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Psychometric properties of the Spence Children's Anxiety Scale with young adolescents

Susan H. Spence[a,*], Paula M. Barrett[b], Cynthia M. Turner[b]

[a]*School of Psychology, University of Queensland, Brisbane, Qld 4072, Australia*
[b]*School of Applied Psychology, Griffith University, Mt. Gravatt Campus, Brisbane, Qld, Australia*

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Abstract

The psychometric properties of the Spence Children's Anxiety Scale (SCAS) were examined with 875 adolescents aged 13 and 14 years. This self-report measure was designed to evaluate symptoms relating to separation anxiety, social phobia, obsessive-compulsive disorder, panic-agoraphobia, generalized anxiety, and fears of physical injury. Results of confirmatory and exploratory factor analyses supported six factors consistent with the hypothesized subtypes of anxiety. There was support also for a model in which the first-order factors loaded significantly on a single second-order factor of anxiety in general. The internal consistency of the total score and sub-scales was high, and 12-week test–retest reliability was satisfactory. The SCAS correlated strongly with a frequently used child self-report measure of anxiety and significantly, albeit at a lower level, with a measure of depression.

Keywords: Anxiety disorders; Adolescents; Confirmatory factor analysis; Assessment

1. Introduction

Anxiety disorders are a relatively common problem among adolescents. Studies suggest a point prevalence of around 5–10%, and lifetime prevalence

* Corresponding author. Tel.: +61-7-3365-6220; fax: +61-7-3365-4466.
E-mail address: sues@psy.uq.edu.au (S.H. Spence).

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around 20%, with estimates varying according to the population, measure, and level of impairment used to determine presence of a disorder (Essau, Conradt, & Petermann, 2000; Fergusson, Horwood, & Lynskey, 1993; Lewinsohn et al., 1993; Shaffer, Fisher, Dulcan, & Davies, 1996). Researchers and clinicians have become increasingly aware of the significance of anxiety disorders in adolescence, in terms of adverse social and educational outcomes and risk of persistence through to adulthood (Spence, 2001). This has been accompanied by a recent increase in research into the treatment and prevention of adolescent anxiety. However, research into development of reliable and valid methods for assessment of anxiety in adolescents has lagged behind.

Self-report represents an important method of assessing adolescent anxiety, given that many aspects of anxiety represent subjective cognitive and emotional experiences that are not open to observation by others. To date, the content of most self-report anxiety measures has focused on the general aspects of trait or state anxiety or specific fears. Commonly used measures include the Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978), the State-Trait Anxiety Inventory for Children (Spielberger, 1973) and the Fear Survey Schedule for Children—Revised (Ollendick, 1983). While providing valuable information relating to general aspects of anxiety or fears, these measures do not produce data relating to occurrence or severity of anxiety symptoms relevant to specific anxiety disorder categories as described in diagnostic classification systems such as DSM-IV (American Psychiatric Association, 1994). Furthermore, traditional child and adolescent self-report measures of anxiety represent downward extensions of adult anxiety scales, and include items that may be of less relevance to anxiety in younger populations.

Recently, clinical researchers have sought to develop symptom specific instruments that correspond to DSM-IV anxiety disorder categories and that include items developed for child and adolescent populations. Such measures include the Multidimensional Anxiety Scale for Children (March et al., 1997; March, Sullivan, & Parker, 1999), the Screen for Child Anxiety Related Emotional Disorders (Birmaher et al., 1997) and its revision (Muris, Merckelbach, Schmidt, & Mayer, 1999) and the Spence Children's Anxiety Scale (Spence, 1998). The psychometric properties of these measures have been shown to be good, with empirical support for test–retest reliability and internal consistency (Muris, Gadet, Moulaert, & Merckelbach, 1998; Muris, Merckelbach, van Brakel, Mayer, & van Dongen, 1998; Muris et al., 1999; Muris, Schmidt, & Merckelbach, 2000).

The present study focuses on the psychometric properties of the Spence Children's Anxiety Scale with young adolescents. The SCAS assesses the young person's perception of the frequency with which they experience symptoms relating to obsessive-compulsive disorder, separation anxiety, social phobia, panic/agoraphobia, generalized anxiety/overanxious disorder and fears of physical injury. The original paper describing development of the SCAS involved a large sample of Australian children aged 8–12 years (Spence, 1998). Spence

(1998) demonstrated high internal consistency for the total score and factor scores, acceptable 6-month test–retest reliability, and high concurrent validity with the RCMAS. SCAS scores also differed significantly between clinically diagnosed anxious versus non-anxious children, with sub-scale scores reflecting the type of presenting anxiety disorder in the clinical sample. Results of the confirmatory and exploratory factor analyses were supportive of the DSM-IV constructs of anxiety disorders, but with first-order factors loading strongly on a higher-order factor of anxiety in general. Muris et al. (2000) also found evidence to support the strong psychometric properties of the SCAS with Dutch 7–19-year-olds. This study, although supporting reliability and concurrent validity of the SCAS with adolescents, did not examine the factor structure of the SCAS with an adolescent sample specifically. Results showed that the hypothesized six, correlated factor model provided a good fit of the SCAS data with 7–19-year-olds. In contrast, no satisfactory model was found for the SCARED when all its sub-scales were included in the confirmatory factor analysis. However, the sample used in the Muris et al. (2000) study ranged from 7 to 19 years and confirmatory factor analysis was not conducted for separate age groups. Also, their study did not examine the possibility of a higher-order factor of anxiety for the SCAS.

