Psychometric properties of the Spanish version of the Anxiety Sensitivity Index for Children

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Abstract

Background: Anxiety sensitivity is a useful construct in explaining anxiety disorders. The Anxiety Sensitivity Index for Children (ASIC) is a brief self-report designed to assess anxiety sensitivity in youth. **Method:** Students (N = 1348; ages 10-17) completed a Spanish translation of the ASIC and measures of anxiety and depression. **Results:** Confirmatory factor analyses found that scores on the ASIC- Spanish version can be fitted to two factorial structures: A single factor and two first-order factors grouped into one higher-order factor. The two-factor structure was invariant between children and adolescents, and between boys and girls. The ASIC scales (Total Score, Mental Concerns, and Physical Concerns) demonstrated high internal consistency and test-retest reliability. ASIC scores were significantly related to measures of anxiety and, to a lesser extent, to a measure of depression. **Conclusions:** Results supported the factorial, convergent, and discriminant validity of ASIC scores in Spanish youth.

Keywords: Anxiety, anxiety sensitivity, children, adolescents, ASIC.

Resumen

Propiedades psicométricas de la versión española del Índice de Sensibilidad a la Ansiedad para Niños. **Antecedentes:** la sensibilidad a la ansiedad es un constructo útil en la explicación de los trastornos de ansiedad. El Índice de Sensibilidad a la Ansiedad para Niños (ASIC) es un breve autoinforme diseñado para evaluar la sensibilidad a la ansiedad en la población infanto-juvenil. **Método:** 1.348 estudiantes (edad: 10-17 años) completaron una traducción al español del ASIC y de medidas de ansiedad y depresión. **Resultados:** los análisis factoriales confirmatorios encontraron que las puntuaciones de la versión española del ASIC se ajustan a dos posibles estructuras factoriales: un único factor o dos factores de primer orden agrupados en un factor de orden superior. Esta última estructura es invariante entre niños y adolescentes y entre chicos y chicas. Las tres escalas del ASIC (Puntuación Total, Preocupación Mental y Preocupación Física) presentan alta consistencia interna y fiabilidad test-retest. Las puntuaciones del ASIC se relacionan significativamente con medidas de ansiedad y, en menor medida, con una medida de depresión. **Conclusiones:** los resultados apoyan la validez factorial, convergente y discriminante de las puntuaciones del ASIC en niños y adolescentes españoles.

Palabras clave: ansiedad, sensibilidad a la ansiedad, niños, adolescentes, ASIC.

Anxiety is a useful protection and defence mechanism. However, when it produces clinically significant distress or when it strongly interferes in a person's life, it is maladaptive and could become a psychological disorder. Many anxiety disorders begin in childhood, and, if not diagnosed and treated, persist into adulthood with significant negative consequences (Clark & Beck, 2012). Most epidemiological studies agree that anxiety is one of the most commonly diagnosed disorders in young people (Echeburúa & del Corral, 2009). In children, its prevalence varies between 15% and 20% (Orgilés Méndez, Espada, Carballo, & Piqueras, 2012).

Anxiety sensitivity (AS) is a construct that has been closely linked to anxiety. AS is defined as the fear of symptoms or feelings of anxiety (e.g., racing heartbeat, mental block, sweating, flushing) based on the belief that such symptoms, especially if they occur suddenly, sharply, or unexpectedly, may have important physical consequences (e.g., experiencing a heart attack or fainting), psychological consequences (e.g., loss of control, going insane), or social consequences (e.g., negative social evaluation) (Reiss, Peterson, Gursky, & McNally, 1986). Such catastrophic beliefs about the manifestations of anxiety constitute a vulnerability factor for developing anxiety disorders, especially panic attacks (Clark & Beck, 2012; Maller & Reiss, 1992; Reiss, 1991). AS is viewed as a relatively stable personality variable, and is considered an important risk factor and useful variable to predict future anxiety disorders (Maller & Reiss, 1992; Sandín, 1997). Thus, its early identification in children would assist in preventing future development of anxiety disorders.

