schooling. Fifty-six students were working on their doctoral degree and 23 students were working on their master's degree. Ethnic composition of the sample consisted of Caucasians (70.9%), Asian Americans (17.7%), African Americans (6.3%), Hispanics (1.3%), and Others (2.5%).

### Instruments

**AMAS-C.** The AMAS-C is a 49-item self-report measure used to assess the level and nature of chronic, manifest anxiety in the college student population. Each item on the AMAS-C describes how an individual thinks, feels, or behaves at different times. A student rates each statement on the AMAS-C on a dichotomous scale using a yes/no format. A student's Total Anxiety score is obtained by summing all the yes responses to the 42 anxiety items. A higher Total Anxiety score is presumed to indicate a higher level of anxiety (Reynolds et al., 2003d).

The items from the original version of the RCMAS served as a model for the development of the items on the AMAS-C. An age-appropriate parallel item was written for each of the 100 original RCMAS items. An additional 20 items were written that reflected the test anxiety construct based on the literature and clinical expertise of the test developers. Once the items were developed, the items were reviewed by a panel of expert judges (i.e., measurement experts) for their clarity, readability, and congruity with the dimensions or constructs the items were supposed to represent. Some items were rewritten based on the review. These items were rewritten before the standardization process began (Reynolds et al., 2003d).

Few studies have been conducted to assess the reliability and validity of the AMAS-C scores. Reynolds and colleagues (2003d) reported an internal consistency reliability estimate

of .94 for the Total Anxiety scale score in the standardization sample. Internal consistency reliability estimates for the four anxiety subscale scores (i.e., Physiological Anxiety, Social Concerns/Stress, Test Anxiety, and Worry/Oversensitivity) and Lie scale scores ranged from .72 to .95. Reynolds et al. also reported on the findings of one test-retest study. A sample of 70 college students were administered the AMAS-C on two separate occasions. A reliability estimate of .87 was found for the AMAS-C Total Anxiety scale scores throughout a 1-week test-retest interval. For the four anxiety subscale scores and Lie scale scores, temporal stability coefficients ranged from .68 to .83.

Preliminary support for the construct validity of the AMAS-C test scores has been reported via factor analysis (see Lowe, 2000; Reynolds et al., 2003d) and computation of internal consistency coefficients (see above), interscale correlations (i.e., subscale intercorrelations, which ranged from .36 to .48 in the standardization sample), and predictive validity coefficients (see Reynolds et al., 2003d). In the predictive validity study, 62 college students' scores on the AMAS-C were compared with the individuals' scores on the Multiscore Depression Inventory (MDI; Berndt, 1986). The majority of the correlations between the AMAS-C scores and MDI scores were found to be in the moderate range, suggesting that the AMAS-C shares substantial variance with another measure assessing a related construct (Reynolds et al., 2003d).

*EMAS.* The EMAS consists of three separate scales: the EMAS–Perception (EMAS-P), EMAS–State (EMAS-S), and EMAS–Trait (EMAS-T). For the purpose of the current study, only the EMAS-T, a 60-item self-report measure of trait anxiety, was used. The EMAS-T is composed of four anxiety subscales: Social Evaluation, Physical Danger, Ambiguous, and Daily Routines. Respondents rate their responses to the items on a 5-point Likert-type scale ranging from 1 (*not at all*) to 5 (*very much*).

The EMAS-T scores have adequate psychometric properties. Internal consistency reliability estimates for the EMAS-T subscale scores ranged from .88 to .94 for a U.S. college student sample (see Endler, Edwards, & Vitelli, 1991b). According to Endler et al., Ziegler (1987) reported test-retest reliability estimates of .59 to .79 for the EMAS-T subscale scores throughout a 4-week test-retest interval.

Evidence supporting the construct validity of the EMAS-T scores has been found. Ziegler (1987) reported moderate validity coefficients between three of the four EMAS-T subscale scores and the STAI Trait scale scores. In contrast, a small correlation coefficient was found between the EMAS-T Physical Danger subscale scores and STAI Trait scale scores. Low validity coefficients also were found between the four EMAS-T anxiety subscale scores and the Social Desirability scale scores (Davis & Cowles, 1989), supporting the discriminant validity of the EMAS-T subscale scores. The EMAS-T scale was selected to assess the convergent and discriminant validity of the AMAS-C scores.

*STAI.* The STAI is a 40-item self-report measure used to assess state and trait anxiety. Respondents rate their responses to each of the 40 items on a 4-point Likert-type scale.

