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Assessing state-anxiety in European Portuguese children and adolescents: Adaptation and validation of the State Anxiety Scale for Children

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Abstract

We present an initial validation of the State Anxiety Scale for Children for Portuguese children and adolescents. No significant differences were found between sexes and among school cycle groups. The data revealed good psychometric properties and the 'anxiety-absent' and 'anxiety-present' factors were confirmed. Potential applications of the instrument are presented.

Keywords: State Anxiety Scale for Children (SASC), European Portuguese children, European Portuguese adolescents, Psychometric properties, Confirmatory Factor Analysis

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Introduction

Anxiety is an emotion with adaptive functions that typically includes cognitive, physiological and behavioral manifestations. However, when this emotional response is excessive it becomes a pathological condition (Beesdo, Knappe, & Pine, 2009). Particularly in children and adolescents, anxiety disorders have negative impact in various areas such as in cognitive and academic performance, and in social life (e.g., Mazzone et al., 2007; Settipani & Kendall, 2013). Furthermore, this type of disorder is amongst the most frequent psychopathologies in young ages and is related to a higher probability of experiencing anxiety problems later in adulthood (Merikangas, Nakamura, & Kessler, 2009), as well as of suffering from other pathologies such as depression or substance abuse (Wu et al., 2010). Understanding the anxiety reactions of children and adolescents in their everyday lives is crucial to help them deal with those situations, to prevent the development of clinical conditions, and to avoid the negative consequences these might have. Using appropriate instruments that allow a reliable assessment of anxiety states is essential to achieve these goals.

The State-Trait Anxiety Inventory for Children (STAIC; Spielberger, Edwards, Lushene, Monturoi, & Platzek, 1973) is one of the most used instruments to assess anxiety in children and adolescents (Seligman, Ollendick, Langley, & Baldacci, 2004). This self-report questionnaire includes two scales that separately assess the state- and the trait-anxiety. The first refers to a transitory emotional reaction to a real or potential stressful event or stimuli, whereas the second refers to a more stable tendency to experience anxiety and is often described as an individual difference (Spielberger et al., 1973). In this work, we focused our attention in the state scale of STAIC, hereafter designated by State Anxiety Scale for Children (SASC).

The SASC has been frequently used in research and in clinical settings. Specifically, it has been used to assess the anxiety consequences of certain life events such as the death of a parent (e.g., Raveis, Siegel, & Karus, 1999) or having to face medical procedures (e.g., Li & Lopez, 2004). The psychological adjustment to specific treatments has also been tracked with this scale (e.g., Wechsler & Sánchez-Iglesias, 2013). Studies exploring the relation between state-anxiety, cognitive performance (e.g., Hadwin, Brogan, & Stevenson, 2005), and other areas of performance (e.g., musical performance; Ryan, 2004; anxiety when performing sport and nonsport activities;

Simon & Martens, 1979) have also used it. Although other instruments exist to assess the anxiety experienced in specific situations (e.g., Children's Fear Survey Schedule-Dental Subscale; Beena, 2013), the SASC is a worldwide used scale in a large variety of domains.

The SASC is composed of 20 items, 10 of which formulated to capture the absence of anxiety and the remaining 10 to capture its presence. The former correspond to the "anxiety-absent" factor and the later to the "anxiety-present" factor, according to studies that have explored the factorial structure of this scale (e.g., Dorr, 1981; Hedl & Papay, 1982). This same factorial structure has been obtained consistently in validation studies across the world (e.g., Li & Lopez, 2004; Psychountaki, Zervas, Karteroliotis, & Spielberger, 2003). Although the SASC was originally designed to measure anxiety in children aged 9-12 years (Spielberger et al., 1973), it can be used with younger and older children. Indeed, several validation studies have obtained good psychometric properties for the scale using other age ranges (e.g., 7-12Y-old, Li & Lopez, 2004; 9-15Y-old, Spielberger, Edwards, Lushene, Monturoi, & Platzek, 2009).

