The Journal of General Psychology, 2002, *129*(2), 127–136

Development of a Short Form of the Test Anxiety Inventory (TAI)

JOANNE TAYLOR
School of Psychology
Massey University, Palmerston North, New Zealand

FRANK P. DEANE
Department of Psychology
Illawarra Institute for Mental Health
University of Wollongong, Australia

ABSTRACT. 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. However, there are a number of instances in which a short version of the TAI would be more appropriate, especially when time constraints preclude the use of the full form. Similar short forms have been developed for other measures such as the State scale of the State-Trait Anxiety Inventory (STAI; T. M. Marteau & H. Bekker, 1992). The authors of the present study aimed to develop a short form of the TAI. The TAI was completed by 333 undergraduate psychology students. Item–remainder correlations were used to compare short forms with varying numbers of items. Internal consistency and concurrent and construct validity were assessed in hypothetical and actual examination conditions. A 5-item short form produced optimal reliability and validity, and a balance of items from the Worry and Emotionality subscales of the TAI. Further research is needed to replicate these results, but the 5-item short form of the TAI shows promise, particularly for contexts in which time demands preclude the use of longer versions.

Key words: short form, Test Anxiety Inventory

THE TEST ANXIETY INVENTORY (TAI; Spielberger et al., 1980) was developed as a measure of individual differences in test anxiety as a situation-specific personality trait (Spielberger, 1972). It has been used in research and applied settings in research with students and has also been found to be a sensitive outcome measure in studies of the treatment of test anxiety (Spielberger et al.).

Address correspondence to Joanne Taylor, School of Psychology, Massey University, Private Bag 11-222, Palmerston North, New Zealand; Joanne.Taylor.1@uni.massey.ac.nz (e-mail).

The TAI is a 20-item inventory that asks respondents to report how frequently they experience specific symptoms of anxiety before, during, and after tests and examinations. It provides a total scale score (range 20–80) that measures proneness to anxiety in test situations. It also comprises two subscales that assess worry and emotionality (TAI/W and TAI/E; range 8–32). Norms for the TAI are available for large samples of American college undergraduates, college freshmen, and high school students, as well as a smaller sample of community college students. These normative samples allow for comparison between appropriate reference groups because the TAI was developed primarily to be used with students. Studies of test–retest and internal-consistency reliability, as well as concurrent and construct validity (Spielberger et al., 1980), have supported the use of the TAI.

The TAI has been used extensively, and the manual indicates that "most high school and college students complete the inventory in 8 to 10 minutes" (Spielberger et al., 1980, p. 6). However, even this relatively short administration time may be considered a deterrent to its use in studies in which questionnaire completion time is limited or other measures are being administered at the same time. Such factors may be relevant both before and after tests or examinations. Anecdotal observations from our own research (Carlton & Deane, 2000) suggests that some individuals respond negatively to the number of items they see in a questionnaire. This negative response occurs despite reassurances that it will take a short time to complete. It is relatively rare (particularly in research contexts) to administer a single questionnaire that taps only one construct. That is, the full TAI has 20 items but it is likely to be accompanied by other measures that could further exacerbate the number-of-items effect. Thus, the ability to reduce the number of items and still capture the relevant construct is helpful. The potential to use the TAI in pre–post examination situations has been supported by previous research (e.g., Zeidner, 1991). Brescia and Fortune (1989) found that test motivation appears to be related to test performance for certain test takers, although no studies that specifically examine test length and test motivation could be found. Test length may be an important factor in test motivation, particularly for students who experience test anxiety.

Several research contexts could benefit from the use of a short form of the TAI. For example, in an assessment of the role of anxiety in the use of a security password system, one paradigm provided a unique identifier of users based on key-stroke latencies (Henderson, Mahar, Saliba, Deane, & Napier, 1998; Mahar, Henderson, & Deane, 1997). In addition to onscreen security prompts, state anxiety "onscreen" had to be assessed while disruption to the computer tasks that were being assessed was minimized. The onscreen security prompt and the required response were a form of test. In a full protocol, the availability of a brief measure of test anxiety would have allowed the researchers to assess and control for the effects of test anxiety in such situations. Other research situations that require the control of test anxiety would also benefit from a shorter version of the TAI. For example, an assessment of anxious drivers before they take a driving

test would include a measure of test anxiety as distinguished from driving-related anxiety to ascertain the impact of the test situation on the results of the driving assessment.

