



Instructions for authors, subscriptions and further details:

<http://ijep.hipatiapress.com>

The Development and Psychometric Assessment of a Scale to Measure the Severity of Examination Anxiety among Undergraduate University Students

Dalia Bedewy¹ & Adel Gabriel²

1) Department of Educational Psychology, Tanta University, Egypt

2) Department of Psychiatry & Community Health Sciences, University of Calgary, Canada

Date of publication: February 24th, 2013

To cite this article: Bedewy, D. & Gabriel, A. (2013). The Development and Psychometric Assessment of a Scale to Measure the Severity of Examination Anxiety among Undergraduate University Students. *International Journal of Educational Psychology*, 2(1), 81-104. doi: 10.4471/ijep.2013.19

To link this article: <http://dx.doi.org/10.4471/ijep.2013.19>

PLEASE SCROLL DOWN FOR ARTICLE

The terms and conditions of use are related to the Open Journal System and to Creative Commons Non-Commercial and Non-Derivative License.

The Development and Psychometric Assessment of a Scale to Measure the Severity of Examination Anxiety among Undergraduate University Students

Dalia Bedewy
Tanta University

Adel Gabriel
University of Calgary

Abstract

The study reported here aimed to develop and psychometrically assess an instrument to measure examination anxiety among undergraduate university students. Based on empirical evidence and recent literature review we developed a 12 item scale to measure the severity of examination anxiety. The instrument was administered to students, two weeks before they wrote their examinations. Experts (n=10) participated in a validation process of the instrument before it was administered to students (n= 40). Internal consistency reliability for the instrument was 0. 82 (Cronbach's alpha) and there was 92 % overall agreement between experts about the relevance of the instruments' items to measure students' examination anxiety, providing evidence for content validity. Factor analysis resulted in three cohesive and theoretically meaningful factors. There is evidence for content and convergent validity. The developed instrument is a reliable, valid and empirical measure to assess the severity of examination anxiety. The scale will take five minutes to complete.

Keywords: examination anxiety, measurement scales, university students.

El Desarrollo y Evaluación Psicométrica de una Escala para Medir la Severidad de la Ansiedad Vinculada a los Exámenes entre Estudiantes Universitarios de Grado

Dalia Bedewy
Tanta University

Adel Gabriel
University of Calgary

Resumen

El estudio que compartimos en este artículo se dirigió a desarrollar y evaluar de forma psicométrica un instrumento para medir la ansiedad ante los exámenes entre estudiantes universitarios de grado. En base a evidencias empíricas y una revisión de la literatura reciente desarrollamos una escala de 12 ítems para medir la severidad de la ansiedad ante los exámenes. El instrumento se administró a los estudiantes dos semanas antes de que realizaran sus exámenes. Expertos (n=10) participaron en un proceso de validación del instrumento antes de que se administrara a estudiantes (n=40). La fiabilidad consistencia interna del instrumento fue de 0.82 (alfa de Cronbach) y hubo un 92% de acuerdo general entre expertos acerca de la relevancia de los ítems del instrumento para medir la ansiedad de los estudiantes ante los exámenes, evidenciando esto la validez del contenido. El análisis de factores resultó en tres factores coherentes y significantes teóricamente. Existe evidencia sobre la validez convergente y de contenido. El instrumento desarrollado es una medida fiable, válida y empírica para evaluar la severidad de la ansiedad ante los exámenes. Completar la escala lleva cinco minutos.

Palabras clave: ansiedad ante los exámenes, escalas de medida, estudiantes universitarios.

Test anxiety is defined as a special form of anxiety, which is characterized by somatic, cognitive and behavioral symptoms of anxiety in situations of preparing and performing in examinations (Latas, Pantić, & Obradović, 2010). The fear of negative evaluation, may lead to poor study skills and poor test performance (Chapell, Blanding, Silverstein, Takahashi, Newman, Gubi, & McCann, 2005; Szafranski, Barrera, & Norton, 2012).

Nicaise (1995) also defined test anxiety as an individual's physiological, cognitive, and behavioral responses that stimulate negative feelings about an evaluation. When an individual becomes anxious, the physiological system becomes aroused, such as the heart beating faster or the sweat glands producing more perspiration. At the same time, the individual may experience apprehension and a higher sense of inadequacy. When an individual experiences test anxiety, these physical and cognitive responses may lead to negative feelings and cognitions about testing situations (Nicaise, 1995).

The size of the problem

Many college students experience anxiety during their examinations, and in fact, previous research suggests a modest prevalence rate of 10 - 35% of college student's experience functionally impairing levels of test anxiety (Naveh-Benjamin, Lavi, McKeachie, & Lin, 1997). The severity of anxiety symptoms and the associated academic impairments were found to be higher in females, than in males, in younger age group, and higher prevalence rates were reported in medical students who presented moderate level of test anxiety (Latas et al., 2010; Schaefer, Matthess, Pfitzer, & Köhle, 2007; Eum & Rice, 2011). In several studies, female students had statistically significant more intense symptoms of test anxiety than male students. For example, in a recent study (Szafranski et al., 2012) examined changes in the Test Anxiety Inventory (TAI) scores in college undergraduates (n=437). Authors reported significant increases in TAI scores for females while the same remained constant for males (Szafranski et al., 2012). In a larger study by Schaefer et al. (2007) it was reported that about 10 % of students (n=945) suffer from test anxiety to such an extent that treatment is warranted. The

correlation of high test anxiety with other mental disorders and study success is rarely investigated (Schaefer et al., 2007).