The STAI scores have good psychometric properties. Internal consistency reliability estimates for the State and Trait scale scores ranged from .91 to .93 and .90 to .91, respectively, for samples of college students. Test-retest reliability coefficients for the State and Trait

scale scores throughout a 60-day test-retest interval were .36 for women and .51 for men and .65 for women and .68 for men, respectively.

Evidence supporting the construct validity of the STAI test scores has been found (see Spielberger, 1983). Spielberger reported high validity coefficients between the STAI Trait scale scores and the TMAS scale scores ( $r = .80$ ) and moderate validity coefficients between the STAI Trait scale scores and the Psychasthenia scale scores of the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1943;  $r = .65$ ) and between the STAI State scale scores and the MMPI Psychasthenia scale scores ( $r = .45$ ). In contrast, low validity coefficients were found between the STAI State scale scores and college students' high school GPA ( $r_s = -.02$  and  $-.03$  for women and men, respectively) and between the STAI Trait scale scores and college students' high school GPA ( $r_s = .00$  and  $-.06$  for women and men, respectively; see Spielberger, 1983), supporting the discriminant validity of the STAI State and Trait scale scores. The STAI State and Trait scales were selected to assess the convergent and discriminant validity of the AMAS-C scale scores.

*TSCS:2*. The TSCS:2 is an 82-item measure used to assess self-concept in the adult population. The TSCS:2 consists of two summary scales (Total Self-Concept and Conflict), six self-concept scales (Academic/Work, Family, Moral, Personal, Physical, and Social), three supplementary scales (Behavior, Identity, and Satisfaction), and four validity scales (Faking Good, Self-Criticism, Inconsistent Responding, and Response Distribution). The validity scales were not used in the current study. Raters respond to the TSCS:2 items on a 5-point Likert-type scale ranging from 1 (*always false*) to 5 (*always true*).

The TSCS:2 scores have adequate psychometric properties. Coefficient alphas reported for the TSCS:2 scale scores ranged from .81 to .95 and test-retest reliability estimates (1- to 2-week interval) for the TSCS:2 scale scores ranged from .62 to .82.

Support for the construct validity of the TSCS:2 scale scores has been found (see Fitts & Warren, 1996b). High validity coefficients were reported between the TSCS Total Self-Concept scale scores and the Coopersmith Self-Esteem Inventory (Coopersmith, 1981) scores and between the TSCS Total Self-Concept scale scores and Piers-Harris Self-Concept Scale (Piers, 1991) scores (see Fitts & Warren, 1996b).

The TSCS:2 Conflict scale scores measure a construct that is different from the construct of anxiety. The Conflict scale scores measure the degree to which an individual has a balanced self-view and is not defensive, oppositional, or ambivalent. Researchers have reported low correlation coefficients of .12 and .13 between the Conflict scale scores and scores on measures of anxiety, such as the MMPI Psychasthenia scale scores and TMAS scale scores, respectively (see Fitts & Warren, 1996b). Thus, the TSCS:2 Conflict scale was selected to evaluate the discriminant validity of the AMAS-C scale scores, whereas the TSCS:2 Self-Concept scales were chosen to examine the convergent validity of the AMAS-C scale scores because anxiety and negative self-concept are related constructs (see Watson & Clark, 1984).

## Procedure

Graduate students completed a packet of measures, including the AMAS-C, EMAS-T, STAI, and TSCS:2, in their classes. Before beginning work on the measures, the test administrator

requested that the students read the instructions printed on each measure, read the items on each measure, and mark their responses on the appropriate form. Students also were asked to complete a demographic sheet that provided information on each individual's age, degree-seeking status, educational attainment, gender, and race/ethnicity.

Eight weeks later, the AMAS-C was readministered to the same graduate students in their classes. The same procedures used to administered the AMAS-C in the first session were followed in the second session.

## Analyses

Coefficient alphas were computed for the AMAS-C Total Anxiety scale, four anxiety subscales, and Lie scale scores. Interscale correlation coefficients and validity coefficients were computed for the AMAS-C scores using the Pearson product moment correlation coefficient ( $r$ ) statistic. Temporal stability coefficients were computed for the AMAS-C scores using the Pearson product moment correlation coefficient ( $r$ ) statistic and intraclass correlation coefficient ( $ICC$ ) statistic.