The popularity of this instrument has motivated researchers from around the world to adapt it for their own populations. As stressed by various authors, instruments should be adapted for the culture where they will be used, because some items or concepts may be appropriate in a given culture, but not in another (e.g., Beaton, Bombardier, Guillemin, & Ferraz, 2000). The SASC has been translated and adapted into languages such as Brazilian Portuguese (Biaggio, 1980), Chinese (Li & Lopez, 2004), Greek (Psychountaki et al., 2003), and Spanish (Gómez-Fernández & Spielberger, 1990), just to name a few. Overall, the validation studies have reported good internal consistency as measured by Cronbach's α (e.g., 84-.85, Li & Lopez, 2004; 82-.87, Spielberger et al., 1973) and good test-retest reliability (e.g., .78-.79; Li & Lopez, 2004).

Some of these validation studies have also explored sex differences on state-anxiety motivated by the fact that females tend to develop higher anxiety levels than males. However, the results have been inconsistent with some studies reporting a tendency for higher anxiety in males than in females (e.g., Spielberger et al., 1973), others reporting the opposite pattern (Gómez-Fernández & Spielberger, 1990), and still others reporting no difference between sexes (e.g., Psychountaki et al., 2003).

Another variable that has been considered in the study of state-anxiety and that has also provided mixed results is age. For example, Psychountaki et al. (2003) obtained a significant effect of the academic year (strongly related to age) on state-anxiety: Participants attending the fourth grade reported significantly less anxiety than those attending the fifth grade who, in turn, indicated less anxiety than the participants from the sixth grade (not significant). However, Day, Knight-II, El-Nakad, and Spielberger (1986) found no influence of grade level on state-anxiety.

Given the overarching importance of assessing state-anxiety, the aims of this study were to translate and adapt the SASC for European Portuguese children and adolescents, to provide its preliminary psychometric proprieties, to test its factorial structure and to present other validity indicators. A previous study has been conducted in Portugal to adapt and validate this instrument. In this study conducted by Matias (2004) , during the adaptation process, 10 new items were added to the original scale, resulting in an instrument that differs somewhat from the original. Additionally, no Confirmatory Factor Analysis (CFA) was conducted in that work. Finally, Mind Garden (owner of the copyrights of the instrument) informed us of the inexistence of a European Portuguese version of this scale. The present study is also justified by the potential applicability of this instrument as just reviewed. To fulfill our aims, we conducted the typical translation procedures from the original instrument and applied the resulting version to a group of children and adolescents in two different moments in time. We also asked participants to report the presence of any stressors in the two administration moments. We provide information on the reliability of the scale, as evaluated by its internal consistency (Cronbach's α), and temporal constancy (test-retest reliability) by calculating the Intraclass Correlation Coefficient (ICC). The factorial structure was tested via a CFA using several indexes (cf. data analysis section). The state-anxiety values reported by participants who experienced a stressful event in only one of the moments were considered to provide preliminary evidence of the construct validity of the data (Li & Lopez, 2004). We predicted that state-anxiety would be higher when a stressor was occurring as compared to when it was absent. Additionally, we explored the differences between sexes and among school cycle groups; Considering that the school cycles are naturally related with age, the later analysis provides information on the relation between age and anxiety. We do not provide specific predictions for these results given the inconsistencies in the literature.

