



Measuring Test Anxiety In Students Aged 10-17 Years in Egypt: Factor Analysis and Psychometric Properties

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Abstract

The aims of this study were: (1) to translate Children's Test Anxiety Scale (CTAS) into Arabic language, (2) to examine factor structure for Arabic version of Children's Test Anxiety Scale (CTAS), and (3) to explore its psychometric properties when administered on students aged 10-17 years in Egypt. The participants were 320 students from six primary, preparatory and secondary schools in Baltim Sector, Egypt. They were aged 10-17 years old. Findings showed that the percentage of variance was 25.26% for Thoughts, 19.66% for Autonomic Reaction, and 18.6% for Off-Task Behaviors. Similarly, the eigenvalues for three scales of Children's Test Anxiety Scale (CTAS) ranged from 5.58 to 7.58. Alpha reliability of different scales of Children's Test Anxiety Scale (CTAS) ranged from 0.75 to 0.89.

Keywords : *Anxiety, Test Anxiety, Psychometric properties, Factor analysis, Children's Test Anxiety Scale (CTAS)*

Introduction

Test anxiety is a situation-specific anxiety generally characterized by maladaptive cognitions, physiological reactions, and behaviors, and has been reported across various student populations. With the increase in standardized testing at younger ages, test anxiety is likely to become more prevalent, particularly for elementary students (Hill & Wigfield, 1984; Wren & Benson, 2004). Increased demands on students and schools to meet academic standards emphasize the importance of treating students whose test anxiety can significantly affect academic and cognitive performance.

Test anxiety has negative effects on learning and academic performance. Students who become anxious in testing situations do not achieve well on standardized achievement tests, leading to poor grades, retention, and eventual school dropout (Cizek & Burg, 2006; Lowe, et al., 2007). These negative effects can also lead to potentially higher amounts of test anxiety (Cizek & Burg, 2006) and impact the student's current and future level of academic standing, degree achievement, entrance into college, and selection of occupation, with test anxious students pursuing careers that involve infrequent evaluation that may not challenge them mentally (Ergene, 2003).

According to Zeidner (1998), the amount of anxiety an individual experiences varies in relation to the qualities of the task (e.g. difficulty and time constraints of tests), as well as personal perceptions such as threat, fear, and coping ability. These experiences may be heightened during standardized assessments. In a recent study of third, fourth, and fifth graders, students reported experiencing significantly higher anxiety during standardized tests than class tests (Segool, Carlson, Goforth, von der Embse, & Barterian, 2013).

Teachers also reported significant increases in anxiety during their students' standardized testing, which could indirectly increase the anxiety of the students (Doyal & Forsyth, 1973; as cited in Segool et al., 2013). Test anxiety may be characterized as state anxiety, an anxiety level that varies in relation to the perceived threat of a situation, as opposed to trait anxiety, an enduring individual proneness to anxiety across settings (Spielberger & Vagg, 1995).

Test-anxious individuals are usually higher in trait anxiety and experience more profound state anxiety during tests; as such, test anxiety is generally regarded as a situation-specific anxiety trait (Spielberger, Gonzalez, Taylor, Algaze, & Anton, 1978; as cited in Spielberger & Vagg, 1995). These students usually experience anxiety in other contexts, but it is significantly heightened in evaluative testing situations.

Generally, test anxiety is characterized as a tridimensional construct including maladaptive cognitive, physiological, and behavioral responses (Kendall, 1993; Zeidner, 1998). This triad is reflected in the difficulties individuals report during testing situations. Students state they are often preoccupied with worries about work evaluation, expectations of failure, and feelings of threat, self-deprecation, and low self-efficacy (Ergene, 2003; I. Sarason, 1975; I. Sarason & Stoops, 1978). They report heightened fear of failure and criticism, worry, and social concerns, as well as depressive symptoms and hopelessness (King, Mietz, Tinney, & Ollendick, 1995). Furthermore, physiological responses (e.g. increased respiration, heart rate, blood sugar) as well as behavioral responses (e.g. avoidance, distraction) have been widely reported (Zeidner, 1998). Anxious responses are different for each individual, but it is clear that multiple effects are evident.

While various measures can be used to assess test anxiety, the most common method is the use of self-report questionnaires. The first operationally defined self-report measure for test anxiety was created in the 1950s, simply titled the Test Anxiety Questionnaire (TAQ; Sarason & Mandler, 1952; Sarason et al., 1952). Since the TAQ, a multitude of self-report measures have been made available for use (e.g. Test Anxiety Inventory, Reactions to Tests, Revised Test Anxiety Scale). However, the majority of these measures have been developed for adults or lack adequate psychometric evaluation with children (Wren & Benson, 2004; Wigfield & Eccles, 1989). Although some scales have been used with school-age populations, they may not provide adequate measures of test anxiety because they were created for adult use. It is necessary for children to be assessed using measures appropriate for their age.