## Results

Internal consistency reliability estimates for the AMAS-C scale scores were examined for the sample of graduate students. Coefficient alphas for the Total Anxiety scale scores, four anxiety (Physiological Anxiety, Social Concerns/Stress, Test Anxiety, and Worry/Oversensitivity) subscale scores, and Lie scale scores ranged from .68 to .88 (see Table 1). The majority of these reliability estimates are in the adequate to good range, with the exception of one coefficient that fell slightly less than .70. The internal consistency reliability estimates found in the current study with a sample of graduate students are not substantially different from the reliability estimates reported in Lowe's (2000) study with a sample of undergraduates and in Reynolds et al.'s (2003d) study with the AMAS-C standardization sample, indicating generalizability of item-homogeneity from the principally undergraduate test development sample to the current sample of graduate students.

Temporal stability coefficients for the AMAS-C Total Anxiety scale scores, four anxiety subscale scores, and Lie scale scores for the sample of graduate students throughout an 8-week test-retest interval are presented in Table 2. In addition, the means and standard deviations for the Total Anxiety scale scores, four anxiety subscale scores, and Lie scale scores at Times 1 and 2 are shown.

For the AMAS-C anxiety scale and subscale scores, the means slightly decreased from Time 1 to 2. In contrast, the AMAS-C Lie scale scores slightly increased from Time 1 to 2. Paired samples  $t$  tests were computed between the means of the AMAS-C scale and subscale scores at Times 1 and 2. All  $t$  tests were nonsignificant, with one exception. The means for the AMAS-C Total Anxiety scale scores at Times 1 and 2 were statistically significantly different from each other. Because the AMAS-C Total Anxiety score is the most reliable score, it is the most sensitive to change and is best able to detect differences (e.g., discriminate between groups) in comparison to the other AMAS-C scale and subscale scores.

**Table 1**  
**Internal Consistency Reliability Estimates and Interscale Correlations**  
**for the Adult Manifest Anxiety Scale–College Version (AMAS-C)**  
**Scores in the Graduate Student Sample ( $n = 79$ )**

Scale	AMAS-C					
	Worry/ Oversensitivity	Test Anxiety	Physiological Anxiety	Social Concerns/Stress	Lie	Total Anxiety
Worry/Oversensitivity	(.75)					
Test Anxiety	.46	(.79)				
Physiological Anxiety	.37	.40	(.79)			
Social Concerns/Stress	.44	.29	.42	(.68)		
Lie	-.12	-.19	-.18	-.24	(.82)	
Total Anxiety	.78	.83	.69	.62	-.23	(.88)

Note: Coefficient alphas are in parentheses.

**Table 2**  
**Test-Retest Reliability Estimates Throughout an 8-Week Test-Retest Interval for the**  
**Adult Manifest Anxiety Scale–College Version (AMAS-C) Test Scores for the**  
**Graduate Student Sample ( $n = 79$ ) and Means and Standard Deviations**

Scale	Time 1		Time 2		<i>r</i>	<i>ICC</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Worry/Oversensitivity	6.68	3.01	6.35	3.60	.82	.80
Test Anxiety	5.15	4.07	4.84	3.70	.84	.83
Physiological Anxiety	2.29	2.27	2.03	2.40	.72	.72
Social Concerns	1.64	1.73	1.45	1.68	.74	.73
Lie	2.39	2.12	2.43	2.34	.70	.79
Total Anxiety	15.76*	8.34	14.67*	8.69	.87	.86

Note: *ICC* = intraclass correlation coefficient.

\* $p < .05$ . \*\* $p < .01$ .

The test-retest reliability coefficient for the Total Anxiety scale scores was .87, suggesting that the Total Anxiety scale scores show good test score stability for the sample of graduate students throughout an 8-week period. For the four anxiety subscale scores and Lie scale scores, temporal stability coefficients ranged from .70 to .84. These reliability estimates are in the adequate to good range and are similar in value to the reliability estimates (1-week test-retest interval) reported by Reynolds and colleagues (2003d) in the *AMAS-C Manual* with a sample of undergraduate students ( $r_s = .68$  to .87). In addition, intraclass correlation coefficients (*ICCs*), which take the between-subject variation and within-subject variation into consideration, were calculated. The *ICC* for the Total Anxiety scale scores was .86. For the four anxiety subscale scores and Lie scale scores, the *ICCs* ranged

from .72 to .83. These test-retest reliability estimates were not substantially different from the results obtained with the Pearson product moment correlation coefficient ( $r$ ) statistic. Overall, the temporal stability coefficients reported in the current study provide support for the reliability of the AMAS-C scores, at least throughout an 8-week period, for the sample of graduate students.