Method

Participants

The sample included 405 participants aged 8-14 years (M_{age} = 11.41, *SD* = 1.87): 202 females (M_{age} = 11.52, *SD* = 1.87) and 203 males (M_{age} = 11.30, *SD* = 1.86). Participants were recruited from 7 schools of the Aveiro district and were attending three different school cycles. According to the Portuguese education system, the first cycle includes grades 1-4, the second cycle includes grades 5 and 6, and the third cycle includes grades 7-9. In our sample, the group from the first school cycle included students attending the third and fourth grades (N = 100; 24.7% of the full sample; M_{age} = 8.87; *SD* = 0.69). The group from the second school cycle included students from grades five and six (N = 78; 19.3% of the full sample; M_{age} = 10.49; *SD* = 0.73). Finally, the group from the third school cycle included students attending the seventh and eighth grades (N = 227; 56.0% of the full sample; M_{age} = 12.85; *SD* = 0.79). Six other participants were excluded because they turned 15 years during the study (N = 2) or did not complete the two phases of the data collection (N = 4). Schools were selected by convenience but, in an effort to increase the representativeness of our sample regarding different educational environments, we included public and private schools, as well as schools from rural and urban areas. The study was authorized by the Portuguese Directorate-General for Education and by the school directors. Only students with previous informed consent from their parents and who agreed to participate voluntarily took part in the study.

Instrument

The *SASC* is one of the independent scales of the STAIC (Spielberger et al., 1973) that assesses the level of anxiety individuals are experiencing at the exact moment they are responding to the instrument. It includes 20 items and responses are provided by choosing one of three options that describe how the participant is feeling at that moment. Most studies argue for a two-factor scale. The "anxiety-absent" factor includes items that are formulated to capture the absence of anxiety (e.g., item 1: "I'm feeling…"© with the response options "very calm", "calm" or "not calm"; items 1, 3, 6, 8, 10, 12, 13, 14, 17, and 20); the lowest, intermediate and highest severity of the symptom are scored with 1, 2, and 3 points, respectively. The remaining 10 items of the

scale compose the "anxiety-present" factor and are formulated to indicate the presence of anxiety (e.g., item 4: "I'm feeling…"© with the response options "very nervous", "nervous" or "not nervous"); these are scored in the opposite manner. The total score ranges from 20 (minimal anxiety) to 60 points (highest anxiety).

The translation of the SASC into European Portuguese included the following four phases: 1) translation of the original questionnaire into European Portuguese by two Portuguese researchers highly proficient in English; 2) re-translation of our translated form of the scale into English by a bilingual English Professor naïve to the original version; and, 3) examination of the translated and re-translated versions by two researchers and one clinical psychologist to adjust some of the terms considering our age sample. Finally, in order to ensure the content validity of the instrument, a think-aloud protocol was implemented with 15 participants (9 males) aged 8-13 years (M_{age} = 9.87; *SD* = 2.26) in group sessions of 2-3 participants. This last procedure led to additional wording adjustments to ensure the instrument was adequate. For example, the word "troubled" translates directly to "perturbado", a term not easily understood by our children; To allow clarification of the term we added the expression "muito agitado" [*very agitated*] which was used by participants during the think-aloud procedure. During the entire process of adaptation and validation of the instrument, we complied with all the formal requirements imposed by Mind Garden, Inc, owner of the copyrights of the instrument.

Procedure

The scale was administered in groups of 12-28 participants under the supervision of one of the authors in sessions lasting approximately 15-20 minutes (the SASC was included in a battery of instruments administered to each group of participants; according the aims of this paper, we only report the data from the SASC). This same procedure was repeated 3-4 weeks later for the retest assessment. In both sessions, after completing the questionnaires, participants were asked to indicate (written response) any recent event that worried them or any stressful event they were still experiencing.

Data Analysis

The factorial validity of the instrument was assessed through CFA using the Weighted Least Squares with Mean and Variance adjustment (WLSMV; Finney & diStefano, 2006); These analyses were conducted using M-Plus 7.4 (Muthén & Muthén, 2012). This estimator relied on the polychoric correlation matrix given the categorical nature of the scale (Lorenzo-Seva & Ferrando, 2014). The overall goodness-of-fit of the factor model was evaluated using the following indexes: χ^2; Comparative Fit Index (CFI); Parsimony Comparative Fit Index (PCFI); Tucker Lewis Index (TLI); Root Mean Square Error of Approximation (RMSEA); P[rmsea $\leq$ 0.05]; Akaike Information Criterion (AIC); and, Weighted Root Mean Square (WRMR). For each index, we considered the cut-off points for "good adjustment" as defined by Marôco (2014, p.51; see note in Table 1). Sex invariance was tested using the χ^2 difference test for categorical variables. These analyses were also conducted using M-Plus 7.4 (Muthén & Muthén, 2012). The local adjustment was estimated by the factor weights and individual reliability of the items. The Composite Reliability and Average Variance Extracted (AVE; Convergent and Discriminant Validity) for each factor were evaluated as described by Fornell and Larcker (1981). In reliability analysis, the internal consistency was evaluated by Cronbach's α and the temporal constancy (test-retest reliability) by the Intraclass Correlation Coefficient (ICC).