Those undergraduate college students, who experience functionally impairing levels of test anxiety, may suffer from poor academic performance (Strumpf, & Fodor, 1993; Cassady, 2004; Raju, Mesfin, & Alia, 2010). Empirical findings have consistently reported that high levels of cognitive test anxiety were negatively correlated to global indices for academic performance, such as scores on standardized achievement tests, grades, and overall grade point average (GPA) (Putwain, Connors, & Symes, 2010), and it was concluded that cognitively test-anxious persons might have greater abilities than they commonly show (Lang & Lang, 2010).

Components of test anxiety

Within the test anxiety literature, it is a widely held belief that test anxiety is comprised of two main common components: “worry” or aversive cognitions related to testing stimuli, and “emotionality” or physical symptoms of anxiety while in testing situations (Liebert & Morris, 1967).

Cognitive features

It is emphasized that anxiety is a response to the perceived inability to handle a challenge in a satisfactory manner (Klinger, 1975). Also among the characteristics of cognitive anxiety responses are the following; 1) The situation is seen as difficult, challenging, and threatening, 2) The individual sees himself or herself as ineffective in handling, or inadequate to do the task at hand, 3) The individual focuses on undesirable consequences of personal adequacy, 4) Self-depreciatory preoccupations are strong and interferes with task-relevant cognitive activity, and 5) The individual expects and anticipates failure and loss of regard by others (Sarason, 1978). These negative cognitions often lead to students’ inability to concentrate on the immediate task, thus making it more likely for them to encounter negative outcomes (e.g., poor test performance).

Some types of examination format were associated with more anxiety than with others. For example, it was demonstrated that state anxiety during the Observed Structured Clinical Examinations (OSCE) was associated with the level of preparation for the examination (Brand & Schoonheim-Klein, 2009), which suggests that appropriate level of arousal might be necessary for an optimal performance. Conversely, excessive cognitive test anxiety was found to be inversely associated with performance indicators, and positively associated with maladaptive perfectionism (Eum & Rice, 2011). Hancock (2011) and Hembree (1988) reported that negative cognitions related to examinations, when such students underestimate their own abilities, or overestimation the consequences related to their failure, are often accompanied by higher anxiety levels, and poor performance (Hancock, 2011; Hembree, 1988).

Somatic and psycho-biophysiological features

Physical symptoms associated with test anxiety can be as intrusive as the negative cognitions. The somatic presentations of test anxiety may include number of autonomic responses and bio-physiological changes which essentially are transient in nature. Evidence for stressful situations such as test situations and examinations were investigated extensively in research. For example, it was confirmed in a number of studies that routine academic events may cause stress and produce temporary elevations in pulse, blood pressure, and that there is strong positive correlations between the self-rating anxiety score and the blood pressure and heart rate increase amplitudes (Conley & Lehman, 2012; Pramanik, Ghosh, & Chapagain, 2005; Zhang, Peng, Yang, & Cheng, 2011). Also, it was demonstrated that there was a statistically significant decrease in auditory reaction time, galvanic skin resistance and eosinophil count (eosinophils are components of white blood cells. They make about 1-6% of white blood cells, they help fighting infections, and they tend to increase in number as a result of allergic reactions, parasitic infections, and certain autoimmune disease), before the examination as compared to the control readings, in 30 male and 25 female medical students appearing for their Bachelor of Medicine final examinations (MBBS) viva-voce examination (Malathi & Parulkar, 1992).

Laboratory research has confirmed that social-evaluative threat has a significant influence on the hypothalamus pituitary adrenal axis (HPA). For example, cortisol concentrations were elevated on the examination day, with increased concentrations before but not after the examination (Preuss, Schoofs, Schlotz, & Wolf, 2010). Others investigated the respiratory response to stress. For example, (Liu, Coe, Swenson, Kelly, Kita, & Busse, 2002) evaluated 20 college students with mild asthma during the stress phase of the final examination week. Students' anxiety and depression scores were found to be significantly high during the examination period, and sputum eosinophils levels significantly increased and were enhanced during the stress phase ($p < 0.01$). These findings suggest that stress associated with final examinations can act as a cofactor to increase eosinophilic airway inflammation and thus may enhance asthma exacerbations in some patients (Liu et al, 2002). Also changes in the resting metabolic rate and triglycerides were associated with high anxiety scores (Maimanee, 2010; Schmidt, O'Connor, Cochrane, & Cantwell, 1996).