The present study extends previous research by examining the factor structure of the SCAS with a large sample of 13- and 14-year-old adolescents. It was hypothesized that data would be best explained by a six, correlated factor model in which questionnaire items loaded upon factors relating to social phobia, separation anxiety, obsessive-compulsive problems, panic/agoraphobia, fears of physical injury and generalized anxiety disorder, broadly consistent with DSM-IV anxiety disorders. Four models were compared, namely: (i) a single factor, (ii) six, uncorrelated factors, (iii) six, correlated factors, and (iv) six factors, loading onto a single second-order factor. It was predicted that the six factors would be strongly intercorrelated, given evidence of high levels of comorbidity between child anxiety disorders (Anderson & McGee, 1994). Further, in line with results of Spence (1997, 1998), it was predicted that this high degree of intercorrelation between factors would be explained by a single, higher-order factor of anxiety in general. The study also examined the internal consistency, 12-week test–retest reliability and convergent and divergent validity of the SCAS in terms of association with measures of child anxiety and depression.

2. Method

2.1. Participants

All participants ($N = 875$) were aged 13 or 14 years (mean age 13.51 years, S.D. = .51 years) living in the metropolitan area of Brisbane, Australia. The sample included 472 males (54%) and 403 females (46%). Participants were drawn from six co-educational, independent, private schools within the Brisbane

area, and schools were selected to represent varying levels of socio-economic advantage and religious affiliation. Students were predominantly from Anglo-Saxon families, with English as their primary language, and came from middle-class socio-economic backgrounds on average. Students came from dual-parent (76.6%) and single-parent (10.3%) families, and 13.1% of participants did not report on their family composition.

2.2. Measures

The *Spence Children's Anxiety Scale* (Spence, 1998) is a self-report measure of anxiety originally developed to examine anxiety symptoms in children aged 8–12 years. The SCAS consists of 44 items, 38 of which assess specific anxiety symptoms relating to six sub-scales, namely social phobia, separation anxiety, panic attack/agoraphobia, obsessive-compulsive disorder, generalized anxiety and physical injury fears. The remaining six items serve as positive ''filler items'' in an effort to reduce negative response bias. Respondents are asked to indicate frequency with which each symptom occurs on a four-point scale ranging from *Never* (scored 0) to *Always* (scored 3). A total SCAS score is obtained by summing scores of the 38 anxiety symptom items. Previous studies have demonstrated high internal consistency, high concurrent validity with other measures of child and adolescent anxiety, and adequate test–retest reliability, as outlined above.

The *Revised Children's Manifest Anxiety Scale* (RCMAS; Reynolds & Richmond, 1978) assesses physiological symptoms, worry and inattentiveness associated with anxiety in children. It has been shown to have good psychometric properties and to provide elevated scores for children experiencing anxiety in comparison to non-clinical control children (Reynolds & Richmond, 1978). However, the scale does not reliably discriminate between anxious children and those with other forms of psychopathology (Perrin & Last, 1992). Although the RCMAS does not provide information about experience of specific anxiety disorder symptoms, it does give an indication of overall anxiety levels. Thus, it was predicted that the RCMAS would be correlated significantly with the SCAS in the present study and provide an indicator of convergent validity.

The *Children's Depression Inventory* (CDI; Kovacs, 1985) is a commonly used self-report measure of depressive symptoms for children 7–17 years of age. The scale has 27 items dealing with sadness, self-blame, insomnia, loss of appetite, interpersonal relationships, and school adjustment. For each item, there are three alternatives yielding a possible score of 0, 1 or 2, with high scores reflecting more severe depression. The scale has high internal consistency (Orvaschel, Weissman, & Kidd, 1980) and test–retest reliability (Kovacs, 1985), and correlates highly with clinician ratings of depression (Matson, 1989). Given the high level of comorbidity between anxiety and depression in children, it was predicted that the SCAS would correlate significantly with the CDI. However, given that there is also evidence of unique variance in measures of anxiety and depression, with both

overlapping and unique factors contributing to aetiology (Thapar & McGuffin, 1997), it was predicted that the correlation between the SCAS and the CDI would be lower than that found between the SCAS and the RCMAS.

The Child Behavior Checklist (CBCL; Achenbach, 1991). The CBCL was selected as an indicator of convergent validity of the SCAS, through use of an independent informant. The CBCL includes 118 items describing child behavior problems, to which parents are asked to respond on a three-point scale whether that behavior is "*not true*," "*somewhat or sometimes true*" or "*very true or often true*" of their child's behavior now or over the past 6 months. The measure includes two broad band factors (Internalizing and Externalizing) and eight subscales. The CBCL has been widely used as an assessment of child behavior problems and has been demonstrated to have adequate psychometric properties. It was predicted that the SCAS would correlate significantly with CBCL Internalizing scores, but not with the Externalizing dimension.

2.3. Procedure

Participants completed the questionnaires for the current study as a screen for self-report symptoms of anxiety and depression, as part of a longitudinal study examining the onset, course and prevention of anxiety and depression in children and youth. Parental consent was required for all students participating in the project, with a participation rate of 75.96% of those students invited to take part. Students completed the self-report assessment within normal class time. A registered and clinically-trained psychologist read the instructions and questionnaires aloud to all students. A post-graduate psychology student assisted students who had questions or difficulty in understanding a question. Students were informed that all questionnaire responses were confidential, and upon completion of the questionnaires, all participants were encouraged to ask questions they may have had. The order of questionnaires was counterbalanced across classrooms to avoid order effects.