Reiss et al. (1986) developed the Anxiety Sensitivity Index (ASI), a 16-item self-report, to evaluate AS in adults, Silverman, Fleisig, Rabian, & Peterson (1991) adapted the ASI to children when developing the Childhood Anxiety Sensitivity Index (CASI).

Laurent Schmidt, Catanzaro, Joiner, & Kelley (1998) also adapted the ASI to children by developing the 12-item Anxiety Sensitivity Index for Children (ASIC). Main differences between the CASI and ASIC are the number of items (18 for CASI, 12 for ASIC) and number of response options (three for CASI, four for ASIC).

The Spanish version of the CASI (Sandín, Chorot, Santed, & Valiente, 2002) was developed using a sample of 151 children (ages 9-11). This translation mimicked the English version with 18 items and three response options. Sandín and colleagues (2002) found that a two correlated factor model and two first-order factors grouped into a higher-order factor model fit the data better than a three first-order factor model. Unfortunately, little data exist concerning the reliability and validity of the Spanish version of the CASI.

Although the CASI is more popular than the ASIC (Noël & Francis, 2011), the ASIC has similar psychometric properties and the practical advantage of being briefer. These characteristics, along with the fact that the Spanish CASI is not well established, led to the current study that translated the ASIC for use with Spanish youth. Specifically, the factor structure and internal consistency of the ASIC-Spanish version were compared to those of the original English version. The relationship of the ASIC-Spanish version with anxiety symptoms and other related variables was also studied. Because previous studies have suggested that the factor structure of the CASI may vary according to age (Chorpita & Daleiden, 2000), we examined whether the ASIC-Spanish version demonstrated metric invariance between children and adolescents, and between boys and girls.

Method

Participants

A convenience, unselected sample of 1,348 children and adolescents (652 boys and 696 girls; ages 10-17 years), Spaniards and native Spanish speakers, from three primary, three secondary, and two vocational schools located in popular or middle-class neighbourhoods in the south of Spain was used. The schools were a mix of public and private (i.e., "concertadas").

Instruments

The Anxiety Sensitivity Index for Children (ASIC, Laurent et al., 1998) consists of 12 items that are answered on a scale ranging from 0 (not true) to 3 (true). A Total Score is obtained along with scores for two subscales, Physical Concerns and Mental Concerns, that refer to concerns that arise when experiencing physical symptoms (e.g., rapid heartbeat) or cognitive aspects of anxiety (e.g., losing control of one's own behaviour), respectively. The internal consistency of the ASIC Total Score and both subscales is excellent (Deacon, Valentiner, Gutiérrez, & Blacker, 2002; Laurent et al., 1998). As expected, ASIC scores are associated with measures of anxiety symptoms, especially, panic attacks (Deacon et al., 2002). The ASIC - Spanish version can be obtained from godoy@uma.es.

The Spence Children Anxiety Scale (SCAS, Spence, 1997; Spanish adaptation Orgilés Méndez, Spence, Huedo, & Espada, 2012) is a 44-item scale. In addition to the Total Score, six subscales based on DSM-IV criteria exist: Panic/Agoraphobia, Separation Anxiety, Social Phobia, Fear of Physical Injury,

Obsession-Compulsions, and Generalized Anxiety. Items are answered on a scale from 0 (almost never) to 3 (almost always). The internal consistency, test-retest reliability, and factor structure of the SCAS are well established for versions in several languages (e.g., Essau, Sasagawa, Anastassiou, Guzman, & Ollendick, 2011; Orgilés, Fernández-Martínez Guillén-Riquelme, Espada, & Essau, 2016) and for the Spanish version (Carrillo, Godoy, Gavino, Nogueira, Quintero, & Casado, 2012; Godoy, Gavino, Carrillo Cobos, & Quintero, 2011; Orgilés et al., 2012.). In the current study, Cronbach's alphas were: Total Score = .94; Panic Disorder/Agoraphobia = .88; Separation Anxiety = .73; Social Phobia = .72; Fear of Physical Injury = .71; Obsession-Compulsions = 0.77; and Generalized Anxiety = .80.