A more general consideration that might support the need for a brief measure of test anxiety relates to the effects of increasing the number of items on test anxiety responses. That is, the effects of completing a longer questionnaire might engender test anxiety simply because of its length. The latter point is speculative, but the high alpha coefficient (.92 or higher) for the full form suggests that there are likely to be redundant items within the TAI. Similar short forms have been developed for other measures such as the State scale of the State-Trait Anxiety Inventory (STAI; Marteau & Bekker, 1992). Other researchers (e.g., Ware, Galassi, & Dew, 1990) have suggested the need for a shorter revised version of the TAI, especially given its high internal consistency. The aim of the present study was to develop a short form of the TAI for situations in which use of the full form is precluded by time constraints or the demands of other measures.

Method

Participants

The participants comprised 333 undergraduate (3rd-year) psychology students who completed at least some of the anxiety measures in the different protocols. Data were collected over a 3-year period in two psychology courses, which resulted in seven separate data sets that were pooled for the purposes of the present study. All administrations occurred during routine class times. The classes were given written information that was displayed on PowerPoint™ or on overhead transparencies; the displayed information included an indication that the completion of any measures for either learning or research purposes was entirely voluntary. The students could choose not to complete the questionnaires at all or they could complete the measures to support their learning only and retain them at the end of class so that they were not available for research purposes. Those who were willing to have their questionnaires used for research purposes were asked to hand in their questionnaires at the end of class. Unfortunately, the number of students who did not want their questionnaires used for research purposes was not reliably recorded except for one class administration in which pre–post examination measures were administered. There were 60 students in that class, and 45 (75%) agreed to participate. We were able only to estimate the participation rates for the other samples on the basis of the number of enrolments in the courses and what was typically a 60% attendance rate at lectures. The participation rates would have ranged from 68% to 80% across the remaining classes on the basis of these estimates.

There were 124 (37%) internal and 209 (63%) extramural students. Most of the participants were female (74%, n = 246). There were 83 men. Four partici-

pants had missing data for gender. Extramural students, on average, are older adults who typically combine part-time, home-based university studies with full-time employment, domestic and child-caring duties, or both. The mean age was 32.20 years (SD = 11.06, range 19–80), and the median age was 29 years. There were no age differences between men and women. Extramural students were older (M = 36.21, SD = 10.66, n = 202; 7 had missing data) than were internals (M = 25.46, SD = 8.08, n = 120; 4 had missing data), $t(321) = 91.00$, $p < .001$.

Procedure

Three of the seven data sheets contained solely TAI data. Three hundred and twelve of the 333 participants handed in completed TAI protocols. The remaining 21 protocols had data missing. The TAI was not completed immediately before an actual testing situation. Additional questionnaires were completed for the remaining four data sets (with varying sample sizes). The Trait scale of the STAI (STAI-T) was completed in three of the remaining four data sets. (There were 71 completed STAI-T protocols.) In all four sets, the short-form State scale of the STAI (STAI-6) was completed in relation to how the respondent felt "right now" (in a normal classroom situation; 141 were completed). We also used the STAI-6 to measure hypothetical and actual test-related state anxiety. In three data sets, the respondents rated how they believed they would feel "just prior to the final examination in an important course" (hypothetical test situation; 71 completed). In two data sets, the respondents were extramural students who were attending an on-campus course for 5 consecutive days. The participants were asked to complete the STAI-6 in class just before they sat for a test that was worth 20% of their final grade. They were asked to rate how anxious they felt "right now" (actual test situation, 122 completed). Their scores were compared with the scores on the STAI-6, which was completed during regular class time the day after the test.

Results

Preliminary Item Selection

The purpose of this part of the study was to select the smallest subset of items from the full form of the TAI. We accomplished this by comparing the item–remainder correlations and the correlations between the possible short forms and the remaining items of the TAI (e.g., 4 items correlated with the remaining 16 items).

We generated item–remainder correlations for all TAI items (see Table 1). The 10 items with the highest item–remainder correlations are italicized in the table. Equal numbers of items from the Worry and Emotionality subscales were thought to constitute a more stable and consistent measure (Spielberger, 1983).