Test–retest reliability was examined 12 weeks later for a sub-sample of 362 participants, following the same administrative procedure as outlined above.

3. Results

3.1. Confirmatory factor analysis

Confirmatory factor analysis was conducted to determine whether the factor structure of the measure did indeed reflect the six dimensions of anxiety disorder that the SCAS purported to evaluate. The data were examined using EQS (Bentler, 1995) with elliptical reestimated least squares (ERLS) estimation using the correlation matrix. ERLS estimation was selected given that tests of normality revealed evidence of significant positive skewness and kurtosis among many of

the questionnaire items. This reflected the nature of the problem checklist, as the majority of children did not report high frequency of symptoms. Estimation methods such as maximum likelihood (ML) which rely upon assumptions of normality were not therefore considered appropriate. Rather, the ERLS estimation method was considered preferable given that this method of estimation allows variables to share a common, non-zero kurtosis parameter, which was the case in the present data set (Anderson & Gerbing, 1988; Bentler, 1995). However, ERLS still does not overcome the problems of skew in the data. The sample size was not considered large enough to justify use of arbitrary distribution estimation methods which would have overcome both skew and kurtosis problems. Thus, the ERLS estimation method was selected as the most appropriate method available although, given the skew in the data, the results should be treated with caution. In support of the validity of the findings, the results using ML solution mirrored those produced by ERLS estimation, although the goodness of fit indices were somewhat lower.

Only anxiety items were included in the analyses, with positively worded filler items being excluded. In all instances, the iterative estimation procedure converged, all matrices were positive definite and no parameter estimate problems were encountered.

3.1.1. Model 1 (single factor)

The single factor model examined the degree to which all symptoms can be regarded as assessing a single, homogeneous dimension of anxiety rather than reflecting clusters of anxiety symptoms. All SCAS question items loaded significantly ($P < .01$) upon the single factor, with loadings greater than .44. Table 1 indicates that the one factor solution represents a reasonably good fit of the data in terms of the Normed Fit Index (NFI), Non-Normed Fit Index (NNFI) and comparative fit index (CFI). Values for NFI, NNFI, and CFI greater than .90 indicate a relatively good fit of the model to the data. However, the chi-square statistic for the model was significant, $\chi^2(665) = 2617$, $P < .001$, indicating that parameters of the model differed significantly from those of the data set. Significant chi-square statistics are not unusual where large sample sizes are involved, even though the fit indices indicate a relatively good fit of the model to the data (Marsh, 1994). In order to determine whether the one factor solution provided a better fit of the data than did the six, correlated factor model, the chi-square values of the two models were compared in relation to changes in the degrees of freedom. The change in the chi-square statistic between the single factor model and the six, correlated factor model, in relation to the change in the degrees of freedom, indicated a significantly better fit of the data for the six, correlated factor model, as shown in Table 1.

3.1.2. Model 2 (six uncorrelated-orthogonal factors)

In this model, the confirmatory factor analysis loaded each SCAS item onto the latent factor that represented the dimension of anxiety that the item was

Table 1
Fit indexes for each model with comparisons between models

Model	χ^2	*df*	*P*	NFI	NNFI	CFI	RMR	RMSEA	Comparison	χ^2 change	*df* change	*P* of χ^2 change
Null model	29,398	703										
Model 1, one factor	2617	665	<.001	.91	.93	.93	.057	.058	Model 1 versus 3	983	15	<.001
Model 2, six uncorrelated factors	4220	665	<.001	.86	.87	.88	.22	.078	Model 2 versus 3	2586	15	<.001
Model 3, six correlated factors	1634	650	<.001	.94	.96	.97	.052	.042	Null versus Model 3	27,764	53	<.001
Model 4, six first-order factors, one second-order factor	1804	660	<.001	.94	.96	.96	.053	.045	Model 4 versus 3	Target coefficient = .91		

hypothesized to measure. However, the factors were not allowed to intercorrelate in the model. The fit indices for this model indicate a relatively poor fit of the data, with fit indices below .90. The change in chi-square statistic in relation to change in the degrees of freedom between the six, correlated and six, uncorrelated factor solutions indicated a significantly better fit of the data by the six, correlated factor model.

3.1.3. Model 3 (six correlated factors)

This model fixed the factor loadings so that questionnaire items loaded uniquely on the latent factor (anxiety disorder dimension) that the item was hypothesized to reflect. However, the factors were allowed to intercorrelate. The factor loadings of each SCAS item upon the hypothesized latent factor are shown in Table 2. Factor loadings were all statistically significant, with standardized values exceeding .35. A high degree of intercorrelation between factors was found as shown in Table 3. However, when the standard errors of the correlations were considered, none of the confidence intervals included the value of unity. Thus, it is unlikely that the factors of the scale can be considered as assessing exactly the same dimension.

Taken together, the fit indices suggest that the six, correlated factor model provided a good fit of the data. Furthermore, as previously noted the six, correlated factor model represented a significantly better fit than the one factor, or six, uncorrelated factor models.