The Children Depression Inventory-Short (CDI-S; Kovacs, 1992; Spanish adaptation del Barrio, Roa, Olmedo, & Colodrón, 2002) consists of 10 items related to cognitive, affective, and behavioural aspects of depression that are rated on a scale from 0 to 2 to form a total score. The reliability and convergent and divergent validity of the CDI are adequate both in the original (Kovacs, 1992) and Spanish versions. The reliability and validity indices of the CDI-S do not differ from those of the original version of 27 items (del Barrio et al., 2002). In the current study, Cronbach's alpha was .80.

The Thought-Action Fusion Questionnaire for Adolescents (TAFQ-A, Muris, Meester, Rassin, Merckelbach, & Campbell, 2001; Spanish adaptation Fernández-Llebrés, Godoy, & Gavino, 2010) is a 15-item questionnaire that assesses the belief that risky thoughts are equivalent to risky actions. Items are answered on a scale from 0 (not true at all) to 3 (very true), and grouped into two subscales: TAF-Morality and TAF-Likelihood. Both the original version (Muris et al., 2001) and the Spanish version (Fernández-Llebrés et al., 2010) have demonstrated excellent psychometric properties regarding reliability and relationships with other associated variables. In the current study, alpha coefficients were: Total Score = .92; TAF-Morality = .92; TAF-Probability = .91.

The Penn-State Worry Questionnaire for Children (PSWQ-C, Chorpita, Tracey, Brown, Collica, & Barlow, 1997) is a 14-item self-report that assesses the tendency to worry about multiple everyday issues. Students respond to items on a scale from 0 (not at all true) to 3 (always true). The PSWQ-C is unifactorial and has excellent reliability and validity in samples of clinical and nonclinical youth (Chorpita et al., 1997; Pestle, Chorpita, & Schiffman, 2008). A Spanish version of the PSWQ-C was created *ad hoc* for the current study. Cronbach's alpha for our Spanish translation of the PSWQ-C was .89.

Procedure

Informed consent for students to participate in the study was obtained from their parents/guardians, and permission was obtained from their head teachers. Groups of 20 to 25 students voluntarily and without reward completed the questionnaires during school hours in the students' classroom in sessions lasting 45-60 minutes. The order of tests was counterbalanced to control for potential reactivity. One month after the initial test, a subsample of 326 participants (approximately 41 students for each age group) completed the ASIC a second time.

Two school psychologists with extensive experience working with young people in testing situations conducted the sessions. Two psychology graduate students, who were trained to answer

questions and ensure that no items were left unanswered, assisted them.

The ASIC items were translated into Spanish and then back-translated into English employing commonly recommended procedures (Hambleton, Merenda, & Spielberger, 2005).

Data analysis

The sample of 1348 children and adolescents was split in two subsamples with approximately 50% of individuals randomly selected for each. Principal component analyses were used with the first subsample ($n = 689$) to ensure that the Spanish version of the ASIC presented the same two components as the original English version. To this end, principal component analyses with both promax and oblimin rotations were conducted. Thus, the present results can be compared with those found by Laurent et al. (1998), who performed both, orthogonal and oblique rotations (i.e., promax and oblimin), and those found by Deacon et al. (2002), who performed an oblique (i.e., oblimin) rotation.

Confirmatory factor analyses (CFA) were then conducted on the second subsample ($n = 660$) to investigate whether the structure found with the first subsample was sound. Three models were tested: Model 1, where ASIC items scores were independent; Model 2, where the scores of all items were grouped into a single factor; and Model 3, based on previous studies, where item scores were grouped into two first-order factors (physical concerns and mental concerns) that, in turn, formed a higher-order factor.

