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RESEARCH ARTICLE

The self-report Version of the LSAS-CA: Psychometric Properties of the French Version in a non-clinical adolescent sample

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The Liebowitz Social Anxiety Scale (LSAS) is one of the most popular measures of social anxiety in adults. The LSAS has been adapted for clinical assessment of children and adolescents (LSAS-CA). The psychometric properties of the self-report version of the LSAS-CA (LSAS-CA-SR) have been investigated in a Spanish population. However, no study to date has adapted and validated this scale in French. The purpose of this study was to develop a French version of the LSAS-CA-SR and to assess its score reliability and structural validity in a French-speaking community sample. The sample was made up of 1,343 teenagers from secondary schools, aged between 14 and 18 years. Confirmatory factor analyses established the structural validity of the French version of the LSAS-CA-SR and good psychometric properties, including reliable internal consistency, were observed.

Keywords: LSAS-CA-SR; social anxiety; psychometric properties; French-speaking sample; adolescents

Social Anxiety Disorder (SAD) is characterized by anxiety and avoidance behaviours in situations of social interaction or performance in which a person must face unfamiliar people or possible scrutiny (American Psychiatric Association, 1994). It is one of the most common anxiety disorders among children and adolescents, with a mean age of onset of 15.5 years (Faravelli et al., 2000). The lifetime prevalence rate of SAD in adolescents ranges from 1.6% (Essau, Conradt, & Petermann, 1999) to 4.9% for males and 9.5% for females (Wittchen, Stein, & Kessler, 1999). A recent study based on a self-report scale of social anxiety determined the prevalence rate of SAD to be 10.6% in young people (Gren-Landell, Aho, Andersson, & Svedin, 2011).

Adolescence is a particular developmental period, distinct from childhood and adulthood. Indeed, this period is characterized by a stressful shift, including behavioral and cognitive changes. Teenagers could have difficulties to cope with these transitions, especially environmental and social challenges (Collins, 2001; Jessor, 1993). Compared to other periods of life, they experiment more stressors and negative life events (Buchanan, Eccles, & Becker, 1992; Larson, Asmussen, & Anger, 1991) and they respond quite differently

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(Spear, 2007). This could lead to the emergence of anxiety disorders, specifically during adolescence (Kessler, 2007). The detection of such a disorder in this specific developmental period of adolescence is therefore essential, especially for prevention.

Individuals with SAD report more experiences of peer victimization, maltreatment and sexual victimization (Gren-Landell, 2010). Comorbid psychiatric disorders are observed in 90% of cases (Faravelli et al., 2000). SAD frequently results in depressive symptoms and substance abuse (Stein & Stein, 2008). Among young people, the disorder commonly prevents them from going to school, sometimes resulting in dropping out (Stein & Kean, 2000), and is associated with disliking school, loneliness, school avoidance and internalizing coping (Weeks, Coplan, & Kingsbury, 2009). SAD influences young people's functioning overall, in the context of school, social, family and personal interactions (Beidel, Ferrell, Alfano, & Yeganeh, 2001). There are several treatments to deal with social anxiety in adolescents, such as individual or group cognitive behaviour therapy, educational/supportive psychotherapy, psychosocial and pharmacological interventions, and parental involvement in treatment (Herbert et al., 2009; Hitchcock, Chavira, & Stein, 2009; Kashdan & Herbert, 2001; Rodebaugh, Holaway, & Heimberg, 2004).

Several scales have been developed to measure social anxiety, including the Social Phobia Scale (SPS), the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998), the Social Phobia and Anxiety Inventory (SPAI; Turner Beidel, Dancu & Stanley, 1989) and the Fear of Negative Evaluation scale (FNE; Watson & Friend, 1969). However, the most frequently used measure of SAD in adults and the best psychometrically validated scale is the Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987). The LSAS is a 24-item semi-structured clinical interview that measures fear and avoidance in social and performance situations. The interviewer asks the patient to rate the fear and avoidance he/she experiences in social and performance situations. For each situation, two 4-point Likert scales are provided, one for the intensity of fear (0, *None*; 1, *Mild*; 2, *Moderate*; 3, *Severe*) and one for the frequency of avoidance of the situation (0, *Never*; 1, *Occasionally*; 2, *Often*; 3, *Usually*). This measure provides a total score for social anxiety and separate scores for social and performance situations, fear and avoidance. The LSAS demonstrates good internal consistency (α = .81–96) and good convergent and discriminant validity for the global score and the two subscales (Heimberg et al., 1999). A two-factor (fear and avoidance) and a four-factor (social interaction, public speaking, observation by others, and eating and drinking in public) models were proposed (Heimberg et al., 1999; Safren et al., 1999).

A self-report version of the LSAS (LSAS-SR), which is easier to administer, was created. This version also demonstrated strong psychometric properties, including test-retest reliability, internal consistency (α = .78–.92), convergent and discriminant validity and sensitivity to treatment change (Baker, Heinrichs, Kim, & Hofmann, 2002; Fresco et al., 2001). In addition, the LSAS showed a good cross-cultural consistency, corroborating the psychometric qualities found in earlier samples. The scale has been adapted and validated into French (Heeren et al., 2011; Yao et al., 1999), Spanish (Bobes et al., 1999), Portuguese (Terra et al., 2006), and Turkish (Soykan, Ozguven, & Gencoz, 2003).