3.1.4. Model 4 (six correlated factors loading onto one higher-order factor)

The higher-order model examined the degree to which the intercorrelation between factors could be explained by a single, second-order factor representing a general dimension of anxiety problems. The loadings of the first-order factors upon the second-order factor were all significant ($P < .01$). Factor loadings upon the second-order factor were .88 for panic/agoraphobia, .88 for separation anxiety, .82 for social phobia, .78 for physical injury fears, .85 for obsessive-compulsive problems and .92 for generalized anxiety. The percentages of unique variance accounted by each sub-scale factor were panic–agoraphobia = 23%; separation anxiety = 23%; social phobia = 33%; physical injury fears = 38%; obsessive–compulsive = 28%; and generalized anxiety = 10%. The remainder of the variance for each factor could be explained by the second-order factor, justifying use of a total score, in addition to the sub-scale values.

Table 2 shows values for NFI, NNFI and CFI in excess of .90 indicating that the second-order model explained the data well. However, it is important to note that the fit of a second-order factor model cannot exceed the fit of the corresponding model involving the correlated first-order factors alone. Higher-order factors are merely attempting to explain the covariation between the first-order factors (Marsh & Hocevar, 1985). Thus, it is not appropriate to compare the level of fit of the second-order versus the first-order model. Rather, the aim is to determine whether the higher-order model provides a satisfactory explanation for the

Table 2
Confirmatory factor analysis loadings of anxiety symptoms upon predicted six factors

Predicted DSM-IV category	Questionnaire items	Factor loadings					
		F1	F2	F3	F4	F5	F6
Panic attack and agoraphobia	13. I suddenly feel as if I can't breathe when there is no reason for this	.65	–	–	–	–	–
	21. I suddenly start to tremble or shake when there is no reason for this	.62	–	–	–	–	–
	28. I feel scared if I have to travel in the car, or on a bus or a train	.55	–	–	–	–	–
	30. I am afraid of being in crowded places (like shopping centres, the movies, buses, busy playgrounds)	.57	–	–	–	–	–
	32. All of a sudden I feel really scared for no reason at all	.69	–	–	–	–	–
	34. I suddenly become dizzy or faint when there is no reason for this	.52	–	–	–	–	–
	36. My heart suddenly starts to beat too quickly for no reason	.63	–	–	–	–	–
	37. I worry that I will suddenly get a scared feeling when there is nothing to be afraid of	.69	–	–	–	–	–
	39. I am afraid of being in small closed places, like tunnels or small rooms	.35	–	–	–	–	–
Separation anxiety disorder	5. I would feel afraid of being on my own at home	–	.53	–	–	–	–
	8. I worry about being away from my parents	–	.51	–	–	–	–
	12. I worry that something awful will happen to someone in my family	–	.53	–	–	–	–
	15. I feel scared if I have to sleep on my own	–	.65	–	–	–	–
	16. I have trouble going to school in the mornings because I feel nervous or afraid	–	.60	–	–	–	–
	44. I would feel scared if I had to stay away from home overnight	–	.59	–	–	–	–
Social phobia	6. I feel scared when I have to take a test	–	–	.56	–	–	–
	7. I feel afraid if I have to use public toilets or bathrooms	–	–	.38	–	–	–
	9. I feel afraid that I will make a fool of myself in front of people	–	–	.64	–	–	–
	10. I worry that I will do badly at my school work	–	–	.62	–	–	–
	29. I worry what other people think of me	–	–	.66	–	–	–
	35. I feel afraid if I have to talk in front of my class	–	–	.46	–	–	–

Table 2 (*Continued*)

Predicted DSM-IV category	Questionnaire items	Factor loadings					
		F1	F2	F3	F4	F5	F6
Physical injury fears	2. I am scared of the dark	–	–	–	.59	–	–
	18. I am scared of dogs	–	–	–	.43	–	–
	23. I am scared of going to the doctors or dentists	–	–	–	.53	–	–
	25. I am scared of being in high places or lifts (elevators)	–	–	–	.42	–	–
	33. I am scared of insects or spiders	–	–	–	.46	–	–
Obsessive-compulsive disorder	14. I have to keep checking that I have done things right (like the switch is off, or the door is locked)	–	–	–	–	.48	–
	19. I can't seem to get bad or silly thoughts out of my head	–	–	–	–	.57	–
	27. I have to think of special thoughts to stop bad things from happening (like numbers or words)	–	–	–	–	.61	–
	40. I have to do some things over and over again (like washing my hands, cleaning or putting things in a certain order)	–	–	–	–	.52	–
	41. I get bothered by bad or silly thoughts or pictures in my mind	–	–	–	–	.69	–
	42. I have to do some things in just the right way to stop bad things happening	–	–	–	–	.60	–
Generalized anxiety disorder/overanxious disorder	1. I worry about things	–	–	–	–	–	.60
	3. When I have a problem, I get a funny feeling in my stomach	–	–	–	–	–	.58
	4. I feel afraid	–	–	–	–	–	.53
	20. When I have a problem, my heart beats really fast	–	–	–	–	–	.58
	22. I worry that something bad will happen to me	–	–	–	–	–	.64
	24. When I have a problem, I feel shaky	–	–	–	–	–	.63

Table 3
Standardized intercorrelations between latent factors

Factor	1	2	3	4	5	6
1. Panic/agoraphobia	1.00					
2. Separation anxiety	.80	1.00				
3. Social phobia	.64	.72	1.00			
4. Physical injury fears	.70	.82	.65	1.00		
5. Obsessive-compulsive	.79	.70	.67	.60	1.00	
6. Generalized anxiety	.80	.75	.84	.66	.81	1.00

covariance between the first-order factors. In order to do so, a target coefficient is calculated, being the ratio of the chi-square value of the first-order model to the chi-square of the second-order model. The target coefficient has an upper limit of 1, which would be possible only if the covariance between first-order factors could be totally explained by the second-order factor. A target coefficient greater than .90 suggests that the second-order factor provides a good explanation for the covariance between factors. Comparison of the chi-square values of the six, correlated factor model and the higher-order model produced a target coefficient of .91. This result suggests that the higher-order model did indeed provide a satisfactory explanation for the covariance between first-order factors and an adequate fit of the data.