Given the impact of test anxiety on students' performance, it is important to identify students who are at risk for developing anxiety, particularly because both pharmacological and non-pharmacologic options such as cognitive-behavioral therapy are effective in the management of anxiety before taking tests. Therefore prediction and detection of anxiety will provide key opportunities for preventive or early therapeutic interventions to improve academic outcomes, and students' psychological health. There is empirical evidence that therapeutic interventions studies have proved efficacy in the management of examination anxiety. For example, problem-focused coping strategies including optimistic action and social support to deal with stress (Wang & Yeh, 2005). Also, emotional disclosure, and writing repeatedly about personal stressful experiences may lead to improved academic performance of college students (Radcliffe, Stevenson, Lumley, D'Souza & Kraft, 2010), and self affirmation may attenuate sympathetic nervous system responses of anxiety (Sherman, Bunyan, Creswell, & Jaremka, 2009).

Other medical interventions including antianxiety medications were needed in a subgroup of students For example, it was reported that those

who scored either very high for test anxiety had higher scores on anxiety trait tests, and consumed more medication, and that 7 % of the students with high test anxiety were in psychotherapeutic treatment (Schaefer et al., 2007).

Measuring Test Anxiety

Over the last fifty years, few instruments were developed to measure and examine test anxiety. One of the earliest was the Test Anxiety Scale (TAQ). This scale was described by Sarason & Mandler (1952) (the test Anxiety Questionnaire), consists of 37 items. However, later after revisions, the Test Anxiety Scale (TAS) which consists of 21- true - false items, was described. Few revised versions for this instrument were developed later and they were used till late 1970s, and the scale was tested in college students (Sarason & Mandler, 1952; Sarason, 1978). The following are examples of items of the Test Anxiety Scale (TAS); (T) 1. While taking an important exam I find myself thinking of how much brighter the other students are than I am; (T) 2. If I were to take an intelligence test, I would worry a great deal before taking it; (F) 3. If I knew that I was going to have a test, I would feel confident and relaxed, beforehand. In the opinion of authors that the weakness in this scale lies in the fact that its responses are categorical with either TRUE or FALSE, for a subtle measure such as anxiety, which could be better measured on a continuum.

In 1980, Spielberger, described the Test Anxiety Inventory (Spielberger, 1980) with its 20 item. This was used extensively among undergraduate students, and it takes 10 minutes to be completed. The TAI was utilized in test anxiety research extensively as a primary outcome variable (Spielberger, 1980). The TAI was psychometrically assessed in college undergraduates in 1980, and displayed good convergent validity. The Test Anxiety Inventory (TAI) is widely used in research and practical settings and has particular application to the assessment and treatment of test anxiety in student populations (Spielberger, 1980). However, Taylor & Deane (2002) attempted to avoid the limitations created by lengthy scales, and developed a short form of the (TAI) (Appendix), which consists of a 5-item only. Short

form of the (TAI), was extracted from the 20- item (TAI). This instrument was tested in the 3rd year undergraduate psychology students (n=333) (Taylor & Deane, 2002). Although the psychometric properties of the five-item short form of TAI are strong, some of its items are vague, such as the item 2, about feeling panicky, which could be misinterpreted. Also, another limitation with using present scale which were developed at least 30 years ago is problematic because the academic landscape has altered in a variety of ways in the past 30 years, particularly in areas like quantity of student enrollment, age of students, percentage of first-generation students (i.e., neither parent has graduated nor attended college), full time vs. part time students, as well as ethnic and gender diversity (Szafranski et al., 2012). The Egyptian academic landscape is no exception as it has witnessed many academic changes such as a dramatic increase in the number of undergraduate students, the development of many privately owned universities and the significant increase in tuition fees and expenses of education. This has been the cause of stress among students, which hardly addressed in research. For example, El-Zahhar & Hocevar (1991) examined cultural and sexual differences in test anxiety in samples of high school students in Egypt (N= 277), Brazil (N = 234), and the United States (N = 141). Authors reported higher trait anxiety and arousability among high school students in Egypt, compared to both the United States and Brazil students. United States greater test anxiety was found in Egypt on both the worry dimension and the emotionality dimension. Also, they found that in all three cultures females reported greater worry, emotionality, trait anxiety, and arousability than males (El-Zahhar & Hocevar, 1991)¹.

In the present review, authors were not able to identify recent studies to examine examination anxiety among Egyptian undergraduate university students.

To the best of authors' knowledge, there is no published psychometrically assessed scale that was developed to measure examination anxiety among Egyptian university undergraduate students.

Objectives of the Study

The objective of this study is to develop and psychometrically assess a scale, to measure examination anxiety in university undergraduate

students just before taking end of the third year examinations in psychology. Also, it was aimed at developing an instrument which is not, too long or too short, with an optimal number of items that could be completed by students in short time; in order to avoid and remedy some limitations in previously developed test anxiety scales. Therefore there is need to develop a reliable measure of examination anxiety, with demonstrated evidence of validity, which could be a utilized to identify students who are at high risk of developing excessive anxiety before taking examination, and to manage their anxiety experiences as early as possible accordingly.