The semi-structured interview version of the LSAS was also adapted for the assessment of children and adolescents (LSAS-CA; Masia-Warner, Klein, & Liebowitz, 1999). The approach is identical to the adult version. The authors suggest seven dimensions for the scale: an overall score, separate anxiety and avoidance scores and four separate scores for performance anxiety, performance avoidance, social anxiety and social avoidance. Two other dimensions can be added: separate performance and social scores (combining anxiety and avoidance sums for the performance and social items respectively). The first psychometric investigation (Masia-Warner et al., 2003), based on seven

dimensions, reported a high internal consistency (α = .83–.97) and strong correlations between the overall score and the subscale scores (r = .78–.99). These authors suggested a cut-off score of 22.5 to differentiate young people with social phobia from healthy controls. Regarding convergent and divergent validity, higher correlations between LSAS-CA scores and measures of social anxiety and general impairment were observed than with depression scores. Storch et al. (2006) tested the two-factor (performance and social situations) structure of the LSAS-CA, separately for anxiety and avoidance, but poor fit indices were obtained. These authors proposed an exploratory model including a two-factor solution (social and school performance) with a higher-order factor for the anxiety and avoidance subscales. This model revealed good psychometric properties: high internal consistency (α = .87–.94), respectable correlations between factors (r = .70–.99), and good construct validity (F = 14.05, $p < .001$). A self-report version of the LSAS-CA (LSAS-CA-SR) has been assessed in a Spanish population (Olivares, Sanchez-Garcia, & Lopez-Pina, 2009). These authors proposed a one-dimensional solution for anxiety and avoidance scales, which best fitted to their results and demonstrated good reliability and validity (in terms of concurrent validity, internal consistency with α = .81 to .94, and correlations).

Different models can be identified in the above-mentioned literature, but their structural validity has never been compared: global score; anxiety/fear and avoidance scores; performance and social interaction scores; and scores for fear in performance situations, fear in social interaction situations, avoidance in performance situations and avoidance in social interaction situations. Moreover, although the previously reported models are convincing, they greatly differ in their structure. These discrepancies between various studies might be explained by the administration method (clinician-administered or self-report) or by the cultural characteristics of the evaluated population.

Structural validity is a very critical point because it refers to the degree to which the scale measures the psychological construct that it purports to measure. In other words, using confirmatory factor analysis to assess the factor structure of the LSAS-CA-SR is a means of ascertaining that one can generalize from this measure to the concept it assesses. Although the French version of the LSAS-SR has been validated for adults (Heeren et al., 2011; Yao et al., 1999), no valid French version exists for children and adolescents.

Therefore, the present study was designed to overcome these limitations (especially the lack of valid French version and factorial structure of the LSAS-CA-SR) by answering several questions. First, which structural factor solution exhibits the best fit indices in a French-speaking community sample of adolescents? Second, given that no French adaptation and validation of the self-report version of the LSAS-CA has yet been published, can the good psychometric properties of the initial version reported in the literature be replicated in a French-speaking sample? Consequently, the study was designed to provide a French translation of the LSAS-CA-SR, with the central overarching goal of examining the translation's psychometric properties in a non-clinical adolescent's sample. This large sample was as representative as possible of the adolescent population, allowing a wide use of the tool.

Concretely, the scale was first translated into French. Next, the structural validity of the French version of the LSAS-CA-SR was tested with confirmatory factor analyses. We then examined the descriptive statistics and internal consistency reliability. Finally, we assessed its convergent and divergent validity, examining its relation with depression and anxiety.

Method

French Adaptation of the Scale

We followed the steps for the transcultural validation of psychometric instruments described by Hambleton, Merenda, and Spielberger (2004) for test adaptation. Items

were first translated into French and then back-translated into English. An expert translated the original English scale into French. The French version was then translated back into English and re-evaluated by another bilingual expert. The first author supervised the whole translation/back-translation process. The experts were instructed to check the conformity of the retranslated English version with the original version and the precision of the French items. Items with problematic back-translations were thoroughly discussed and appropriately amended. Most discrepancies were minor, involving choices between synonyms. In order to ensure that the items and the instructions were perfectly understandable and appropriate, 30 teenagers from the acquaintance of the first author (comparable to those of the main analyses described below) were then instructed to comment on the overall presentation of the scale and the precision of the items. No important remarks were made, confirming its face validity (see Appendix A for the French adaptation of the scale).

Participants

A sample of 1,343 (49.59% female) teenagers was recruited from 11 secondary schools representing all educational networks in a French-speaking part of Belgium (Liège) (*Mean age* = 15.70, *range:* 14–18, *SD* = 0.88).[1] Initial phone contact was made with a large number of randomly selected schools, but only half of them agreed to participate. The students were in their fourth year of secondary school during the data collection phase. Data were obtained with a self-report questionnaire. The experimenter himself administered the questionnaire collectively in class, without the participation of teachers. The study protocol was approved by the University's Institutional Review Board, and informed consent from parents and students was obtained prior to data collection. The consent documents were transmitted before data collection and recovered on the day of administration. Only native French speakers completed the questionnaire.