Construct validity of the AMAS-C scale scores also was examined in the present study. Different indexes of construct validity were investigated, including convergent and discriminant validity, internal consistency (see above), and pattern of interscale correlations. The subscale intercorrelations at Time 1 are shown in Table 1.

Moderate intercorrelation coefficients, with the exception of one intercorrelation coefficient, were found between the AMAS-C anxiety subscale scores. The intercorrelations ranged from .29 to .46. The magnitude of the subscale intercorrelations is somewhat similar to intercorrelations reported with the standardization sample (.36 to .48; see Reynolds et al., 2003d). These intercorrelations are consistent with adequate construct validity of a measure's test scores (see Reynolds et al., 2003d).

Correlations between the AMAS-C scores and scores from measures external to the test (i.e., EMAS-T, STAI, and TSCS:2) also were examined. Validity coefficients are presented in Table 3.

Moderate correlation coefficients were found between the majority of the AMAS-C anxiety scale and subscale scores and the scores of the EMAS-T and STAI ( $r_s = .25$  to  $.65$ ). Moreover, the majority of the AMAS-C anxiety scale and subscale scores correlated more highly with the STAI-Trait scores ( $r_s = .36$  to  $.65$ ) than the STAI-State scores ( $r_s = .25$  to  $.48$ ). The AMAS-C Total Anxiety scores and the Worry/Oversensitivity scores correlated the highest with the STAI-Trait scores ( $r = .61$  and  $.51$ , respectively). Similarly, the AMAS-C Social Concerns/Stress scores correlated the highest (i.e., highest positive correlation) with the STAI-Trait scores ( $r = .65$ ). In addition, more of the AMAS-C anxiety scale and subscale scores correlated higher with the EMAS-T scores than the STAI-State scores. Overall, the pattern of correlation coefficients reported between the AMAS-C anxiety scale and subscale scores and the scores of the STAI and EMAS-T supports the validity of the interpretation of the AMAS-C anxiety scale and subscale scores as a measure of chronic, manifest, or trait anxiety.

In contrast, small correlation coefficients ( $r_s = -.07$  to  $.00$ ) were found between the AMAS-C anxiety scale and subscale scores and scores from the EMAS-T Physical Danger subscale. These results are in agreement with the psychometric and neurophysiological findings reported by a number of researchers (e.g., Watson & Clark, 1984; White & Dupue, 1999), suggesting that fear (e.g., measured by the EMAS-T Physical Danger subscale scores) and anxiety (e.g., measured by the AMAS-C anxiety scores) are separate constructs. Likewise, the correlation coefficients between the AMAS-C anxiety scale and subscale scores and the TSCS:2 Conflict scale scores were small ( $r_s = .12$  to  $.25$ ). These small correlation coefficients suggest that the AMAS-C anxiety scale and subscale scores and the TSCS:2 Conflict scale scores are not measuring the same construct. Thus, these findings provide support for the discriminant validity of the AMAS-C anxiety scale and subscale scores.

Moderate and negative validity coefficients were found between the majority of the AMAS-C anxiety scale and subscale scores and the TSCS:2 Self-Concept scale scores.

**Table 3**  
**Validity Coefficients of the Adult Manifest Anxiety Scale–College Version (AMAS-C) Scores and the Scores of the Endler Multidimensional Anxiety Scale–Trait (EMAS-T), State-Trait Anxiety Inventory (STAI), and Tennessee Self-Concept Scale: Second Edition (TSCS:2) for the Graduate Student Sample ( $n = 79$ )**

Scale Scores	AMAS-C Scale Scores					
	Total Anxiety	Worry/Oversensitivity	Test Anxiety	Physiological Anxiety	Social Concerns	Lie
STAI–Trait	.61	.51	.36	.44	.65	-.16
EMAS–T Social Evaluation	.52	.42	.39	.35	.40	-.12
EMAS–T Ambiguous	.46	.33	.27	.34	.45	-.22
STAI–State	.41	.25	.28	.48	.30	-.22
EMAS–T Daily Routines	.36	.24	.31	.22	.27	-.25
TSCS:2 Conflict	.18	.21	.12	.25	.17	.00
TSCS:2 Family Self-Concept	.17	.12	.12	.13	.14	-.08
EMAS-T Physical Danger	-.05	-.04	-.06	-.07	.00	.24
TSCS:2 Moral Self-Concept	-.11	-.24	.03	.02	-.26	.22
TSCS:2 Satisfaction	-.16	-.07	-.21	-.09	-.11	.11
TSCS:2 Behavior	-.34	-.42	-.04	-.24	-.52	.30
TSCS:2 Social Self-Concept	-.37	-.37	-.08	-.32	-.60	.37
TSCS:2 Academic Self-Concept	-.41	-.18	-.46	-.25	-.25	.19
TSCS:2 Physical Self-Concept	-.42	-.38	-.22	-.41	-.35	.24
TSCS:2 Identity	-.47	-.34	-.27	-.47	-.44	.42
TSCS:2 Total Self-Concept	-.52	-.47	-.28	-.38	-.58	.33
TSCS:2 Personal Self-Concept	-.52	-.50	-.22	-.38	-.67	.31