Method

Participants

Students

There were 40 students, both men and women, ranging from 19 - 26 years of age (mean = 20.5 years) that participated. The proportion of male to female participants was 30/10 (75 % / 25%). All the participating students were from the third year, education psychology class at Tanta University Egypt. Students were included if they were planning to sit their 3rd year final course examinations in educational psychology. All students who participated in this study did not have a history of diagnosed psychiatric disorders, and all provided their consent to be included in the study.

The examination process involved taking a three – hour written essay paper, and an oral examination in the same day, which followed the written examination almost immediately. The written examination carried 75% of the total mark, and the oral examination carried the rest (25%). Students did not receive any credits for any assignments, or any home work, which they did during the whole year. Students therefore have to memorize a large amount of knowledge, for the two main semesters which they attended throughout the year.

Psychology and Psychiatry Experts

Both male and female experts (more than 15 years of experience as independent psychiatrists or psychologists), were invited to participate in the present study. Participated ten experts (female / male =3/7, mean age = 48 years; SD=8.8, and mean years of experience as independent Psychiatry or Psychology consultants = 21; SD = 6.7). Among experts, there were eight from the University of Calgary, and two from Tanta University Egypt who collaborated in this project. Letters of invitations were sent by e mail or face to face inviting experts to participate in the validation process. There was also one on one discussion, and feedback, about each item of the scale with regard its relevancy to sample examination anxiety among undergraduate students. Among experts, there were three at the rank of professor, one at associate professor, and six at assistant professor. Initially experts provided opinion about the overall content of the instrument. Each expert reviewed and provided comments on the relevance of the scale to be developed before testing the instruments with students.

Procedure

The design involved the development and the psychometric assessment of a scale to measure examination anxiety. Following extensive literature review, a table of specification with the initial items was created to guide item construction for developing the scale. We were able to identify a list of specification with two main components to characterize test anxiety, 1) cognitive anxiety, and 2) somatic anxiety. The items of cognitive anxiety, and somatic anxiety symptoms, on the list of specification, were converted to a 12-item, 5-point Likert questionnaire, resulting in the Examination Anxiety Scale (EAS).

The volunteer panel of experts discussed and reviewed with the items to examine the appropriateness and clarity of items, and to ensure that each item assessed students' examination anxiety as they present clinically.

Experts were invited to formally rate each item for its relevancy in measuring anxiety severity, on a five point Likert scale (1= extremely irrelevant, 2 = irrelevant, 3 = slightly relevant, 4 = relevant, and 5 =

strongly relevant). The objective of consultation with experts was to provide both face and content validity by providing their agreement about the relevance for each item separately as a measure of students' examination anxiety. For the purpose of developing the EAS, it was agreed to include only items receiving a mean score above 3.5 rating from experts, as relevant to develop the scale. This process resulted in selecting the Examination Anxiety Scale (EAS, n =12 items).The EAS includes two main subscales: the cognitive anxiety subscale (5 items), and the somatic anxiety subscale (7 items).

Table 1
Table of specification and experts' ratings of the examination anxiety scale

1. Cognitive and avoidances Subscale	Experts' Responses	
	Min-Max (Mean ± SD)	
Am afraid of failure when I go to the exam	4-5	4.6 (.53)
I do not have confidence in myself to pass	4-5	4.6 (.53)
Even when I'm well prepared for the exam, I feel anxious about it	4-5	4.9 (.38)
My anxiety interferes with my performance in the exam	4-5	4.8 (.38)
Am preoccupied with failure just before exams	4-5	4.6 (.53)
2. Somatic anxiety subscale		
I experience an upset stomach during exam days- 8	4-5	4.7(.49)
My sleep is disturbed during exams	2-5	4.3 (1.1)
Exams make feel shaky	4-5	4.7(.49)
Exams make me unable to relax	3-5	4.3 (1.0)
My heart beats fast (races) during exams	4-5	4.7(.49)
I tend to have breathing difficulty on the exam day	3-5	4.4(.79)
I develop diarrhea around the exams	3-5	4.6(.79)
Average ratings	4.6 (92 %)	

*Note.*Experts' responses: (1= extremely irrelevant – 5 = very relevant)

Format, Layout, and Language Review of Instruments

All items were reviewed by an English literature teacher for clarity and grammatical corrections. After the scale was written, the Microsoft Word computer program was used to assess the grammar. This was carried out to ensure that students could easily understand and interpret each item. Given the fact that students are studying psychology in English language, it was decided that the EAS could be administered in English and not in Arabic language.

Administration to Students

The scale was pilot tested among four students. Students concerns and feedback were sought in the following aspects of the scale:

1. Clarity of items, identifying and reporting any ambiguous items and items difficult to interpret.
2. Difficulties with language, technical jargon, or any offending language.
3. Reactions and responses to the format and layout of each item.
4. Time needed to complete the scale.