An independent samples *t*-test and one-way ANOVA were used to evaluate the relationship of sex and school cycle in SASC totals, respectively (two-tailed significance level, $p < .05$). We also explored if sex influenced the results on each factor considering that the two-factor structure was confirmed for the two sexes (repeated-measures ANOVA). The difference in state-anxiety considering the presence/absence of a stressor was calculated using a paired *t*-test. These analyses were carried out with IBM SPSS (v.22).

Results

Construct Validity

The construct validity was evaluated by considering the factorial, the convergent and the discriminant validities. Regarding the factorial validity, we compared different factorial solutions using CFA with the WLSMV estimator and a polychoric matrix. We

started by considering a one-factor solution given the initial formulation of the instrument. Then, following the theoretical developments and previous empirical demonstrations we tested the two-factor model (e.g., Dorr, 1981; Psychountaki et al., 2003). The former revealed poor goodness-of-fit indexes, whereas the latter obtained good goodness-of-fit indexes (see Table 1 for the indexes obtained with these solutions). Regarding the WRMR, even though both models exceed the recommended value, the two-factor solution obtained a lower value than the one-factor solution, indicating that less variance would be left unexplained by the two-factor model. Also, according to the AIC index, the two-factor model provides the most parsimonious solution to our data (Marôco, 2014). Thus, considering the overall results, the two-factor solution reported in other multicultural studies presents a good fit to our data.

Regarding the item loadings, 19 of the items obtained high factor weights ($\lambda \geq 0.59$; Hair, Black, Babin, & Anderson, 2009) in this two-factor model; item 5 was the only presenting a low factor weight ($\lambda = .19$) (see item loadings in Table 2). Interestingly, this same item has obtained low factor weights in other studies that have explored the factorial structure of the data (e.g., Dorr, 1981; Hedl & Papay, 1982). Importantly, the inclusion of item 5 did not preclude our two-factor solution from producing good adjustment results. In a CFA conducted with the exclusion of item 5, the following values were obtained: $\chi^2(151) = 454.08$; $p < .001$; CFI = .94; PCFI = .83; TLI = 0.93; RMSEA = .070; P(rmsea<=0.05) < .001; AIC = 570.08; WRMR = 1.43. In this solution, all items obtained factor weights $\lambda \geq 0.59$. Given that other studies opted to maintain the original structure of the scale, the fact that our data with the full scale obtained overall good fit to the two-factor model, and to allow multicultural comparisons of the scale, we decided to maintain the full scale.

Table 1. *Psychometric indexes obtained in the CFA when considering one- and two-factor solutions. We also provide the results regarding the test of the measurement invariance by gender of the two-factor model (dataset-1)*

	χ^2	df	CFI	PCFI	TLI	RMSEA	P[rmsea ≤ 0.05]	AIC	WRMR
Overall Sample									
One-factor	958.27	170	.842	.753	.823	.107	< .001	1078.3	2.101
Two-factor[#]	591.77	169	.915	.814	.904	.079	< .001	713.8	1.598
Test of the measurement invariance by gender of the two-factor model									
Females	379.04	169	.932	.829	.923	.078	<.001	501.0	1.320
Males	364.91	169	.904	.804	.892	.076	<.001	486.9	1.296
Configural invariance	762.98	356	.920	.862	.915	.075	<.001	971.0	1.865
Full scalar invariance	749.00	374	.926	.911	.925	.070	<.001	921.0	1.927
Partial scalar invariance	740.71	372	.927	.907	.926	.070	<.001	916.7	1.914

