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Utility and validity of the STAI with anxiety disorder patients

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Factor analytic studies of the State–Trait Anxiety Inventory (STAI) have provided support for the concepts of state and trait anxiety. This article reports the factor structure of the STAI (Form X) using 205 panic-disordered patients with and without agoraphobia. Results show that a two-factor oblique solution is the most appropriate, accounting for 41.1 per cent of the variance. Eighteen of the A-State items had salient loadings on factor 1 (state anxiety) and all 20 of the A-Trait items had salient loadings on factor 2 (trait anxiety). This study demonstrates the utility of the STAI in measuring anxiety in clinical populations and further supports the theoretical distinction between state and trait anxiety.

The construct of anxiety has played a major role in various theories of personality and psychopathology. Cattell (1966) was the first theorist to distinguish between anxiety as a transitory condition which fluctuated according to circumstance, and anxiety as a relatively stable personality trait less dependent on situational stress. Spielberger, Gorsuch & Lushene (1970) then developed the State–Trait Anxiety Inventory (STAI) which aimed to measure and differentiate between anxiety as a state (S-Anxiety) and anxiety as a Trait (T-Anxiety). The STAI is now a very widely known and reliable self-report scale that has been used extensively in the past two decades as a research and clinical instrument.

Factor analytic studies on normal populations using the original Form X of the STAI (Kendall, Finch, Auerbach, Hooke & Mikulka, 1976) and the revised STAI Form Y (Vagg, Spielberger & O'Hearn, 1980) have revealed fairly clear-cut distinctions between state and trait anxiety factors as well as anxiety-present and anxiety-absent factors. The factor structure of the Form X S-Anxiety scale has been shown to have greater stability than that of the T-Anxiety scale. Replacement of several items in the STAI Form X resulted in a more stable factor structure (Spielberger, Vagg, Barker, Donham & Westberry, 1980). Even though Form Y has a more consistent and replicable factor structure, both forms are widely used and are highly correlated. STAI scores are generally interpreted as unidimensional measures of state and trait anxiety despite variations across studies (Vagg, Spielberger & O'Hearn, 1980). Previous factor analytic studies of the STAI have used subjects sampled from a normal population. As the STAI is especially useful for identifying persons with high levels of clinical anxiety, research into the psychometric properties of the STAI using varied anxiety disorder patients would be useful and has not yet been attempted. The aim of the study described here was to examine the factor structure of the STAI using subjects suffering from anxiety disorders. It was hypothesized that factors of state and trait anxiety would emerge.

Method

The sample of 205 clinical subjects comprised 156 agoraphobics with panic attacks and 49 panic disorder (DSM-III). Both clinical samples were obtained from data gathered at the Anxiety Disorder Clinic, Brisbane, over a period of five years between 1983 and 1987. The subjects were assessed and diagnosed according to DSM-III criteria (American Psychiatric Association, 1980). The detailed procedures are

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similar to those previously reported by Oei, Cavallo & Evans (1987). The group of agoraphobics with panic attacks consisted of 114 females and 42 males. Ages ranged from 16 to 64, with a mean age of 38.1 years (SD = 11.61). The group of panic-disordered clients consisted of 34 females and 15 males. Ages ranged from 17 to 62, with a mean age of 34.8 years (SD = 9.12).

Form X of the State – Trait Anxiety Inventory (Spielberger *et al.*, 1970) was administered to patients on admission to the Anxiety Disorder Clinic as part of a battery of tests to aid in research and diagnosis. The STAI consists of two self-report rating scales. The S-Anxiety scale consists of 20 statements used by the client to describe how they feel 'right now... at this moment', while the T-Anxiety scale consists of 20 statements used by the client to describe how they 'generally feel'.