After slight modification based on expert and students' input, the Examination Anxiety Scale (EAS, items = 12) was distributed to all students in the 3rd class of educational psychology ($n= 60$), by e mail, two weeks before they wrote their examination. Forty students (40/60, 66.6%) returned the completed EAS. Students were asked to rate on a 5-point Likert scale (from 1= strongly disagree to 5 = strongly agree) their perceptions and experiences about each item in measuring examination anxiety. At the same time, students were asked to complete the Sheehan Patient-Rated Anxiety Scale (SPRAS) (Sheehan, 1999). This is a 35-item, patient rated scale, with four specific items which evaluate situational anxiety, unexpected anxiety, unexpected limited symptom attack, and anticipatory anxiety. Students were also asked to provide demographics including age, sex, and if they had any history of diagnosed psychiatric disorders or anxiety. SPRAS is utilized as a criterion measure, to assess criterion related validity of the newly developed scale.

Data Collection and Analysis

Responses from psychology, and psychiatry experts were used to provide evidence for content validity for the instrument, while students' responses and performances on the instrument was utilized to provide evidence for internal consistency reliability, and convergent validity as adduced in correlation analysis of the patients' responses on the subscales of the instrument. Students needed on average, five minutes to complete the EAS.

Results

The results of experts' and students' responses are summarized in [table 1](#) and [table 2](#), respectively. The internal consistency reliability (Cronbach's alpha) was 0.82 for the 12 items of the EAS. Analyses of variance (ANOVA) indicated that there were no significant differences in the mean EAS score, between sexes, age groups in the severity scores of anxiety symptoms.

Experts' Responses

A close inspection of [table 1](#), there were no significant differences in ratings among experts based on their length of experience ($p < .06$). Expert's ratings for all items on the scale ranged from a minimum of 3.7 to a maximum of 5 and an average rating for all the instrument items of 4.6. This yields an overall agreement of 92% among experts about the 12 items to assess students' examination anxiety.

Students' Responses

A close inspection of [table 2](#) will show that the level of the anxiety reported by students was in the moderate range for most scales' items. Utilizing Pearson product moment correlations students' scores correlated significantly on the two subscales; the cognitive and the somatic ($r = .579, p < .001$).

Table 2
Students' ratings of the examination anxiety scale

1. Cognitive and Avoidance Subscale	Students' Responses	
	Min-Max	(Mean \pm SD)
Am afraid of failure when I go to the exam	1-5	3.7(1.5)
I do not have confidence in myself to pass	1-5	2.1(1.1)
Even when I'm well prepared for the exam, I feel anxious about it	1-5	2.7(1.4)
My anxiety interferes with my performance in the exam	1-5	3.5(1.1)
Am preoccupied with failure just before exams	1-5	3.5(1.4)
I experience an upset stomach during exam days- 8	2-5	3.1(1.3)
My sleep is disturbed during exams	1-5	3.5(1.2)
Exams make feel shaky	1-5	3.1(1.3)
Exams make me unable to relax	1-5	3.5(1.2)
My heart beats fast (races) during exams	1-5	3.3(1.4)
I tend to have breathing difficulty on the exam day	1-5	2.6(1.4)
I develop diarrhea around the exams	1-5	2.8(1.5)
Average ratings	3.1 (62%)	

Note. Students' responses: (1= strongly disagree to 5= strongly agree)

Factor Analysis

Several exploratory principal component analyses were conducted on the 12-item scale. Based on the Kaiser rule (eigen values > 1.0), the percentage of variance accounted for, and the cohesiveness of the factors (i.e., patterns of loadings), a three factor solution appeared optimum. The three factors accounted for 59.1% of the variance in responses related to students' experiences of examination anxiety, and the varimax rotation converged in four iterations. Table 3 contains the factor loadings, the internal consistency reliability analysis, and the proportion of observed variance for each factor.

Table 3
Rotated Factor Matrix Examination Anxiety Scale scores

Items (n=12) of the Examination Anxiety Scale (EAS)	Factor Loadings		
	F1	F2	F3
My heart beats fast (races) during exams	.77		
My anxiety interferes with my performance in the exams	.70		
Am afraid of failure when I go to the exam	.68		
Exams make me unable to relax	.66		.54
I tend to have breathing difficulty on the exam day		.74	
I develop diarrhea around the exams		.73	
Am preoccupied with failure just before exams		.67	
Even when I'm well prepared for the exam, I feel anxious about it		.60	
I do not have confidence in myself to pass		.50	
Exams make feel shaky			.75
I experience an upset stomach during exam days			.63
My sleep is disturbed during exams			.53
Internal Consistency (Cronbach's alpha) for each factor	.78	.72	.72
Proportion of Observed Variance for each factor (%)	34.8	16.2	8.0

Note. Principal components extraction, Varimax rotation with Kaiser Normalization

Rotation converged in four iterations

†Factor loadings < .40 have been excluded

Factor 1: Excessive performance anxiety

Factor 2: Negative academic self concept and excessive autonomic response

Factor 3: Familiar test anxiety

Factor 1: Excessive performance anxiety

This component consists of four items, has an internal consistency of 0.78, and explains 34.8% of the observed variance. It refers to the excessive preoccupation with poor performance and the fear of failure in the examination, the inability to relax, and the experience of racing heart.