3.2. Exploratory factor analysis

An exploratory factor analysis was conducted in order to determine whether the factor structure was sufficiently stable to be reflected in this less restricted form of analysis. Principal components extraction was used, with varimax rotation. Oblique rotation was also examined, but the results were more difficult to interpret. The analysis produced seven factors with an eigenvalue greater than 1, but the seven-factor solution produced one factor with only three items. The six-factor solution was therefore selected as being the most parsimonious, and accounted for 47% of the variance in SCAS scores. The first factor was very clearly a panic–agoraphobia factor that also included two physiological items relating to physiological symptoms of anxiety that had been proposed to load on the generalized anxiety factor (eigenvalue = 10.52, 28% of variance). The second factor represented a mixture of generalized anxiety and separation anxiety items (eigenvalue = 2.04, 5.4% variance). The third factor clearly related to obsessive-compulsive disorder (eigenvalue = 1.73, 4.5% of variance), with the fourth factor specifically relating to a further mix of generalized anxiety and separation anxiety items (eigenvalue = 1.26, 3.3% of variance). The fifth factor was a clear social phobia factor (eigenvalue = 1.25, 3.3% of variance) and the final factor included four items relating to fears of physical injury (eigenvalue = 1.13, 3% of variance). Six items cross-loaded onto two factors, with loadings in excess of .35.

Item 28 (I feel scared when I have to travel in the car, or on a bus or a train), Item 30 (I am afraid of being in crowded places) and Item 16 (I have trouble going to school in the mornings because I feel nervous or afraid) loaded on both the panic/agoraphobia dimension and the first separation/generalized anxiety factor. Similarly Item 2 (I am scared of the dark) loaded on fears of physical injury and the first separation/generalized anxiety factor. Item 1 (I worry about things) cross-loaded on the social phobia and second generalized anxiety/separation factor, and Item 3 (When I have a problem, I get a funny feeling in my stomach) loaded on the panic/agoraphobia factor and second generalized anxiety/separation factor. Thus, although the factor structure was broadly consistent with the theoretical basis of the SCAS, it was clear that there was a good deal of overlap between factors with evidence of cross-loadings. In particular, the separation anxiety items did not cluster as distinctly in this young adolescent group and merged with the generalized anxiety/overanxious items.

3.3. Internal consistency and test–retest reliability

Internal consistency was examined using the total sample of 875 adolescents. The analysis produced a coefficient alpha of .92 and a Guttman split half reliability of .90. The internal consistency of the sub-scales was also acceptable, with coefficient alphas of .80 (panic–agoraphobia); .71 (separation anxiety); .72 (social phobia); .60 (physical injury fears); .75 (obsessive-compulsive); and .77 (generalized anxiety).

Test–retest data were available for sub-sample of 362 students who were reassessed 12 weeks after the initial data collection. This analysis showed a 12-week test–retest reliability coefficient of .63 for the total score on the SCAS. The temporal stability of the sub-scale scores were .51 for panic-agoraphobia; .52 for separation anxiety; .75 for social phobia; .59 for physical injury fears; .69 for obsessive-compulsive problems and .66 for generalized anxiety.

3.4. Convergent and divergent validity

Convergent validity was examined through intercorrelation of SCAS scores with other measures that purport to assess the construct of anxiety. Complete data sets for the SCAS, CDI and RCMAS were available for 792 students. The Pearson's product-moment correlation between SCAS total scores and the RCMAS total score was .75 ($N = 792$, $P < .001$). Each sub-scale also correlated significantly with the RCMAS total score (panic–agoraphobia, $r = .61$; separation anxiety, $r = .53$; social phobia, $r = .65$; injury fears, $r = .40$; obsessive-compulsive, $r = .60$; and generalized anxiety, $r = .66$; $N = 792$, $P < .001$ in all cases). Correlations between the RCMAS Lie Scale and the SCAS total score, $r = .01$, and all factor scores were extremely low.

Correlations were then examined between scores for the SCAS and child report on the Children's Depression Inventory in order to explore divergent validity.