In analysing the data, males and females were pooled, as separate analyses revealed similar factor structures. Data from the two clinical groups were also combined to increase sample size and hence increase the stability of the factor structure. The Statistical Package for the Social Sciences (SPSS-X, 1986) was used in the data analysis. The factor structure of the inventory was then examined by simultaneously factoring all 40 STAI items. Factor extraction was based on the method of principal axis factoring – where squared multiple correlation coefficients are used as initial estimates of communality. Cattell's (1966) scree criteria suggested that two or three factors should be rotated, therefore both solutions were examined. Orthogonal and oblique two-factor rotations revealed good simple structure (Kaiser, 1958; Thurstone, 1947), i.e. the majority of items loaded unambiguously on only one of the factors. Both solutions were parsimonious and psychologically meaningful. The oblique rotation was selected over varimax rotation as it had a superior simple structure and because of the high correlation between the two factors ($r = .557$). The three-factor solution was rejected because it was difficult to interpret meaningfully and many of the items loaded on more than one factor, thus causing ambiguity.

Results

The results of the factor analysis of the STAI-X for the anxiety disorder sample support the theoretical constructs of state and trait anxiety. Extraction of two factors using the principal axis method of extraction accounted for 41.1 per cent of the variance (factor 1 = 34.0 per cent; factor 2 = 7.1 per cent). Table 1 shows the salient loadings for the two-factor oblique solution. Salient loadings greater than .30 on only one factor identified items that were used to name the two factors. From this table it can be seen that items from the A-State scale (items 1–20) consistently load on factor 1; except for items 4 and 19 which have weak loadings on both factors. Items from the A-Trait scale (items 21–40) consistently load on factor 2; except for item 26 which has low salient loadings on both factors. Thus, factor 1 can be identified as state anxiety and factor 2 as trait anxiety. Both factors are bipolar in that negative loadings are associated with anxiety-absent items (e.g. 'I feel calm') and positive loadings with anxiety-present items (e.g. 'I am tense'). Table 2 displays the means and standard deviations of STAI-S and STAI-T scores for males and females in the two patient groups. Results of two-way ANOVAs using the STAI-S total scores only revealed a significant difference between the two patient groups (F (1) = 7.962, $p < .005$), showing that agoraphobic patients with panic attacks scored higher in state anxiety than patients with panic disorder alone. The other ANOVA using STAI-T total scores only revealed a significant difference between the two diagnostic groups (F (1) = 13.68, $p < .000$) showing that agoraphobic patients with panic attacks scored higher on trait anxiety than patients with a diagnosis of panic disorder.

Discussion

The present findings support the hypothesis that the factors of state and trait anxiety would emerge from data obtained from a sample of anxiety-disordered clients. In the two-factor oblique solution 18 S-Anxiety items had salient loadings on factor 1 (state anxiety) and all 20 T-Anxiety items had salient loadings on factor 2 (trait anxiety). It should be noted that these two S-Anxiety items with non-salient dual loadings and the single T-Anxiety item with dual salient loadings were both replaced in the development of the STAI (Form Y) because of their poor psychometric properties (Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983). This study demonstrates that the STAI is a useful and valid instrument for measuring anxiety disorder patients and also provides support for the theoretical constructs of state and trait anxiety. The distinction is still evident in a psychiatric sample suffering from

Table 1. Loadings for the two-factor oblique solution based on a factor analysis of the STAI-X for anxiety disorder patients

STAI-X items	Two-factor solution	
	1 State Anxiety	2 Trait Anxiety
1. I feel calm	−.69	
2. I feel secure	−.47	
3. I am tense	.75	
4. I am regretful	(.27)	(.28)
5. I feel at ease	−.79	
6. I feel upset	.56	
7. I am presently worrying	.40	
8. I feel rested	−.51	
9. I feel anxious	.86	
10. I feel comfortable	−.75	
11. I feel self-confident	−.33	
12. I feel nervous	.86	
13. I feel jittery	.76	
14. I feel 'highly strung'	.71	
15. I am relaxed	−.76	
16. I feel content	−.54	
17. I am worried	.69	
18. I feel over-excited	.34	
19. I feel joyful	(−.29)	(−.27)
20. I feel pleasant	−.50	
21. I feel pleasant		−.58
22. I tire quickly		.43
23. I feel like crying		.44
24. I wish I could be as happy as others seem		.72
25. I am losing out on things...		.61
26. I feel rested	−.32	−.36
27. I am 'calm, cool, and collected'		−.50
28. I feel that difficulties are piling...		.59
29. I worry too much over something...		.54
30. I am happy		−.70
31. I am inclined to take things hard		.56
32. I lack self-confidence		.71
33. I feel secure		−.46
34. I try to avoid facing a crisis or difficulty		.49
35. I feel blue		.74
36. I am content		−.59
37. Some unimportant thought runs...		.42
38. I take disappointments so keenly...		.72
39. I am a steady person		−.42
40. I get in a state of tension or turmoil...		.53
Eigenvalue	13.61	2.84
% Variance	34.00	7.10