Factor 2: Negative academic self concept and excessive autonomic response

This component consists of five items, has an internal consistency of 0.72, and explains 16.2% of the observed variance. The component refers to feeling stigmatized, poor self concept, lack of confidence in academic abilities, and the fear of failure despite preparation for the exams.

Factor 3: Familiar test anxiety

This component consists of six items, has an internal consistency of 0.72 and explains 8% of the observed variance. It refers to the commonly encountered experiences of examination anxiety such as reporting poor sleep, and butterflies in the stomach.

Factor scores were intercorrelated with Pearson product moment correlations and with the total scores of the Sheehan Patient-Rated Anxiety Scale (SPRAS). Sheehan self-report scale. These results are summarized in [table 4](#). A close inspection of [table 4](#), reveals that there is significant correlation between the three factors of the EAS, and there was significant correlation between EAS factor scores, and the mean scores of (SPRAS), especially factor 2 scores “Negative academic self concept and excessive autonomic response”,. Also, the mean EAS score correlated significantly ($r = .35, p < .01$), with the mean SPRAS score. Between group differences were analyzed using ANOVA. There were no significant differences between males and females, or between age groups, in the mean scores of the scale’s factors.

Table 4

Pearson Product Moment Correlations between factors Scores and Sheehan's self-report scale

EAS Factors	1: Excessive performance anxiety	2: Negative academic self concept and excessive autonomic response	3: Familiar test anxiety
Factor 1: Excessive performance anxiety	1.00	.37 ^b	.74 ^b
Sheehan Patient-Rated Anxiety Scale (SPRAS)	.17	.37 ^a	.267

Note. ^aCorrelation is significant at the 0.05 level (2-tailed). ^bCorrelation is significant at the 0.01 level (2-tailed).

Discussion

In the present study, examination anxiety symptoms among the 3rd year psychology students, just before taking their examination were included in a 12-Likert-type item scale that had an overall reliability internal consistency of 0.82. There was 92% overall agreement among experts about the relevancy of its contents to measure students' examination anxiety. Students' experience of anxiety just before sitting the examination was generally rated as moderate, and there were no differences between male and female students in the severity of anxiety, and factor analysis revealed three factors that explained 59.1%, of the variance for this scale. The anxiety items clustered into constructs (i.e., factors), which resulted in three components. The factors are theoretically meaningful and cohesive, as it was demonstrated in the significant correlations between their scores, supporting evidence for convergent validity. The three extracted factors, factor 1, 'Excessive performance anxiety', factor 2, 'Negative academic self concept and excessive autonomic response', and factor 3, 'Familiar test anxiety', are in concordance with previous research, are theoretically meaningful and cohesive within the framework of test anxiety.

In the current study, Factor 2 ‘Negative academic self concept and excessive autonomic response’ which accounts for 16.2 % of the variance, represents a more intense experience of anxiety, especially at the cognitive level and was associated with poor academic self concept. However all students who completed the EAS, in the current study did not have history of diagnosed anxiety disorders. In the current study, only two students with a history of anxiety or depression were excluded. These findings replicate and extend the findings from other studies, which lend credibility to the construct validity of our scale (Hembree, 1988). In the current study, contrary to what was reported in previous research authors did not find any significant differences in anxiety scores between males and females (El-Zahhar & Hocevar, 1991; Latas et al., 2010; Szafranski et al., 2012).

Evidence for Content Validity

The considerable effort to carefully develop a table of specifications with items for the present scale, plus the systematic input from psychiatric experts enhanced the content and face validity of the scale. The follow-up by the experts further enhanced the content validity because of their very high agreement on the relevance of the items.

Evidence for Convergent and Criterion-Related Validity

From the correlations between the two subscale scores, and the three factor scores, there is evidence to support convergent validity for this scale. Convergent validity was demonstrated in the positive significant correlations between the three factors, and also by the significant positive correlation between scores of the second factor “Negative academic self concept and excessive autonomic response” and the mean score of SPRAS. This was further supported by the significant correlation between the mean EAS score, and the mean SPRAS score.

Since test anxiety essentially is situational in nature, the EAS was administered in the current study two weeks before taking the examinations. This was supported by most research in which anxiety measures were administered either before taking the tests, during

preparing for, or immediately after taking the examinations (Latas et al., 2010; Malathi and Parulkar, 1992; Preuss et al., 2010; Zhang et al., 2011).

Limitations of the Study

This study has a series of limitations that must be taken into account in reading the findings discussed here. In particular, those limitations refer to the sample which, on the one hand, was not large and, on the other hand, was homogenous, as all patients were recruited from one class.

Conclusion

Further research is needed utilizing a larger, heterogeneous sample of students, from different students in different classes, and from different undergraduate students. Also, testing the instrument in different cultural backgrounds, and different examination sittings, may support its reliability and validity to be used in such sittings.