Finally, multi-group CFAs were used on the overall sample ($N = 1348$) to examine whether this factor structure was similar in children and adolescents, and in boys and girls. Students between 10 and 14 years ($n = 705$) were considered "children," and students between 15 and 17 years ($n = 643$) were considered "adolescents." The following was expected: ASIC item scores would be grouped into two first-order factors and one hierarchically higher-order factor (model 3) would show metric invariance between children and adolescents and between boys and girls. In this context, "metric invariance" means that ASIC item scores measure the same construct (equal number of factors), in the same way (equal factor weights), with the same error, and in the same scale (equal intercepts) in children and adolescents, and in boys and girls.

The reliability (internal consistency and test-retest) was estimated for ASIC scales (Physical Concerns, Mental Concerns, and Total Score) with the recombined sample ($N = 1348$). The sources of validity evidence for ASIC scores were examined through their correlations with scores of several types of anxiety symptoms (assessed by the SCAS) and depression (assessed by the CDI-S). Finally, we used the PSWQ-C and the TAFQ-A scores to study the discriminant validity of ASIC scores. It could be considered that ASIC scores simply measure a particular type of concern (e.g., concern about anxiety symptoms), or that they simply measure the belief that thoughts have the same effect as overt actions. To examine these hypotheses, PSWQ-C scores partial correlations were used to determine whether ASIC scores simply measure concerns or whether correlations between ASIC scores and anxiety symptoms is maintained, even if the variance explained by worry is eliminated from the total variance. Similarly, TAFQ-A scores can be used to show whether ASIC scores simply measure confusion between thoughts and reality.

Multi-imputation for missing values (.3%) was performed. Confirmatory factor analyses and metrics invariance estimations

were performed using generalized weighted least squares with LISREL 8.80 (Jöreskog & Sörbom, 2007). Internal consistency was calculated using FACTOR 9 (Lorenzo-Seva & Ferrando, 2013). In all three cases, polychoric correlation matrices were used. The remaining calculations were performed using IBM SPSS 22 (IBM, 2013).

Results

Sources of validity evidence of internal structure: Principal component analyses

PCA with both orthogonal (promax) and oblique (oblimin) rotations were conducted, consistent with previous analyses (Deacon et al., 2002; Laurent et al., 1998). Results are presented in Table 1. As can be seen, there were two components that closely matched those found with the original English version.

Sources of validity evidence of internal structure: Confirmatory factor analyses and metric invariance

As shown in Table 2, using the second subsample, both Model 2 and Model 3 fit the data reasonably well according to criteria established by MacCallum, Browne, & Sugawara (1996). This result is supported by all the goodness-of-fit indexes: Satorra-Bentler χ^2 were similar; Root Mean-Square Error of

Table 1
Factorial weights from the exploratory factor analysis (n = 689) and confirmatory factor analysis (n = 660)

Item	Exploratory factor analysis		Confirmatory factor analysis	
	Physical Concern	**Mental Concern**	**Physical Concern**	**Mental Concern**
2	.26 (.22)	.56 (.57)	.74	–
3	.50 (.49)	.30 (.30)	.71	–
4	.62 (.62)	.20 (.18)	.83	–
5	.66 (.67)	.04 (.01)	.55	–
6	.76 (.77)	.06 (.03)	.80	–
7	.70 (.72)	-.06 (-.09)	.65	–
8	.80 (.83)	-.16 (-.20)	.63	–
10	.79 (.71)	.10 (.08)	.68	–
1	-.14 (-.20)	.87 (.91)	–	.72
9	.28 (.26)	.39 (.39)	–	.80
11	-.03 (-.09)	.84 (.88)	–	68
12	.13 (.09)	.61 (.63)	–	.70
Gamma weights			.62	.43

Note: Principal components with oblimin rotation and promax (within parentheses) rotations.

Table 2
Confirmatory factor analyses: Model structure (n = 660) and metric invariance for children/adolescents and for boys/girls (N = 1348).