Results showed a significant correlation between SCAS total scores and scores on the CDI ($r = .60$, $P < .01$, $N = 792$). In addition, each of the sub-scales on the SCAS correlated significantly with the CDI scores (panic–agoraphobia $r = .59$; separation anxiety $r = .40$; social phobia $r = .47$; injury fears $r = .37$; obsessive-compulsive $r = .49$; and generalized anxiety $r = .47$; $P < .01$, $N = 792$ in all cases). The correlation between the SCAS total score and the CDI was significantly lower than the correlation between the SCAS total score and the RCMAS anxiety score, $Z = 7.98$, $N = 825$, $P < .001$, using the method described by Meng, Rosenthal, and Rubin (1992). This finding supports the divergent validity of the SCAS as an indicator of anxious, rather than depressive symptoms. When the relationships between individual SCAS sub-scales and

Table 4
Raw means and standard deviations (in parentheses) by gender for each SCAS sub-scale score and total score

Sub-scales	Mean (S.D.)
Panic/agoraphobia (nine items)	
Males	1.95 (3.20)
Females	2.95 (3.35)
Combined	2.41 (3.25)
Separation anxiety (six items)	
Males	1.83 (2.29)
Females	2.77 (2.29)
Combined	2.26 (2.34)
Social phobia (six items)	
Males	5.27 (3.07)
Females	6.63 (3.29)
Combined	5.90 (3.24)
Physical injury fears (five items)	
Males	1.86 (2.22)
Females	3.05 (2.31)
Combined	2.41 (2.34)
Obsessive-compulsive (six items)	
Males	3.22 (2.86)
Females	3.59 (3.01)
Combined	3.39 (2.93)
Generalized anxiety (six items)	
Males	4.70 (2.69)
Females	6.07 (3.07)
Combined	5.33 (2.95)
Total score	
Males	18.85 (13.07)
Females	25.08 (13.37)
Combined	21.72 (13.56)

the CDI and RCMAS were examined, an interesting pattern of results emerged. The separation anxiety, social phobia, obsessive-compulsive, and generalized anxiety sub-scales all showed significantly weaker relationships with the CDI than with the RCMAS ($P < .001$ in all cases). However, this was not the case for the fear of physical injury and panic–agoraphobia sub-scales, for which there

Table 5
Rank order percentage of adolescents giving frequency ratings of 2 "often" or 3 "always" for each item

Item	%
29. I worry what other people think of me	34.4
1. I worry about things	32.8
10. I worry that I will do badly at my school work	30.5
35. I feel afraid if I have to talk in front of my class	25.8
9. I feel afraid that I will make a fool of myself in front of people	24.3
12. I worry that something awful will happen to someone in my family	20.1
3. When I have a problem, I get a funny feeling in my stomach	18.3
20. When I have a problem, my heart beats really fast	16.9
33. I am scared of insects or spiders	15.2
19. I can't seem to get bad or silly thoughts out of my head	14.0
14. I have to keep checking that I have done things right (like the switch is off, or the door is locked)	13.9
22. I worry that something bad will happen to me	13.7
41. I get bothered by bad or silly thoughts or pictures in my mind	13.5
6. I feel scared when I have to take a test	13.2
39. I am afraid of being in small closed places, like tunnels or small rooms	12.6
25. I am scared of being in high places or lifts (elevators)	11.3
40. I have to do some things over and over again (like washing my hands, cleaning or putting things in a certain order)	10.3
24. When I have a problem, I feel shaky	10.1
23. I am scared of going to the doctors or dentists	9.4
42. I have to do some things in just the right way to stop bad things happening	7.8
34. I suddenly become dizzy or faint when there is no reason for this	7.3
7. I feel afraid if I have to use public toilets or bathrooms	6.7
21. I suddenly start to tremble or shake when there is no reason for this	6.4
8. I worry about being away from my parents	6.2
5. I would feel afraid of being on my own at home	5.1
4. I feel afraid	5.1
2. I am scared of the dark	4.5
27. I have to think of special thoughts to stop bad things from happening (like numbers or words)	4.3
36. My heart suddenly starts to beat too quickly for no reason	3.9
37. I worry that I will suddenly get a scared feeling when there is nothing to be afraid of	3.7
18. I am scared of dogs	3.5
13. I suddenly feel as if I can't breathe when there is no reason for this	3.3
32. All of a sudden I feel really scared for no reason at all	3.1
30. I am afraid of being in crowded places (like shopping centres, the movies, buses, busy playgrounds)	2.8
16. I have trouble going to school in the mornings because I feel nervous or afraid	2.5
15. I feel scared if I have to sleep on my own	1.8
44. I would feel scared if I had to stay away from home overnight	1.6
28. I feel scared if I have to travel in the car, or on a bus or a train	0.9

were no significant differences in the strength of correlation with the CDI and RCMAS.

The relationship between SCAS scores and parents' ratings on the anxious/depressed withdrawal sub-scale of the CBCL was then examined for a sub-sample of 234 children. No significant correlations were found between the SCAS total score, the RCMAS or the CDI and mothers ratings on the anxious/depressed withdrawal sub-scale of the CBCL. Thus, there was support for the convergent validity of the SCAS scores based on another child-report measure of anxiety, but not with respect to information regarding such problems provided by the mother.

3.5. Mean values by age and gender

Analyses of variance were conducted to examine age and gender differences in anxiety symptoms. There were no significant differences in scores between the 13- and 14-year-olds, and no significant age by gender effects for either the total scores or any of the SCAS sub-scales. Table 4 therefore reports the data for combined age groups. A significant effect was found for gender on the SCAS total score $F(1, 874) = 48.04$, $P < .001$, with girls tending to report significantly greater levels of anxiety symptoms than boys. Girls also reported significantly higher scores than boys for all sub-scales except obsessive-compulsive symptoms, where no gender differences were found (panic–agoraphobia [$F(1, 874) = 20.11$, $P < .001$], separation anxiety [$F(1, 874) = 36.20$, $P < .001$], social phobia [$F(1, 874) = 39.83$, $P < .001$], physical injury fears [$F(1, 874) = 59.87$, $P < .001$], and generalized anxiety [$F(1, 874) = 48.84$, $P < .001$]).