The Children's Test Anxiety Scale (CTAS; Wren & Benson, 2004) is a 30-item questionnaire developed for use with students from third to sixth grades. Wren and Benson state that the majority of students begin to experience standardized testing in third grade, so it is important that a measure be available to identify test anxiety when it begins to manifest. Unlike the TASC, responses are based on a 4-point Likert scale, which enables more adequate ratings of the severity of each item. The CTAS is based on the tridimensional theory of test anxiety including thoughts, autonomic reactions, and off-task behaviors. This theoretical framework reflects a more modern view of the test anxiety construct. Based on the shortening of items, changes in response format, and revised theoretical domain, the CTAS appears to be a more up-to-date measure of test anxiety in children.

The Children's Test Anxiety Scale (CTAS) is based on three interrelated components found in recent literature regarding children's test anxiety manifestation: thoughts, autonomic reactions, and off-task behaviors. The CTAS is a 30 item self report measure that has been validated for use with children in third through sixth grade that asks questions related to the components of thoughts, autonomic reactions, and off-task behaviors with four response choice in a Likert scale format.

The first phase in the development of the CTAS required defining the theoretical domains of children's test anxiety. It had been previously determined that test anxiety is situation specific and manifests during formal evaluative situations when an unpleasant emotional state is experienced. The theoretical definition of test anxiety in relation to the CTAS consists of the three interrelated components of thoughts, autonomic reactions, and off-task behaviors (Wren & Benson, 2004).

In the second phase of development, an open-ended questionnaire was administered as an optional writing assignment to 218 elementary school students in order to find words and language used by children referring to test anxiety (Wren & Benson, 2004). After collecting the responses, the researchers reviewed them, organized a preliminary tryout of items to place on the instrument, and performed a final edit of the items. The number of items initially

consisted of 107 written questions that reflected the three dimensions of test anxiety (thoughts, autonomic reactions, and off-task behaviors). All items were also determined to be best written in the first person. The chosen response format determined for the CTAS was a Likert scale, with four response options of 1= almost never, 2= some of the time, 3= most of the time, and 4= almost always.

An eight member public school teacher panel, all of whom had at least 5 years of teaching experience, judged the questions; two teachers were used at each grade of 3rd, 4th, 5th, and 6th. A reading specialist also analyzed the reading level of all items and discarded the words and phrases students would likely not be able to comprehend. The researchers then used the information from both the teacher's panel and the reading specialist in order to determine which items should stay, be revised, or be thrown out. The final pool of questions was then dropped to a number of 50 which contained 23 items related to thoughts, 14 items related to autonomic reactions, and 13 items related to off-task behaviors (Wren & Benson, 2004).

The third phase of developing the CTAS was the quantitative evaluation phase which had 3 purposes. The researchers obtained data to estimate the internal consistency of the new scale and subscales, obtained a preliminary indication of the plausibility of the three-factor structure proposed for children's test anxiety and how well the questions worked with the theoretical domain, and assessed the relationship among the factors (Wren & Benson, 2004). The 50 item scale was tested on a sample of 230 3rd to 6th graders during normal school hours. The correlations for each item ranged from 0.22 to 0.71 within their subscales of gender, race, and grade level. All questions with less than a 0.20 correlation with their subscale were discarded, which left 9 items related to autonomic reactions subscale, 8 items on the off-task behaviors subscale, and 13 items on the thoughts subscale. The reliability of the 30-item CTAS was 0.92, with the subscales ranging from 0.78 to 0.89 (Wren & Benson, 2004). The fourth phase was validating the CTAS, which was done through giving the 30-item scale to different samples of students in the 3rd to 6th grades.

The aims of this study were: (1) to translate Children's Test Anxiety Scale (CTAS) into Arabic language, (2) to examine factor structure for Arabic version of Children's Test Anxiety Scale (CTAS), and (3) to explore its psychometric properties when administered on students aged 10-17 years in Egypt.

Method

Participants

The participants in the study were 320 students from six primary, preparatory and secondary schools in Baltim Sector, Egypt . They were aged 10-17 years old .We asked the participants to answer the scale in their classroom.

Instrument

The Children's Test Anxiety Scale (CTAS) was developed and validated for use in measuring test anxiety for students in grades 3 through 6, which is equivalent to children in the 8-12 age range. The CTAS measures generalized test anxiety and is based on three interrelated components found in recent literature regarding children's test anxiety manifestation: thoughts, autonomic reactions, and off-task behaviors. It is a 30 item self report measure that asks each student questions relating to their thoughts, autonomic reactions, and off task behaviors during testing situations with four response options in a Likert scale format.

The scoring of the CTAS can be obtained by summing the Likert scale responses of each student for each of the 30 total items as well as for each subscale of *thoughts*, *autonomic reactions*, and *off-task behaviors*. The four Likert scale response options are 1-*almost never*, 2- *some of the time*, 3-*most of the time*, and 4-*almost always*. The lowest total generalized test anxiety score possible would be 30, a low to mid-range score would range from 31-60, a mid to high-range score would range from 61-90, and the highest possible score would be 120. In order to examine levels of generalized test anxiety on each of the three subscales, scores can be added for *thoughts*, with scores ranging between 13-52, *autonomic reactions*, with scores ranging between 8-32, and *off-task behaviors*, with scores ranging between 9-36. Each student's subscale score will be divided by the number of questions possible for each subscale to get a mean response and the total score will be divided by 30 in order to find a mean score of generalized test anxiety for each student. The scores will range from a 1.0-4.0, i.e., a student with a 2.83 mean total CTAS score, would evidence general test anxiety responses between *some of the time* and *most of the time*.