Model structure						
Model	**S-B.χ^2**	**d.f.**	**RMSEA**	**CFI**	**SRMR**	**TLI**
1: Independent	10301.79	66				
2: One single factor	292.04	54	.08 (.07 - .09)	.98	.06	.97
4: Two first-order factors and one higher factor	291.89	53	.08 (.07 - .09)	.98	.06	.97
Invariance of the two first-order factors and one higher factor model						
Children (n=705). Adolescents (n = 643)	796.40	128	.09 (.08 - .09)	.97	Child: .06 Adol: .09	.98
Boys (n = 652) Girls (= 696)	776.30	128	.09 (.08 - .09)	.97	Boy: .06 Girl: .09	.97

S-B: Satorra-Bentler chi-square; d.f.: degree of freedom; RMSEA: Root Mean-Square Error of Approximation; CFI: Comparative Fix Index; SRMR: Standard Residual Mean Root; TLI: Tucker-Lewis Index

Approximation and Standard Residual Mean Root were not greater than .08, and Comparative Fit Index and Tucker-Lewis Index were greater than .95. The last two columns in Table 1 show the factor weights (lambda coefficients) of each item in its factor for Model 3. Weights of the higher-order factor (gamma coefficients) appear at the end of Table 1.

The last two rows of Table 2 present the results of the CFAs testing metric invariance between children and adolescents, and between boys and girls. As shown in Table 2, the model of two first-order factors grouped into a higher-order factor fits the data acceptably well. Moreover, if the value of the Comparative Fit Index is taken into account, as recommended by Cheung and Rensvold (2002), Model 3 describes the data acceptably well when the second subsample is used, and when the recombined sample is split into children and adolescents, or into boys and girls. Model fit, however, is better for children and boys than for adolescents and girls.

Reliability

The internal consistency of the ASIC (i.e., Cronbach's alpha) was excellent: Total Score = .92; Physical Concern = .90; Mental Concern = .82. The test-retest reliability (i.e., intraclass correlation) after one month was .92 for the Total Score; .90 for Physical Concern; and .77 for Mental Concern.

Sources of validity evidence: Correlation between ASIC subscales

Data in Table 3 reveal that there is a high correlation between both ASIC subscales and the total score. However, the correlation between the Physical Concern and Mental concern subscales is moderate.

Sources of validity evidence: Correlations with other variables

Table 3 shows the correlations between the ASIC scales and symptoms of anxiety disorders as evaluated by the SCAS. The results show that there was a moderate correlation between the ASIC total score and its two subscales (physical and mental concerns) and all the SCAS subscales. As suggested by previous studies (e.g., Deacon et al., 2002), the highest correlation was between the SCAS Panic Disorder/Agoraphobia subscale and the ASIC Total Score. When the variance explained by the total score of the TAFQ-A and PSWQ-C was partialed out, all correlations between the ASIC and the SCAS scales remained statistically significant.

The correlations between the scores of the three ASIC scales and depression were generally lower than their correlations with anxiety symptoms. All correlations between the ASIC scales and the depression score tended to approach zero when the variance explained by the total score of TAFQ-A and PSWQ-C was partialed out.

Table 3
Pearson's correlations between ASIC scores and symptoms of anxiety. (Partial correlations partialing out TAFQ-A total score and PSWQ-C score)

	Physical Concerns	Mental Concerns	ASIC Total
ASIC Physical Concerns		.47	.94
ASIC Mental Concerns			.74
SCAS Panic/Agoraphobia	.47 (.33)	.45 (.30)	.50 (.36)
SCAS Social Phobia	.36 (.21)	.39 (.23)	.40 (.24)
SCAS Separation Anxiety	.43 (.31)	.35 (.19)	.44 (.30)
SCAS Obsession-Compulsions	.44 (.27)	.40 (.22)	.46 (.29)
SCAS Generalized Anxiety	.43 (.22)	.41 (.18)	.46 (.23)
SCAS Physical Injury Fear	.30 (.21)	.24 (.12)	.30 (.20)
SCAS Total	.53 (.37)	.50 (.29)	.56 (.39)
CDI-S	.27 (.04)	.36 (.13)	.33 (.08)
TAFQ-A Likelihood	.34	.35	.37
TAFQ-A Moral	.20	.19	.21
TAFQ-A Total	.30	.30	.33
PSWQ-C	.42	.48	.48