Notes: [#]Model that produced the best indexes. CFI=Comparative Fit Index, good adjustment values between .90-.95; PCFI=Parsimony Comparative Fit Index, very good adjustment values when ≥ .80; TLI=Tucker Lewis Index, reasonable adjustment between .80-.90, good adjustment values between .90-.95; RMSEA=Root Mean Square Error of Approximation, good adjustment between .05-.10; AIC=Akaike Information Criterion, the lowest the value the better adjustment. The characterization of these values follows a systemization of the relevant information provided by Marôco (2014, p.51). WRMR=Weighted Root Mean Square Residual, < .90 (Muthén & Muthén, 2012).

Table 2. *Component loadings obtained in the Confirmatory Analyses using the Weighted Least Squares with Mean and Variance adjustment (WLSMV) estimator (Finney & diStefano, 2006) (dataset-1)*

	Component Loadings		
	One-factor model	Two-factor model	
		Factor 1	Factor 2
ITEM 1	0.603	0.622	--
ITEM 2	0.571	--	0.658
ITEM 3	0.558	0.590	--
ITEM 4	0.538	--	0.652
ITEM 5	0.093	--	0.193
ITEM 6	0.628	0.656	--
ITEM 7	0.770	--	0.926
ITEM 8	0.603	0.634	--
ITEM 9	0.666	--	0.794
ITEM 10	0.695	0.721	--
ITEM 11	0.649	--	0.759
ITEM 12	0.709	0.735	--
ITEM 13	0.789	0.824	--
ITEM 14	0.839	0.874	--
ITEM 15	0.657	--	0.789
ITEM 16	0.768	--	0.876
ITEM 17	0.770	0.792	--
ITEM 18	0.600	--	0.707
ITEM 19	0.630	--	0.735
ITEM 20	0.830	0.849	--

We have also explored whether this two-factor structure is stable for both females and males by testing the configural invariance. Additionally, we explored the scalar invariance which tests if the item loadings on each factor and thresholds are equal between groups. Results are provided in Table 1. Full scalar invariance was not obtained because the model fit was significantly damaged by the constraints imposed to the baseline model ($\Delta\chi2 = 29.299$, $df = 18$, $p = .045$). The modification indexes suggest that the threshold of item 10 is variant between groups, while holding all loading values similar across groups. A non-significant difference between the partially constrained and the unconstrained (configural) model was obtained when we allowed the variability of this threshold ($\Delta\chi2 = 23.27$, $df = 16$, $p = .106$). Given that we obtained partial scalar invariance, the mean levels of the constructs can be compared (Hair et al., 2009). No similar test was made for the different school cycle groups given the inadequate sample size of the groups (i.e., < 200; Dimitrov, 2010).

The convergent validity of the two-factor model, as assessed by the AVE, revealed the value of 0.54 for both factors ("anxiety-absent" and "anxiety-present"), a value higher than that usually regarded as adequate (≥ 0.5; Hair et al, 2009). The discriminant validity was calculated by comparing the AVE of each factor with the square of the correlation between the two factors ($r = .639$) (Anderson & Gerbing, 1988). The later value ($r^2 = 0.41$) was lower than the AVE values obtained for each factor confirming their discriminant validity.

Reliability

The results regarding the internal consistency (Cronbach's α) and the test-retest reliability (ICC) for each factor are presented in Table 3 for the total sample and also according to sex and school cycle of the participants. Both factors obtained a good internal consistency with alpha values well above the acceptable cut-off value of 0.7 (Nunnally & Bernstein, 1994). This same conclusion was obtained when the analysis was run using dataset-2 (Cronbach's $\alpha_{Anxiety\_Absent}=0.90$, $\alpha_{Anxiety\_Present}=0.83$; Further information about other results obtained using dataset-2 can be obtained by contacting the corresponding author). The ICC values are also higher than the cut-off points defined by Fleiss, Levin, and Paik (2003) for an acceptable test-retest reliability ($0.4 \leq ICC < 0.75$). Regarding the composite reliability, which reflects the internal consistency

of the items within a factor, for the two factors the values were above 0.70 indicating an appropriate composite reliability ($CR_{Anxiety\text{-}Absent}$ = 0.921; $CR_{Anxiety\text{-}Present}$ = 0.916).