The percentage of adolescents who reported frequency of occurrence of each item as *often* or *always* was then examined. The pattern of most frequent anxiety symptoms was extremely similar for both genders, thus results for both genders combined are reported in Table 5. The most prevalent symptoms generally related to social concerns. It was also interesting to note the high prevalence of obsessive-compulsive symptoms in the sample. Panic and agoraphobic symptoms were less likely to be rated as a frequent problem.

4. Discussion

The present study examined psychometric properties of the SCAS with a young adolescent population. In keeping with the findings for children, confirmatory factor analysis with the young adolescent age group demonstrated that a model with six correlated factors provided a good fit of the data. Strong support was found for a six-correlated factor model involving six factors related to panic/agoraphobia, social phobia, separation anxiety, obsessive-compulsive problems, generalized anxiety and fears of physical injury. All items loaded significantly upon their hypothesized factor, with high factor loadings for almost all items. Thus, data were consistent with the structure outlined within DSM-IV, which

assumes that specific subtypes of anxiety disorder can be identified in children. As predicted, the fit of the six correlated factor model was significantly better than that produced by the uncorrelated six-factor model, confirming strong interrelationships between subtypes of anxiety. The strong intercorrelation between factors suggested the possibility of a higher-order factor or the possibility that the data may be reflecting a single dimension of anxiety in general. However, although the single factor model produced a reasonably good fit of the data, it was statistically less satisfactory than the six-correlated factor model. In contrast, there was considerable support for the higher-order model, consistent with an overall anxiety factor underlying the specific anxiety disorders. These results suggest that the high degree of covariance observed among the first-order anxiety factors can be explained by a single, second-order factor. However, there was sufficient unique variance accounted for by individual factors to justify use of individual factor scores, in addition to an overall anxiety symptom score. The percentages of unique variance explained by each factor were very similar to levels reported by Spence (1997) for a 10–12-year age group.

Also in keeping with research involving the SCAS with children (Spence, 1997), was the finding that the generalized/overanxious factor accounted for only a small percent of unique variance in scores. It is unclear whether this reflects inadequacy in the wording of the generalized anxiety items or whether the validity of the construct of generalized anxiety as a separate anxiety disorder in young people should be questioned. However, the result is consistent with a study reported by Beidel (1991) that failed to support overanxious disorder as a distinct diagnostic category in children. Indeed, Beidel (1991) suggested that overanxious disorder may represent a ''prodromal'' anxious state that underlies development of anxiety disorders in children and adolescents. This possibility may also apply to the construct of generalized anxiety disorder. Further studies are needed to determine whether generalized anxiety disorder represents a valid diagnostic category among young adolescents or whether such symptoms may actually reflect a higher-order factor of anxiety in general, having a common influence across anxiety disorder subtypes.

The data also supported a panic/agoraphobia factor amongst the 13–14-year-olds. These symptoms related to unexpected physiological and affective fear responses, in the absence of obvious threat, and fears of situations in which escape might be difficult. Panic and agoraphobia items loaded together on the same latent factor, providing support for the proposition that young adolescents do indeed experience anxiety symptoms that resemble panic/agoraphobia problems in adults. Such symptoms were, however, less common than other anxiety symptoms, such as those associated with social phobia or obsessive-compulsive disorder.

Results of the present study also provide further support for a fear of physical injury factor, in line with the findings of Spence (1998) with younger children and Muris et al. (2000) with 7–19-year-olds. Campbell and Rapee (1994) also found evidence for a distinct physical fear dimension amongst children. Taken together,

the findings suggest that there may be a subtype of anxiety disorder amongst children in which the primary focus is on situations that have to potential to cause physical injury, albeit with low probability. Thus, it appears that children who experience fears relating to stimuli such as dogs, insects, snakes, injections, or storms, are likely to have comorbid fears spanning a range of potentially harmful stimuli. It would be interesting to determine whether this subtype of anxiety is also evident amongst clinical samples or whether the clustering of fears of physical injury is limited to community samples.

Results of the exploratory factor analysis were broadly consistent with those of the confirmatory factor analysis, although the separation and generalized anxiety dimensions evidenced a good deal of overlap. This overlap between separation and generalized anxiety symptoms was not found with the sample of 8–12-year-olds reported by Spence (1998) also with a community sample with a similar demographic profile to the present study. Thus, the finding may reflect a developmental difference in which separation anxiety represents a less discrete factor with increasing age. Certainly this possibility warrants further examination in future studies.

No significant age differences were found between 13- and 14-year-olds for total or sub-scale SCAS scores. However, mean total and sub-scale scores for the 13- and 14-year-olds combined were lower than those reported for 12-year-olds by Spence (1998), suggesting a continued decrease in self-reported anxiety scores with increasing age. This finding is consistent with Muris et al. (2000), who found a decrease in anxiety symptoms with increasing age with 7–19-year-olds and with previous studies that reported a decline in children's fears with increasing age (Ollendick, Yang, King, Dong, & Akande, 1996).