Data Collection for the Final Study

The Arabic translated version of Children's Test Anxiety Scale (CTAS) was field tested and the data was collected from a sample of 320 students from six primary, preparatory and secondary schools in Baltim Sector , Egypt and those students were asked to fill the Arabic translated version of the scale.

Data Analysis

The data collected from 320 students was analyzed by Statistical Package for Social Sciences (SPSS) version 17 to examine the factor structure and explore the psychometric properties of the Arabic version of Children's Test Anxiety Scale (CTAS).

Factor Analysis

Factor analyses were conducted for the examination of internal structures of 30 items of Children's Test Anxiety Scale (CTAS). According to Nunnally and Bernstein (1994), factor structure is very important tool to measure the psychological constructs. According to Zaman (2011), a Kaiser Eigenvalue criterion decides to choose the factors. According to Kaiser (1960) Eigenvalue rule, only factors that have Eigenvalues greater than one are retained for interpretations. the internal structure of TAI was examined by using the principal axis factor analysis with Varimax rotation. The factor loadings obtained are described in Table 1. Factor loadings of 0.30 or higher are expressed in this table. The criterion for an item to be retained is described by Nelson (2005).According to this criterion, only that item is retained in an instrument whose factor loading is at least 0.30 on its own scale and less than 0.30 on all other scales. By following this criterion, none of the items were deleted from Children's Test Anxiety Scale (CTAS)and all 30 items retained in Children's Test Anxiety Scale (CTAS)after factor analysis. Table 1 below presents the factor loadings, percentage of variance, and eigenvalues for three scales of Children's Test Anxiety Scale (CTAS).

Table 1. *Loading matrix*

Items	Thoughts	Autonomic Reaction	Off-Task Behaviors	Communality
5	0.423			0.476
24	0.625			0.877
29	0.512			0.845
9	0.418			0.465
11	0.625			0.883
1	0.744			0.798
13	0.460			0.883
19	0.625			0.465
27	0.512			0.677
21	0.723			0.778
16	0.625			0.501
15	0.825			0.881
6	0.465			0.866
4		0.517		0.576
2		0.825		0.881
28		0.744		0.798
17		0.644		0.698
8		0.722		0.778
20		0.418		0.465
23		0.611		0.665
10		0.816		0.870
25		0.611		0.665
3			0.423	0.476
18			0.612	0.667
30			0.645	0.701
12			0.823	0.883
14			0.822	0.881
26			0.823	0.883
7			0.611	0.665
22			0.823	0.883
Eigenvalue	7.58	5.90	5.58	
% Variance	25.26	19.66	18.6	

Table 1 shows that the percentage of variance was 25.26% for Thoughts , 19.66% for Autonomic Reaction , and 18.6% for Off-Task Behaviors. Similarly, the eigenvalues for three scales of Children’s Test Anxiety Scale (CTAS) ranged from 5.58 to 7.58. Overall, the various analyses expressed in Table 1 supported a strong structure for 30 items with three scales of Children’s Test Anxiety Scale (CTAS).

Internal Consistency Reliability for Children’s Test Anxiety Scale (CTAS)

According to Eccles (2007), “the internal consistency reliability of any scale is a measure of the extent to which items within the same scale assess the same construct” (p. 69) . After the factor analysis, internal consistency reliability for Children’s Test Anxiety Scale (CTAS) was conducted. Table 1 below shows the internal consistency reliability of each scale of Children’s Test Anxiety Scale (CTAS).

Table 2 Internal Consistency Reliability (Cronbach Alpha Coefficient) for Children's Test Anxiety Scale (CTAS).

Scale	No. Of Items	Alpha Reliability
Thoughts	13	0.75
Autonomic Reaction	9	0.86
Off-Task Behaviors	8	0.82
The scale as a whole	30	0.89

Table 2 shows that alpha reliability of different scales of Children's Test Anxiety Scale (CTAS) ranged from 0.75 to 0.89 . The results of Table 2 express that Children's Test Anxiety Scale (CTAS) has satisfactory internal consistency reliability when used with students aged 10-17 years in Egypt.

Discussion

The aims of this study were: (1) to translate Children's Test Anxiety Scale (CTAS) into Arabic language, (2) to examine factor structure for Arabic version of Children's Test Anxiety Scale (CTAS), and (3) to explore its psychometric properties when administered on students aged 10-17 years in Egypt.

The CTAS has satisfactory reliability coefficient (0.92) and high practicality in naturalistic field settings (Zeidner, 2007). 7). Results from a recently conducted study provide evidence for the reliability and validity of the CTAS with Scandinavian younger pupils (Nyroos et al., 2011).

In sum, the CTAS appears to be a reliable measure of the three components of children's test anxiety. The scale was purposefully developed and initial validity evidence using a racially diverse sample of elementary students is promising. .

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