Descriptive Values, Sex and School Cycle Groups

The overall mean score obtained was 29.43 (*SD* = 5.70). The descriptive values broken down by sex and school cycle are presented in Table 3. Although girls reported experiencing higher levels of anxiety than boys, the difference was only statistically marginal, $t(403) = 1.85$, $p = .07$, $d = 0.183$. The repeated-measures ANOVA considering the two factors (within-subject variable) and sex (between-subjects variable) confirmed no significant effect of sex nor interaction, $F(1,403) = 3.42$, $MSE = 16.15$, $p = .065$, and $F(1,403) = 1.70$, $MSE = 12.05$, $p = .19$, respectively, but a significant effect of factor, $F(1, 403) = 653.51$, $MSE = 7.10$, $p < .001$, $\eta_p^2 = .62$; The latter reflects a higher score of the anxiety-absent as compared to the anxiety-present factor (see Table 3). Regarding the school cycle groups, the participants from the first cycle reported higher anxiety those from the remaining groups. Participants from the third cycle also revealed higher anxiety than participants from the second school cycle. However, a one-way ANOVA revealed a non-significant effect of school cycle on state-anxiety, $F(2, 402) = 1.25$, $p = .29$. This comparison among school cycle groups should be considered only exploratory given that we did not test measurement invariance for these groups.

Table 3. *Descriptive data and reliability measures of the SASC for the total sample, as well as according to the sex and school cycle of the participants (dataset-1)*

		Sex		School Cycle		
	Total Sample (N = 405)	Boys (N=203)	Girls (N=202)	1st cycle (N = 100)	2nd cycle (N = 78)	3rd cycle (N = 227)
Descriptive Data						
Mean (SD): Total Scale	29.43 (5.70)	28.91 (5.25)	29.95 (6.09)	30.12 (6.66)	28.79 (5.51)	29.34 (5.29)
Mean (SD): Factor 1 - Anxiety absent	17.11 (3.92)	16.72 (3.90)	17.49 (3.92)	16.53 (4.24)	16.37 (3.80)	17.61 (3.76)
Mean (SD): Factor 2 - Anxiety present	12.32 (2.83)	12.18 (2.62)	12.46 (3.02)	13.59 (3.51)	12.42 (2.68)	11.73 (2.31)
Reliability Measures						
Factor 1: Anxiety absent						
Cronbach's α	.863	.859	.865	.858	.859	.867
Test-retest reliability (ICC)	.796	.784	.804	.769	.823	.791
Factor 2: Anxiety present						
Cronbach's α	.780	.751	.804	.801	.756	.762
Test-retest reliability (ICC)	.720	.680	.750	.633	.819	.715

Notes: The 1st cycle group includes participants attending the third and fourth grades; the 2nd cycle group includes participants attending the fifth and sixth grades; the 3rd cycle group includes participants attending the seventh and eighth grades.

Stressful Event and State-anxiety

The comparison between the anxiety levels reported when a stressful event was occurring with those obtained in the absence of a stressor indicates whether the instrument is sensitive to the presence/absence of specific stressors. In our sample, 93 participants reported experiencing a stressful event in only one of the administration moments; 35 of the participants reported the stressor in the first and 58 in the second administration. A paired *t*-test revealed that in the presence of the stressor, participants reported significantly higher anxiety than in its absence (M = 29.1, SD = 5.9; and M = 27.8, SD = 6.3, respectively), $t(92) = 2.07$, $p = .041$, $d = .215$. This result was also confirmed when sex was considered as a between-subjects variable in a repeated-measures ANOVA. Specifically, a significant main effect of stressor was found, $F(1,91) = 4.52$, $MSE = 17.29$, $p = .036$, $\eta_p^2 = 0.047$, but the main effect of sex and the interaction were non-significant, both $Fs<1$ (see descriptive values by sex in Table 4). These results should be seen as exploratory given the small number of participants involved.