Moderate and negative correlation coefficients were expected because moderate and negative correlations have been reported between these two constructs and these two constructs are both markers of negative affectivity (see Watson & Clark, 1984). It is interesting to note that the AMAS-C Test Anxiety scores had their highest correlation (i.e., highest negative correlation) with the TSCS:2 Academic Self-Concept scores ( $r = -.46$ ) and the AMAS-C Social Concerns/Stress scores had their highest correlation (i.e., highest negative correlation) with the TSCS:2 Personal Self-Concept scores. According to Fitts and Warren (1996b), students with low Academic Self-Concept scores have expressed difficulty in performing well in school. Moreover, test-anxious students are reported to perform poorly in the classroom and on tests (Hembree, 1988). Thus, students with high levels of test anxiety are more likely to have a poor academic self-concept. Fitts and Warren (1996b) also noted that students with low Personal Self-Concept scores tend to be reactive to the opinions of others in relation to the self. Students who score high on the AMAS-C Social Concerns/Stress scale also are concerned about the views of others and their concern is related to the levels of stress and anxiety experienced (Reynolds et al., 2003d).

Finally, the AMAS-C Lie scale scores correlated the highest with the TSCS:2 Identity scale scores. The Lie scale consists of items that describe ideal behavior (Reynolds et al.,

2003d) and the Identity scale includes items that describe how an individual identifies himself or herself (Fitts & Warren, 1996b). Examinees may respond to the items on both scales by denying common faults; thus, both scales provide a measure of social desirability. These findings provide support for the convergent validity of the AMAS-C Lie scale scores.

## Discussion

Overall, the results from the present study indicate that the AMAS-C test scores have adequate to good internal consistency reliability and test score stability for the current sample of graduate students. The findings reported in the current study with a sample of graduate students were similar to the results reported with the standardization sample consisting principally of undergraduate students and a research sample also consisting of undergraduates. These findings support the use of the AMAS-C with graduate students whose demographic characteristics are similar to the demographic characteristics of the current sample.

Besides evidence supporting the reliability of the AMAS-C scale and subscale scores, the findings from the present study provide support for the construct validity of the AMAS-C test scores as measures of various aspects of anxiety. Moderate correlation coefficients were reported between the AMAS-C anxiety scale and subscale scores and the STAI Trait scale scores and three of the EMAS-T (i.e., Social Evaluation, Ambiguous, and Daily Routines) subscale scores. The three EMAS-T subscale scores and the STAI Trait scale scores are measures of trait anxiety, whereas the AMAS-C scores provide a measure of chronic, manifest anxiety. Chronic, manifest anxiety is viewed as a form of trait anxiety (Reynolds, 1985). According to Spielberger (1972), who refined and elaborated on the state-trait distinction introduced by Cattell and Scheier (1961), trait anxiety is an individual's predisposition to have an anxious experience, whereas state anxiety is a transitory emotional state. Individuals with high levels of trait anxiety are more likely than individuals with low levels of trait anxiety to experience high levels of anxiety in stressful situations throughout their life, barring no clinical intervention (Lowe et al., 2005). Because the AMAS-C, EMAS-T, and STAI are purported to measure similar constructs, moderate correlations would be expected between the AMAS-C test scores and the scores of the two trait anxiety measures. In introducing new measures to the field, moderate correlations between the scores of new and existing instruments purported to measure similar constructs are desired (e.g., Kamphaus & Frick, 2002; Reynolds et al., 2003d). Moderate correlation coefficients between the scores of new and existing measures suggest that the new measures have something unique to contribute to the field, whereas high correlation coefficients between scores of new and existing measures often are redundant and do not contribute substantially to the field. Thus, the findings of the current study suggest that the AMAS-C has something unique to contribute to the field as a measure of chronic, manifest anxiety.