Notwithstanding the limitations of the present study, a brief self report scale to measure student's examination anxiety was developed. There is acceptable internal consistency reliability, and there is evidence for face, content, convergent and criterion related validity for this instrument. In future research the scale should be administered to a larger, heterogeneous sample of students, and in different educational and cultural sittings. Also future research should examine the relationship between examination anxiety and psychiatric disorders especially depression and anxiety disorders, which is lacking in literature.

Notes

*This research project was presented and published as an abstract in the International Journal of Psychiatry in Clinical Practice, 16(supp1), 28. The 12th International Forum on Mood and Anxiety Disorder proceedings; Barcelona Spain, 7th – 9th November 2012.

**This project did not receive any funding, and there is no conflict of interests of any kind.

¹ For further reading about the background, nature and structure of Egyptian higher education the reader should refer to this website for details <http://www.egy-mhe.gov.eg/>

References

- Brand, H.S & Schoonheim-Klein, M. (2009). Is the OSCE more stressful? Examination anxiety and its consequences in different assessment methods in dental education. *European Journal of Dental Education*, 13,147-153. doi: 10.1111/j.1600-0579.2008.00554.x
- Cassady, J.D. (2004). The impact of cognitive test anxiety on text comprehension and recall in the absence of external evaluative pressure. *Applied Cognitive Psychology*, 18, 311- 325. doi: 10.1002/acp.968
- Chapell, M., Blanding, Z., Silverstein, M., Takahashi, M., Newman, B., Gubi, A., & McCann, N. (2005). Test anxiety and academic performance in undergraduate and graduate students. *Journal of Educational Psychology*, 97(2), 268-274. doi: 10.1037/0022-0663.97.2.268
- Conley, K.M., & Lehman, B.J. (2012). Test anxiety and cardiovascular responses to daily academic stressors. *Stress Health*, 28(1), 41-50. doi: 10.1002/smi.1399
- El-Zahhar, N & Hocevar, D. (1991). Cultural and Sexual Differences in Test Anxiety, Trait Anxiety and Arousability: Egypt, Brazil, and the United States. *Journal of Cross-Cultural Psychology*, 22, 238-249. doi: 10.1177/0022022191222005
- Eum, K., & Rice, K.G. (2011). Test anxiety, perfectionism, goal orientation, and academic performance. *Anxiety Stress Coping*, 24(2), 167-78. doi: 10.1080/10615806.2010.488723
- Hancock, D. (2001). Effects of test anxiety and evaluative threat on students' achievement and motivation. *The Journal of Educational Research*, 94(5), 284–290.
- Hembree, R. (1988). Correlates, causes, effects, and treatment of test anxiety. *Review of Educational Research*, 58(1), 47–77. doi: 10.3102/00346543058001047

- Klinger, E. (1975). *Consequences of commitment to and disagreement from incentives. Psychological Review*, 82(1), 1-25. doi: 10.1037/h0076171
- Lang, J.W., & Lang, J. (2010). Priming competence diminishes the link between cognitive test anxiety and test performance. Implications for the interpretation of test scores. *Psychol Sci.*, 21(6), 811-819. doi: 10.1177/0956797610369492
- Latas, M., Pantić, M., & Obradović. D. (2010). Analysis of test anxiety in medical students. *Med Pregl*, 63(11-12), 863-866. doi: 10.2298/MPNS1012863L
- Liebert, R., & Morris L. (1967). Cognitive and emotional components of test anxiety: A distinction and some initial data. *Psychological Reports*, 20(3), 975-978. doi: 10.2466/pr0.1967.20.3.975
- Liu L., Coe C., Swenson C., Kelly E., Kita H., Busse W. (2002). School examinations enhance airway inflammation to antigen challenge. *Am J Respir Crit Care Med.*, 165(8), 1062-1067.
- Maimanee, T. A. (2010). The impact of exams anxiety on the level of triglycerides in university female students. *Journal of Egyptian Society of Parasitology*, 40(1), 259-270.
- Malathi, A., & Parulkar, V.G. (1992). Evaluation of anxiety status in medical students prior to examination stress. *Indian Journal of Physiological Pharmacology*, 36(2), 121-122.
- Mandler, G., & Sarason, S. (1952). The effect of prior experience and subjective failure on the of test anxiety. *Journal of Personality*, 21, 338-341.
- Naveh-Benjamin, M., Lavi, H., McKeachie, W., & Lin, Y. (1997). Individual differences in students' retention of knowledge and conceptual structures learned in university and high school courses: The case of test anxiety. *Applied Cognitive Psychology*, 11(6), 507-526. doi: 10.1002/(SICI)1099-0720(199712)11:6<507::AID-ACP482>3.0.CO;2-G
- Nicaise, M. (1995). Treating test anxiety: A review of three approaches. *Teacher Education and Practice*, 11, 65-81.
- Pramanik, T., Ghosh, A., & Chapagain, G. (2005). Effect of examination stress on the alteration of blood pressure in young normotensives. *Blood Pressure Monitor*, 10(3), 149-50. doi: 10.1097/00126097-200506000-00006