TABLE 1
Item–Remainder Correlations (Pearson Correlation Coefficients) for the Test Anxiety Inventory (TAI; *N* = 312)

Item	*r*	Subscale
1. I feel confident and relaxed while taking tests.	.56	
2. While taking examinations I have an uneasy, upset feeling.	*.62*	*Emotionality*
3. Thinking about my grade in a course interferes with my work on tests.	.52	Worry
4. I freeze up on important exams.	*.64*	*Worry*
5. During exams I find myself thinking about whether I'll ever get through school.	.45	Worry
6. The harder I work at taking a test, the more confused I get.	.49	Worry
7. Thoughts of doing poorly interfere with my concentration on tests.	.58	Worry
8. I feel very jittery when taking an important test.	*.69*	*Emotionality*
9. Even when I'm well prepared for a test, I feel very nervous about it.	*.64*	*Emotionality*
10. I start feeling very uneasy just before getting a test paper back.	.51	Emotionality
11.[a] *During tests I feel very tense.*	*.72*	*Emotionality*
12.[a] *I wish examinations did not bother me so much.*	*.73*	
13. During important tests I am so tense that my stomach gets upset.	.58	
14.[a] *I seem to defeat myself while working on important tests.*	*.71*	Worry
15.[a] *I feel very panicky when I take an important test.*	*.78*	*Emotionality*
16. I worry a great deal before taking an important examination.	*.68*	*Emotionality*
17. During tests I find myself thinking about the consequences of failing.	.50	Worry
18. I feel my heart beating very fast during important tests.	.54	Emotionality
19. After an exam is over I try to stop worrying about it, but I can't.	.53	
20.[a] *During examinations I get so nervous that I forget facts I really know.*	*.71*	*Worry*

Note. 21 participants had missing data. Italics = highest item–remainder correlations.
[a]These items form the 5-item TAI.

However, only the 5-item short form consisted of equal numbers of these items, whereas longer and shorter versions led to an unequal number of TAI/W and TAI/E items. Nevertheless, a number of short forms were compared along with the 5-item short form, including 4-, 6-, 8-, and 10-item forms of the TAI. The correlations between scores from these short forms and the full-length TAI were r = .96 for the 10 items; r = .95 for the 8 items; r = .94 for the 6 items; r = .94 for the 5 items; and r = .93 for the 4 items.

Because the correlations between the smallest subsets (i.e., of 4, 5, and 6 items of the TAI) with the full form were greater than r = .90, we selected those subsets for further study. As Marteau and Bekker (1992) noted, the decision regarding which was the most acceptable short form depended on which version behaved in a similar manner to the full form, and which version demonstrated reliability and validity compared with the full form of the TAI.

Reliability and Validity

The aim of this part of the study was to examine the reliability and validity of the 4-, 5-, and 6-item short forms of the TAI in order to select the optimal short form. Test–retest data was not available for the present study. Instead, we calculated internal-consistency reliability, consistent with the procedure used by Marteau and Bekker (1992). The form of validity to be assessed was concurrent validity, or the degree to which scores obtained with the short form were similar to those that were obtained with the full form. This was assessed with the STAI-T and various STAI-6 measures.

The Cronbach alpha reliability coefficient for the 20-item TAI was .93; for the 6 items, it was .88; for the 5 items, .87; and for the 4 items, .84. Marteau and Bekker (1992) assessed the concurrent validity of the STAI-6 by comparing the prorated scores from the short forms with those from the full form. They used paired t tests to compare each short form with the remaining-item form and the full form to avoid overinflated correlations as a result of items that correlated with themselves. For example, the 6-item short form was compared with the remaining 14-item form and the full 20-item scale. We used the same procedure in the present study to identify the optimal short form of the TAI (see Table 2). Consistent with Marteau and Bekker's procedure, we prorated all short forms to produce scores that could be compared with the full form rather than be incomparable because of the different number of scale items. For example, we multiplied the score on the 5-item short form by 4 to produce a prorated score that could to be compared with the 20-item full form.

The 6-item short form produced a significantly higher mean score than did the full form and the prorated 14-item form. The 4-item short form also produced a significantly higher mean score than was obtained with the full form. The 5-item short form was the only version in which there were no differences in the mean scores that were obtained with the full form and prorated short form.

TABLE 2
Test Anxiety Inventory (TAI) Scores (Means and Standard Deviations) Comparing Each of the Prorated Short Forms With Both the Full Form and Remaining Prorated Item Forms

Form	*M*	*SD*
(a)		
Full form (20 items)	35.81	10.34*
Prorated (6 items)	36.62	13.48
Prorated (14 items)	37.26	11.60*
(b)		
Full form (20 items)	35.81	10.34
Prorated (5 items)	35.47	13.77
Prorated (15 items)	36.95	11.38*
(c)		
Full form (20 items)	35.81	10.34**
Prorated (4 items)	37.04	14.67
Prorated (16 items)	36.64	11.34

Note. $*p < .005$. $**p < .001$. *p* values indicate that the score obtained using that particular form was significantly different from the short form with which it was being compared.