Moderate and negative correlation coefficients were found between the majority of the AMAS-C anxiety scale and subscale scores and the TSCS:2 scale scores. Moderate and negative correlation coefficients were expected because self-concept and trait anxiety are viewed as part of a much broader construct known as Negative Affectivity. According to Watson and Clark (1984), Negative Affectivity describes individual differences in negative

emotionality. Individuals high in Negative Affectivity have negative self-concepts and they experience feelings of nervousness and worry. These subjective feelings are central features of trait anxiety (Spielberger, Gorsuch, & Lushene, 1970).

In contrast, small correlation coefficients were reported between the AMAS-C anxiety scale and subscale scores and the EMAS-T Physical Danger subscale scores. These findings are in agreement with the psychometric data that strongly suggest that anxiety and fear are distinct emotions (White & Depue, 1999). Factor-analytic studies have shown that anxiety and fear load on different factors and the intercorrelations between these factors are close to zero (see White & Depue, 1999). Similar findings of near-zero correlations have been reported between scores of measures of fear and anxiety (Hodges & Felling, 1970; Scarr, Webber, Weinberg, & Wittig, 1981; Spielberger et al., 1970). Neurophysiological findings also suggest that fear and anxiety are independent of each other (e.g., White & Depue, 1999), that is, fear and anxiety are viewed as distinct emotional systems. White and Depue conducted a study to examine two different aspects of norepinephrine functioning in adults: pupillary reactivity to a norepinephrine agonist challenge and pupillary reactivity to a darkness challenge. Specifically, the authors were interested in measuring the degree of pupil dilation of adults over time in response to (a) phenylephrine drops administered to the eyes (i.e., the norepinephrine agonist challenge) and (b) complete darkness (i.e., the darkness challenge). Norepinephrine projection systems are believed to be at the core of models used to explain the presence or existence of fear and anxiety. In addition, the participants completed measures used to assess fear and anxiety. The authors found that pupillary reactivity to a norepinephrine agonist challenge was related to the participants' scores on a fear measure, whereas pupillary reactivity to a darkness challenge was associated with individuals' scores on an anxiety measure. Thus, a differential association of fear and anxiety was demonstrated in this study.

Besides small correlation coefficients between the AMAS-C anxiety scale and subscale scores and the EMAS-T Physical Danger subscale scores, small correlation coefficients between the AMAS-C test scores and the TSCS:2 Conflict scores were noted. Lowe and Reynolds (2004) found similar results when they examined the construct validity of the AMAS-A scores in a sample of young and middle-age adults. The authors reported small correlations between the AMAS-A anxiety scale and subscale scores and the TSCS:2 Conflict scores. Overall, these findings suggest that the scores of measures of chronic manifest anxiety and the TSCS:2 Conflict scale scores are measuring different constructs. Thus, the findings of the current study provide support for the discriminant validity of the AMAS-C anxiety scale and subscale scores.

Several limitations are associated with the present study. A group of graduate students volunteered to participate in the current study. This group of volunteer graduate students was a sample of convenience. Demographic characteristics of a sample of convenience are less likely to be in the same proportion as they appear in the population. In the current study, a larger proportion of women and Caucasians volunteered for the research project. Because more women and Caucasians participated, the generalizability of the findings of the current study may be limited. However, in collegiate settings, a larger proportion of women compared to men typically volunteer to participate in research studies. In addition, a larger proportion of students who are enrolled in graduate schools at universities throughout the United States

are Caucasian. Nevertheless, replication of the current study with a sample consisting of a larger proportion of men and ethnic minority graduate students yielding similar results would provide support for the findings obtained in the present study.

Even though additional research is needed to address the limitations of the current study, the AMAS-C appears to be a new and promising multidimensional self-report measure used to assess anxiety symptoms in the college student population at the graduate and the undergraduate levels. The AMAS-C was designed with a developmental perspective in mind. The AMAS-C includes items used to assess anxiety symptoms that are unique to the college student population as well as items used to assess anxiety symptoms found to be common among individuals of different age groups across the life span (see Lowe, 2000). In collegiate settings with graduate and undergraduate students, mental health professionals can use the AMAS-C as a screener to detect areas of concern and then target those areas of concern for intervention, thus providing a direct link between assessment results and intervention. Mental health professionals also can use the AMAS-C as part of a comprehensive battery to aid in differential diagnosis and treatment planning. Finally, the AMAS-C can be used to monitor client progress and to evaluate treatment outcomes (Reynolds, 2003d). In an era of heightened accountability, quality instruments such as the AMAS-C are needed and in demand.

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