Table 4. *Mean (and SD) values obtained for females and males when a stressor was present and absent. We also provide information on the sample size and mean age (datasets-1 and -2)*

	N	Mean Age (SD)	With stressor	Without stressor
Total	93	11.44 (1.75)	29.1 (5.9)	27.8 (6.3)
Females	51	11.41 (1.79)	29.3 (5.2)	28.4 (6.1)
Males	42	11.48 (1.73)	28.8 (6.8)	27.1 (6.6)

Discussion

This study presents an initial adaptation for European Portuguese children and adolescents of the SASC. Our data revealed good psychometric properties. No significant differences were found between sexes in our sample, a result that is consistent with previous validation studies (e.g., Day et al., 1986; Gómez-Fernández & Spielberger, 1990; Psychountaki et al., 2003), and the original work (Spielberger et al., 1973). Nonetheless, sex differences are typically observed on the more stable individual difference of the propensity to

react anxiously to stressor events (trait-anxiety), with females reporting higher anxiety than males (e.g., Day, et al., 1986). Researchers have proposed possible explanations for these observed differences in trait-anxiety (e.g., males are usually less willing to admit their fears or emotions; Nakazato & Shimonaka, 1989), but less has been explored about state-anxiety given the inconsistent pattern of results reported in the literature as noted in the introduction.

The state-anxiety levels did not differ significantly among our school cycle groups. Given that these groups differ naturally in age, with participants attending the first cycle being the youngest and those attending the third cycle being the oldest, comparisons among our groups are somewhat informative about the relation between age and state anxiety. The results from previous studies have been mixed with some studies reporting a tendency for older participants to experience more state-anxiety than the youngest (Psychountaki et al., 2003), whereas others have reported no influence of this variable (e.g., Day et al., 1986). We should note that the age range in our study was wider than in most of the reviewed studies (e.g., Li & Lopez, 2004; Psychountaki et al., 2003); This allows a better developmental characterization of the state-anxiety but, at the same time, limits the discussion of this result. Also, the contribution of our analyses to this debate should be minor considering we were not able to evaluate measurement invariance. The absence of consistent differences among age groups could be related to the fact that this scale mostly captures anxiety reactions to specific stressors, and exposure to stressors differs greatly among people and across time. Although the relation between age and state-anxiety is not yet well established, authors have stressed that the childhood and adolescence periods are prone to the development of anxiety symptoms and should be fully characterized; to this end, validated instruments to assess anxiety are crucial (Beesdo et al., 2009).

Regarding the factorial structure, the CFA of the two-factor model provided a good fit for our data, corroborating validation studies from other countries (e.g., Li & Lopez, 2004; Psychountaki et al., 2003) and supporting the robustness of the instrument. We should note, however, that we did not explore alternative measurement models but rather tested if our data conformed to the model typically reported in the literature. Our data revealed good internal consistency as well as good test-retest reliability. The Cronbach's alphas obtained for the two factors were good and higher than or similar to those reported in other studies (e.g., Gómez-Fernández & Spielberger, 1990; Psychountaki et al., 2003; Spielberger et al., 1973). This applies for the total sample, as well as separately for each sub-group regarding sex and school cycle. Similarly to the original study (Spielberger et al., 1973), we verified that the

Cronbach's alpha was higher for the female than for the male participants. Good reliability values were also obtained with dataset-2 which provides further evidence of its validity. Regarding the temporal stability, we obtained test-retest reliability values that are similar to those reported in some other validation studies, although also somewhat higher than others (see Table 5). This result was not surprising for us given that, considering an informal analysis of the question regarding the presence of specific stressors in each assessment moment, the large majority of our sample (77%) reported no change in the presence/absence of particular stressors between the two assessment moments. There is also some variability across studies in the intervals between the test-retest moments which could mediate these differences.