However, it was still different from the prorated remaining-item version. The 5-item short form was selected as the most appropriate short form because it did not differ from the mean score that was obtained with the full form. We examined the validity of the 5-item short form of the TAI further by correlating it with scores on the 20-item TAI, the remainder 15-item TAI, the STAI-6 (given in a normal classroom situation, before a test, and hypothetically before an exam), and the STAI-T from a subsample of the full sample (see Table 3). These results suggest a similar pattern of correlations between the three versions of the TAI. In addition, the pattern of correlations of the TAI with the STAI are similar to those reported in the manual (Spielberger et al., 1980, p. 19). As Spielberger et al. stated:

> Much higher correlations were obtained between the TAI scales and the STAI A-State scale when students were given special directions. Imagining themselves in a classroom as the instructor passed out an examination, the students responded to the STAI A-State according to how they would feel *at that moment*. The high correlations of the TAI Total scale with the score from this administration of the STAI A-State, called the Exam A-State, demonstrate the construct validity of the TAI Total as a measure of individual differences in anxiety proneness in test situations. (p. 20)

There was a similar pattern of means and standard deviations among the 20-, 5- and 15-item versions of the TAI as shown in part (b) in Table 2.

TABLE 3
Correlations (One-Tailed) Between the 20-, 15-, and 5-Item Versions of the TAI, the STAI-6, and the STAI-T

	Item		
Measure	TAI-20	TAI-5	TAI-15
STAI-T (n = 71)	.49**	.39**	.45**
STAI-6 normal classroom situation (n = 141)	.23**	.17	.27*
STAI-6 prior to test (actual test situation; n = 101)	.55**	.50**	.55**
STAI-6 prior to final exam (hypothetical test situation; n = 71)	.67**	.66**	.69**

Note. STAI = State Trait Anxiety Inventory. TAI = Test Anxiety Inventory. n for STAI-6 prior to test was 101 rather than 122 because these data came from a data set that had missing data for 21 participants on the TAI.
*p < .05. **p < .01.

TABLE 4
Normative Data (Means, Standard Deviations, Sample Sizes) for the Measures Used in the Present Study

	Total sample			Men			Women		
Measure	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*
TAI-20 item	35.81	10.34	312	36.65	10.59	76	35.40	10.22	232
TAI/W	12.07	3.97	312	12.66	4.24	76	11.85	3.87	232
TAI/E	15.81	5.05	312	15.95	5.16	76	15.69	5.00	232
TAI-5 item	35.47	13.77	312	36.58	14.68	76	34.88	13.39	232
STAI-T	37.45	8.41	71	37.76	9.49	21	37.32	8.02	50
STAI-6 normal classroom situation	9.07	2.38	141	9.10	2.05	39	9.06	2.51	102
STAI-6 hypothetical test situation	15.07	3.38	71	14.52	3.27	21	15.30	3.44	50
STAI-6 actual test situation	12.96	3.26	122	12.36	3.29	31	13.17	3.24	91

Note. TAI = Test Anxiety Inventory; TAI/W = Test Anxiety Inventory/Worry; TAI/E = Test Anxiety Inventory/Emotionality; STAI = Scale Trait Anxiety Inventory; STAI-T = Trait scale of the STAI; STAI-6 = short form State Scale of the STAI. All TAI scales had n = 312 because 21 were missing data. Men and women add to 308 because there were 4 participants with missing data for gender. The n for the remaining measures indicates that there were only those numbers of protocols completed.

Of those participants who had pre–post data on the STAI-6 available in an actual test situation, we calculated a difference score by subtracting the post-STAI-6 score (in a normal classroom situation) from the pre-STAI-6 score (before the test). This calculation yielded an estimate of the amount of anxiety experienced in relation to an actual test situation. This difference score correlated significantly ($p < .01$, one-tailed) with the various TAI versions: for the full form, $r = .48$; for the TAI-5, $r = .53$; and for the remainder 15-item TAI, $r = .47$. Normative data on the measures used in the present study are shown in Table 4.