Note. Salient loadings above ±.30 are reported. When items have no salient loadings, their highest loadings are indicated in parentheses.

Table 2. Means and standard deviations of total STAI-S and STAI-T scores for male and female patients with the diagnoses of agoraphobia with panic attacks (300.21) and panic disorder (300.01)

	STAI-S		STAI-T	
	Males	Females	Males	Females
Agoraphobia with panic attacks				
M	47.19	48.66	51.31	53.81
SD	11.36	12.85	10.57	9.84
Panic disorder				
M	39.87	43.62	45.13	44.53
SD	7.46	13.48	7.39	11.04

anxiety disorders – a group who are often required to complete the STAI for assessment purposes. It can be seen from present findings that agoraphobic patients with panic attacks have consistently higher state and trait anxiety scores than those with panic disorder.

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References

American Psychiatric Association (1980). *DSM-III: Diagnostic and Statistical Manual of Psychiatric Disorders,* 3rd ed. Washington, DC: American Psychiatric Association.

Cattell, R. B. (1966). Anxiety and motivation: Theory and crucial experiments. In C. D. Spielberger (Ed.), *Anxiety and Behavior.* New York: Academic Press.

Cattell, R. B. (1966). *Handbook of Multivariate Experimental Psychology,* pp. 174–243. Chicago, IL: Rand McNally.

Kaiser, H. F. (1958). The varimax criterion for analytic rotation in factor analysis. *Psychometrika,* **23,** 187–200.

Kendall, P. C., Finch, A. J., Jr, Auerbach, S. M., Hooke, J. & Mikulka, P. (1976). The State–Trait Anxiety Inventory: A systematic evaluation. *Journal of Consulting and Clinical Psychology,* **44,** 406–412.

Oei, T. P. S., Cavallo, G. & Evans, L. (1987). Utility of Fear Survey Schedule with Australian samples of anxiety disorder patients. *Journal of Behaviour Therapy and Experimental Psychiatry,* **18** (4), 329–336.

Spielberger, C. D., Gorsuch, R. L. & Lushene, R. E. (1970). *The State–Trait Anxiety Inventory (Self-Evaluation Questionnaire).* Palo Alto, CA: Consulting Psychologists Press.

Spielberger, C. D., Gorsuch, R. L, Lushene, R., Vagg, P. R. & Jacobs, G. A. (1983). *Manual for the State–Trait Anxiety Inventory (Form Y Self-Evaluation Questionnaire).* Palo Alto, CA: Consulting Psychologists Press.

Spielberger, C. D., Vagg, P. R., Barker, L. R., Donham, G. W. & Westberry, L. G. (1980). The factor structure of the State–Trait Anxiety Inventory. In I. G. Sarason & C. D. Spielberger (Eds), *Stress and Anxiety,* vol. 7. New York: Hemisphere/Wiley.

SPSS-X (1986). *Statistical Package for the Social Sciences (Release 3).* New York: McGraw-Hill.

Thurstone, L. L. (1947). *Multiple-Factor Analysis.* Chicago, IL: University of Chicago Press.

Vagg, P. R., Spielberger, C. D. & O'Hearn, T. P. (1980). Is the State–Trait Anxiety Inventory multidimensional? *Personality and Individual Differences,* **1,** 207–214.

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