Pearson's and partial correlations greater than .07 are significant at $p = .01$.
ASIC: Anxiety Sensitivity Index for Children; SCAS: Spence Children's Anxiety Scale; CDI-S: Children Depression Inventory-Short; TAFQ-A: Thought-Action Fusion Questionnaire for Adolescents; PSWQ-C: Penn State Worry Questionnaire for Children

Discussion

Accumulating evidence suggests AS can help understand anxiety among children and adolescents (e.g., Noël & Francis, 2011; Vaina, Kiel, Alfano, Dixon, & Palmer, 2017). The current study developed a Spanish translation of the ASIC. Although not as widely used as the CASI, the ASIC has advantages in that it is a briefer measure with more response options. At the same time, the ASIC has psychometric qualities similar to those of the CASI (Deacon et al., 2002; Laurent et al., 1998).

Factor analyses revealed that scores on the ASIC-Spanish version were grouped into two first-order factors (Physical Concern and Mental Concern), which, in turn, were grouped into a higher-order factor (Anxiety Sensitivity). These findings were consistent with the original English version of the ASIC (Deacon et al., 2002; Laurent et al., 1998) and the CASI (Silverman, Ginsburg, & Goedhart, 1999). Although the two ASIC subscales were highly correlated with the total score, the two subscales were only moderately correlated, which is consistent with results found by Deacon et al (2002). It is worth noting that the findings from the CFA also supported a single factor, suggesting that a total score can be used, if preferred over the two component scores.

The internal consistency of the overall score and subscales was acceptable, and similar to that of the original English version (Deacon et al., 2002; Laurent et al., 1998; Valentiner et al., 2002). The test-retest reliability of the ASIC-Spanish version was also acceptable. To the best of our knowledge, no other studies have investigated ASIC test-retest scores, so we cannot compare our results with those of previous studies.

The convergent validity of the ASIC was also supported. As expected, the three ASIC scores (total score and the two subscales scores) were moderately correlated (generally between .40 and .50) with anxiety symptoms scores. These results were very similar to those reported by Deacon et al. (2002) and Valentiner et al. (2002). Also, as expected, the correlation between the ASIC scores and depressive symptoms (CDI-S) was lower than those between the ASIC scores and anxiety symptoms (SCAS).

Finally, it should be noted that the ASIC scores are statistically associated with measures of thought-action fusion beliefs (TAFQ-A) and worries (PSWQ-C). However, our results support the idea ASIC scores do not simply measure beliefs about the potential dangers of certain types of thoughts or generalized worry. This claim is supported by the low-moderate correlations of the ASIC with measures of thought-action fusion beliefs (TAFQ-A) and with the measure of worry (PSWQ-C), as well as by the fact that the association between the ASIC scores and anxiety symptoms remained significant even when the explained variance of thought-action fusion beliefs and worry measures were partialed out.

A positive aspect of the current study was that it used the largest sample, to date, of any published study on the ASIC. However, despite its size, a convenience sample was used, and, thus, was unrepresentative of any kind of well-defined population. The other major limitation of this study was that only self-reports were used, which diminishes the general validity of its results. However, self-reports are among the most commonly used measurement tools in psychology.

AS is an important variable in the conceptualization and treatment of some anxiety disorders (Busscher, Spinhoven, van Genven, & de Geus, 2013; Korte, Brawn, & Schmidt, 2013; Schmidt, Capron, Raines, & Allan, 2007). The ASIC is a brief, widely available, and easily applicable instrument that is used with children and adolescents. The ASIC-Spanish version will facilitate better understanding of the cross-cultural nature of anxiety sensitivity.

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