Discussion

Overall, the TAI-5 produced scores that are similar to those obtained with the full form of the TAI. It had acceptable internal-consistency reliability and correlated with other measures in a manner similar to the full form. We considered the TAI-5 to be more acceptable than were the other short forms we assessed, in part because of its balance of items from the Worry and Emotionality subscales of the TAI. However, the small number of worry and emotionality items does not allow for the generation of subscales in the TAI-5. Thus, we advocate the use of the full-form TAI when an understanding of the separate components of worry and emotionality is needed. In situations in which a brief measure of test anxiety is needed and the full 20-item version may be too cumbersome, the TAI-5 provides a promising alternative, particularly in research contexts. Further research is needed to replicate these results and to establish additional psychometric properties and normative data for the TAI-5. This is especially important given that the present sample obtained lower overall scores on the TAI (see Table 4) compared with the college undergraduate norms presented in the manual (Spielberger et al., 1980, p. 9; men: $M = 38.48$, $SD = 12.43$, $n = 654$; women: $M = 42.79$, $SD = 13.70$, $n = 795$). A possible explanation for the difference in the present results with this normative data (especially for women) is that the more experienced and mature students in the present sample may have had less test anxiety and thus scored lower on the TAI. By comparison, the results on the STAI-T for the present sample (see Table 4) were more consistent with the norms for a New Zealand sample (Knight, Waal-Manning, & Spears, 1983; men: $M = 33.11$, $SD = 7.80$, $n = 555$; women: $M = 36.85$, $SD = 8.89$, $n = 586$). There is a need for further research using the TAI-5 with different student samples such as incorporating larger numbers of male and high school students. However, preliminary data suggest that the TAI-5 has good reliability, total scores are similar to those for the full version, and validity data suggest the TAI-5 is related to other anxiety measures with patterns of correlations that indicate stronger relationships with state anxiety in hypothetical and actual test situations.

REFERENCES

Brescia, W., & Fortune, J. C. (1989). Standardized testing of American Indian students. *College Student Journal, 23,* 98–104.

Carlton, P. A., & Deane, F. P. (2000). Impact of attitudes and suicidal ideation on adolescents' intentions to seek professional psychological help. *Journal of Adolescence, 23,* 35–45.

Henderson, R., Mahar, D., Saliba, A., Deane, F. P., & Napier, R. (1998). Electronic monitoring systems: An examination of physiological activity and task performance within a simulated keystroke security and electronic performance monitoring system. *International Journal of Human-Computer Studies, 48,* 143–157.

Knight, R. G., Waal-Manning, H. J., & Spears, G. F. (1983). Some norms and reliability data for the State-Trait Anxiety Inventory and the Zung Self-Rating Depression Scale. *British Journal of Clinical Psychology, 22,* 245–249.

Mahar, D., Henderson, R., & Deane, F. (1997). The effects of computer anxiety, state anxiety, and computer experience on users' performance on computer based tasks. *Personality and Individual Differences, 22,* 683–692.

Marteau, T. M., & Bekker, H. (1992). The development of a six-item short form of the state scale of the Spielberger State-Trait Anxiety Inventory (STAI). *British Journal of Clinical Psychology, 31,* 301–305.

Spielberger, C. D. (1972). Conceptual and methodological issues in anxiety research. In C. D. Spielberger & I. G. Sarason (Eds.), *Anxiety: Current trends in theory and research* (Vol. 2). (pp. 481–493). New York: Academic Press.

Spielberger, C. D. (1983). *Manual for the State-Trait Anxiety Inventory STAI (Form Y).* Palo Alto, CA: Consulting Psychologists Press.

Spielberger, C. D., Gonzalez, H. P., Taylor, C. J., Anton, E. D., Algaze, B., Ross, G. R., & Westberry, L. G. (1980). *Manual for the Test Anxiety Inventory ("Test Attitude Inventory").* Redwood City, CA: Consulting Psychologists Press.

Ware, W. B., Galassi, J. P., & Dew, K. H. (1990). The Test Anxiety Inventory: A confirmatory factor analysis. *Anxiety Research, 3,* 205–212.

Zeidner, M. (1991). Test anxiety and aptitude test performance in an actual college admissions testing situation: Temporal considerations. *Personality & Individual Differences, 12,* 101–109.

Manuscript received January 30, 2001
Revision accepted for publication June 18, 2001

Copyright © 2002 EBSCO Publishing