In terms of gender differences, girls were found to report higher scores for the total SCAS and all sub-scales except obsessive-compulsive symptoms, for which there were no differences between genders. This result is in keeping with the findings of Spence (1998) and Muris et al. (2000), and with general population studies of the prevalence of clinically significant anxiety disorders (Anderson, 1994). The finding that obsessive-compulsive symptoms represented the only symptom cluster to be equally prevalent in boys and girls is also consistent with previous literature (March, Leonard, & Swedo, 1995; Whitaker et al., 1990).

The most frequently experienced symptoms of anxiety were similar for both genders and tended to relate to social-evaluative concerns. Obsessive-compulsive symptoms were also among the most commonly presenting symptoms. In terms of separation anxiety, fears of harm befalling family members were relatively common (around 20% of young adolescents reported such concerns). Although fears of being at home alone or being away from parents were less frequent, they were still reported by 5–6% of young adolescents. These findings suggest that, although separation anxiety symptoms decline with age, this area should still be included in the assessment of anxiety among young adolescents.

The mean values reported for SCAS total and sub-scale scores were higher than those reported by Dutch adolescents (Muris, Meesters, Rassin, Merckelback,

& Campbell, 2001; Muris, Merckelbach, Schmidt, Gadet, & Bogie, 2001). It is not clear whether this represents the greater age range of the adolescents in the Dutch studies, or a genuine cultural difference. Certainly the possibility of cultural differences in the reporting and experience of anxiety symptoms warrants further investigation.

The SCAS was found to have high internal consistency, with sub-scales also showing acceptable levels of internal consistency. Test–retest reliability with a sub-sample of adolescents revealed a modest level of stability in children's total and sub-scale scores on the SCAS over a 12-week period. It is difficult to compare the present result for test–retest reliability with that found for other measures of anxiety, as most studies have used shorter periods for assessing test–retest reliability. However, for shorter periods test–retest reliabilities for other anxiety measures have tended to be moderate, in keeping with the results of the present study (e.g., March et al., 1999).

The convergent validity of the SCAS was supported by a strong correlation between the total SCAS scores and total score on the RCMAS. The SCAS also correlated significantly with the Children's Depression Inventory. However, the correlation between the SCAS and the CDI was significantly lower than that between the SCAS and the RCMAS, thereby supporting the divergent validity of the SCAS as an indicator of anxious rather than depressive symptoms. The relationship between the SCAS and mothers' ratings on the anxious/depressed sub-scale of the Child Behavior Checklist was also examined as an evaluation of convergent validity. Contrary to predictions, no significant relationship was found between these measures. However, lack of agreement between parent and child evaluation of childhood anxiety has been found in other studies (Silverman, 1994) and reflects a general lack of agreement between parent and youth in the assessment of emotional and behavioral problems. Low levels of agreement between parents and their children have even been found when parallel versions of the same anxiety instrument have been used. For example, Birmaher et al. (1997) reported a correlation of .30 between parent and child report on the total score of the SCARED.

There are several methodological limitations of the present study. First, the study involved a community sample, thus the findings cannot be generalized to clinical samples. It remains to be determined whether the factor structure is applicable to a clinical sample of young adolescents with diagnosed anxiety disorders. Similarly, it is important in future studies to examine the psychometric properties of the SCAS sub-scales scores as they relate to anxiety diagnoses in a clinical population.

Second, although results are broadly consistent with the structure of DSM-IV anxiety disorders, it is important to note that the study did not aim to validate the actual clinical diagnoses produced by DSM-IV. To do so would require information about the length of time that symptoms had occurred and the number of symptoms experienced simultaneously. The present study was limited to a rating of the frequency with which specific symptoms were experienced.

A further limitation relates to the content of the SCAS. As Muris et al. (2000) noted, the SCAS is to be commended for its strong psychometric properties, but its clinical utility is limited by the absence of a PTSD dimension. It may be valuable in future studies to investigate the development of a PTSD scale in a revision of the SCAS. Alternatively, the SCAS may be used in conjunction with measures that specifically assess PTSD symptoms in children and adolescents. The SCARED, although not as psychometrically sound as the SCAS, includes a PTSD sub-scale (Muris et al., 2000).

In summary, results of the present study support the construct, convergent and divergent validity of the SCAS as an indicator of anxiety symptoms among a community sample of young adolescents. Data were consistent with a model based largely on DSM-IV diagnostic categories of anxiety disorders in children. Anxiety symptoms were found to load onto six, correlated factors relating to panic/agoraphobia, separation anxiety, social phobia, obsessive-compulsive disorder, generalized/overanxious problems and physical fears. The strong intercorrelation between first-order factors is consistent with the high level of comorbidity found amongst anxiety disorders in children. The high level of covariance between factors was satisfactorily explained by a strong, second-order anxiety factor. This higher-order factor accounted for a high proportion of the variance in children's anxiety symptom responses. However, there was sufficient unique variance in the first-order factor to justify use of sub-scale scores, representing different forms of anxiety disorder, in addition to use of the total anxiety symptom score.

Overall, the SCAS was found to have acceptable psychometric properties in terms of internal consistency, convergent and divergent validity. Test–retest reliability was weaker but satisfactory. In sum, the SCAS is likely to be a clinically valuable tool in the assessment of anxiety among young adolescents. The measure provides an indication of anxiety symptoms relevant to specific forms of anxiety disorder, and provides valuable information to indicate the need for in-depth, clinical assessment of anxiety disorders using a clinical diagnostic interview. As such, it provides an advance on other youth self-report measures that focus on the more general aspects of anxiety.

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