- Preuss, D., Schoofs, D., Schlotz W., & Wolf, O. (2010). The stressed student: influence of written examinations and oral presentations on salivary cortisol concentrations in university students. *Stress*, 13(3), 221-229. doi: [10.3109/10253890903277579](https://doi.org/10.3109/10253890903277579)
- Putwain, D., Connors, L., & Symes, W. (2010). Do cognitive distortions mediate the test anxiety-examination performance relationship? *Educational Psychology*, 30, 11-26. doi: [10.1080/01443410903328866](https://doi.org/10.1080/01443410903328866)
- Radcliffe, A.M; Stevenson, J.K; Lumley, M.A; D'Souza, P & Kraft, C. (2010). Does Written Emotional Disclosure about Stress Improve College Students' Academic Performance? Results from Three Randomized, Controlled Studies. *J Coll Stud Ret*, 12(4), 407-428. doi: [10.2190/CS.12.4.b](https://doi.org/10.2190/CS.12.4.b)
- Raju, P.M., Mesfin, M., & Alia, E. (2010). Test Anxiety Scale: reliability among Ethiopian students. *Psychological Repots*, 107(3), 939-948. doi: [10.2466/03.11.17.PR0.107.6.939-948](https://doi.org/10.2466/03.11.17.PR0.107.6.939-948)
- Sarason, S.B., & Mandler, G. (1952). Some correlates of test anxiety. *Journal of Abnormal Psychology*, 47(4), 810-7.
- Sarason, I.G. (1978). The Test Anxiety Scale: Concept and research. In C.D. Spielberger & I.G. Sarason (Eds.), *Stress and anxiety*, Vol. 5 (pp. 193 - 216). New York: JohnWiley & Sons.
- Schmidt, W.D., O'Connor, P.J., Cochrane. J.B., & Cantwell, M. (1996). Resting metabolic rate is influenced by anxiety in college men. *Journal of Applied Physiology*, 80(2), 638-642.
- Schaefer, A., Matthess, H., Pfitzer, G., & Köhle, K. (2007). Mental health and performance of medical students with high and low test Anxiety. *Psychotherapie Psychosomatik Medizinische Psychologie*, 57(7), 289-97.
- Sheehan, D.V. (1999). The Sheehan Patient Rated Anxiety Scale. *Journal of Clinical Psychiatry*, 60, 63-64.
- Sherman, D.K; Bunyan, D.P; Creswell, J.D; Jaremka, L.M. (2009). Psychological vulnerability and stress: the effects of self-affirmation on sympathetic nervous system responses to naturalistic stressors. *Health Psychol*, 28, 554-62. doi: [10.1037/a0014663](https://doi.org/10.1037/a0014663)

- Strumpf, J.A., & Fodor, I. (1993). The treatment of test anxiety in elementary school-age children: Review and recommendations. *Child & Behavior Therapy*, 15(4), 19-42. doi: [10.1300/J019v15n04_02](https://doi.org/10.1300/J019v15n04_02)
- Spielberger, C.D. (1980). *Test anxiety inventory: Preliminary professional manual*. Palo Alto, CA: Consulting Psychologist Press.
- Szafranski, D., Barrera, T., & Norton, P. (2012). Test anxiety inventory: 30 years later. *Anxiety Stress & Coping: An International Journal*, 25(6), 667-677. doi: [10.1080/10615806.2012.663490](https://doi.org/10.1080/10615806.2012.663490).
- Taylor, J. & Deane, F. (2002). Development of a short form of the test anxiety inventory (TAI). *The Journal of General Psychology*, 129(2), 127-36. doi: [10.1080/00221300209603133](https://doi.org/10.1080/00221300209603133)
- Wang, H.F. & Yeh, M.C. (2005). Stress, coping, and psychological health of vocational high school nursing students associated with a competitive entrance exam. *J Nurs Res*, 13, 106-116.
- Zhang, Z., Su, H., Peng, Q., Yang, Q., Cheng, X. (2011). Exam anxiety induces significant blood pressure and heart rate increase in college students. *Clinical and Experimental Hypertension*, 33(5), 281-286. doi: [10.3109/10641963.2010.531850](https://doi.org/10.3109/10641963.2010.531850)

Dalia Bedewy is assistant lecturer in the Department of Educational Psychology at Tanta University, Egypt.

Adel Gabriel is consultant & associate clinical professor in the Department of Psychiatry & Community Health Sciences, at the University of Calgary, Canada.

Contact Address: Direct correspondence to Adel Gabriel, 2000 Pegasus Road NE, Calgary AB, T2E 8K7, Canada. E-mail: gabriel@calgary.ca

Appendix

Short form of the TAI (Taylor & Deane, 2002)

Items (n =5)	Yes / No
1. During the test I feel very tense 2. I wish examinations did not bother me so much 3. I seem to defeat myself while working on important test 4. I feel very panicky when I take an important test 5. During examination I get so nervous that I forget facts I really know	