The consideration of the influence of a specific stressor on state-anxiety provides additional preliminary evidence for the construct validity of the scale. Specifically, higher anxiety was reported when participants were dealing with a specific stressor as compared to when no stressor was present. Previous studies have provided similar results. For example, in Li and Lopez (2004), participants' state-anxiety was higher prior to being submitted to an examination period at school, as compared to after performing such examination. Both in our and in Li and Lopez study, females and males seemed to be equally affected by the presence of the stressing event. This form of validity should be further explored in other studies by "exposing" participants to controlled stressors.

This study presents an initial adaptation and validation for Portuguese children and adolescents of one of the scales most used in the world to assess state-anxiety (Seligman et al., 2004). As noted, anxiety is present in various domains of our children and adolescents' lives (Li & Lopez, 2004; McDonald, 2001) and has many potential long-term effects (see discussion of Psychountaki et al., 2003). Besides all of the potential practical applications this instrument might have, it will also be very useful for general and, particularly, for developmental research. In Portugal, we already have a validated form of the State Anxiety Scale for Adults for the ages of 15-69 (Silva, 2003). Providing a validated form of the corresponding instrument for the ages of 8-14, will allow researchers and practitioners to evaluate the same dimension across time using a comparable measure. Similar cases can be found in the literature: In Biaggio's (1985) study, anxiety in children and adults was measured using the two versions of Spielberger's instrument. This possibility adds validity to these kinds of studies. The psychometric properties we report for our scale are promising and indicate this is an appropriate instrument to assess state-anxiety in Portuguese children and

adolescents. We should point to the limited geographical provenience of our sample and the lack of a concurrent validity test to propose that further studies should be conducted to fully establish the validity of this scale.

In conclusion, we present an initial validation of the SASC for European Portuguese children and adolescents with very positive psychometric properties and good adjustment to the two-factor model proposed in the literature. Given the overarching importance of state-anxiety and the wide variety of contexts in which it is relevant, this instrument will be extremely useful in applied settings as well as in research.

Table 5. *Summary of the mean values obtained for the SASC, Cronbach's α and test-retest reliabilities reported in our and in other studies*

		Mean State-Anxiety		Cronbach's α		Test-retest reliability
	Age-range	Boys	Girls	Boys	Girls	
OUR STUDY	8-14	28.97	29.94	.86 (factor 1) .75 (factor 2)	.87 (factor 1) .80 (factor 2)	.75 (factor 1) .73 (factor 2)
Greek[(a)]	9-12	27.99	27.98	.84 (factor 1) .85 (factor 2)	.85 (factor 1) .82 (factor 2)	.65 (factor 1) .67 (factor 2)
Original[(b)]	9-12	31.00	30.70	.82[§]	.87[§]	.31 (M) / .47 (F)
Matias[(c)]	9-15	29.18	29.97	.86	.88	.35 (M) / .68 (F)
Brazil[(d)]	4th-6th grade[#]	30.35-3.89	29.41-37.04	.84		.66
Spain[(e)]	3rd grade[$]	35.26	36.32	.78	.87	n/a
Chinese[(f)]	7-12	25.4-6.93	25.20-36.12	.84-.85[*]		.78-.79[*]

Notes: [(a)]Psychountaki et al. (2003); [(b)]Spielberger et al. (1973); [(c)]Matias (2004); [(d)]Biaggio (1980); [(e)]Gómez-Fernández and Spielberger (1990); [(f)](Li & Lopez, 2004); [§]Refers to KR-20 index; [#]In the Brazilian Education System, 4th-6th grades frequently include children aged 9-12Y; [$]In the Spanish Education System, 3rd grade commonly includes children aged 8-9Y; *Data obtained during the periods without the stressor; (M) Males; (F) Females.

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