Procedure

We asked participants to complete the French self-report version of the LSAS-CA-SR (Masia-Warner et al., 2003), the Trait version of State-Trait Anxiety Inventory for Children (STAIC-T; Spielberger, Edwards, Lushene, Monturoir, & Platzek, 1973) and the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). These scales were chosen to ensure that the LSAS-CA-SR is well able to differentiate SAD from general anxiety and depressive symptoms.

Measures

The STAIC-T is a 20-item self-report questionnaire measuring trait anxiety in children. Items are rated on a 3-point frequency scale (1 = *hardly ever* to 3 = *often*). A high total score indicates high levels of trait anxiety. This instrument was reported to be a valid, reliable inventory (Spielberger et al., 1973). A cut-off score of 34 is suggested to indicate pathological anxiety in children (Vila, Porche, & Mouren-Simeoni, 1999). The STAIC-T has usually been used as a measure of trait anxiety in adolescents (Comeau, Stewart, & Loba, 2001; Kirisci & Clark, 1996). The French version of the instrument, which was used in the present study, has demonstrated good psychometric properties (α = .89; test-retest correlations = .37–.50) (Turgeon & Chartrand, 2003). In the present sample, the scale demonstrated adequate internal consistency (α = .84), with scores ranging from 20 to 60 (M = 35.07, SD = 7.31).

The CES-D is a 20-item self-report instrument, developed by Radloff (1977), which evaluates depressive symptomatology over the past week in a general population. The scores range from 0 (*rarely or none of the time*) to 3 (*most or all the time*), with a total score ranging from 0 to 60. A total score of 24 or more indicates a possible major depressive disorder (Chabrol et al., 2002). The French version of the instrument was used in the present study (Führer & Rouillon, 1989). Good psychometric properties were reported for this version (Morin et al., 2011). The CES-D has been successfully used in

adolescent populations (Chabrol, Duconge, Casas, Roura, & Carey, 2005; Garrison, Addy, Jackson, McKeown, & Waller, 1991). Indeed, Chabrol et al. (2002) found an internal consistency reliability (Cronbach's alpha) of .85 and suggested a cut-off score of 24 (sensitivity = .74; specificity = .73). In the present sample, the scale showed adequate internal consistency (α = .88), with scores ranging from 0 to 58 (M = 14.21, SD = 9.72).

The French LSAS-CA-SR (described above) also showed adequate internal consistency (α = .93) in the present sample, with total scores ranging from 0 to 112 (M = 27.73, SD = 19.79).

Data Analysis

Statistica 10 software (Hill & Lewicki, 2007) was used to perform descriptive analyses, correlations, and to assess internal consistency reliability. Confirmatory factor analysis, using AMOS 16 software (Arbuckle, 2007), was used to test the structural validity of the LSAS-CA-SR. Before performing the analyses, the normality of each item of the scale was tested using Kolmogorov-Smirnov tests. These analyses revealed that normality was achieved for all items (all $ps > .05$).

For the confirmatory factor analyses, goodness of fit was tested with a χ^2 test (a statistically non-significant value corresponds to an acceptable fit). However, the χ^2 is very sensitive to sample size. Byrne (1994) noticed that it is unusual to obtain statistically non-significant χ^2 when performing confirmatory factor analyses, even if the discrepancy of the observed from the implied data is trivial. Therefore, we selected a derived fit statistic, the normed χ^2, which is less dependent on sample size. The normed χ^2 is determined by computing the ratio of the model χ^2 and the degrees of freedom (Wheaton, Muthén, Alwin, & Summers, 1977). A normed χ^2 below 2 usually suggests good model fit while below 3 indicates acceptable fit (Bollen, 1989).

Many other solutions for the dependency on sample size have been proposed and, consequently, many different fit indices are available. As recommended by Schweizer (2010), we decided to report the Standardized Root Mean Square Residual (SRMR), the Root Mean Square Error of Approximation (RMSEA) and the Comparative Fit Index (CFI). SRMR and RMSEA are both residual-based absolute fit measures. CFI is an incremental relative fit measure. As argued by Hu and Bentler (1998), the combination of RMSEA and SRMR is valuable because the SRMR is sensitive to the misspecification of the factor's covariance, and the RMSEA is sensitive to the misspecification of factor loadings. In that way, if both indices are accepted, then the latent and measurement models would be considered to be well specified. Further, the RMSEA has the advantage of being usually associated with a confidence interval. RMSEA values less than .05 were found to indicate a good model fit (Browne & Cudeck, 1989). The SRMR is expected to stay below .08 (Hu & Bentler, 1998). The CFI indicates a good model fit for values in the range between .95 and 1.0, whereas values in the range of .90 and .95 mean acceptable fit (Bentler, 1990; Hu & Bentler, 1999).

We also reported the Goodness of Fit Index (GFI). GFI is an absolute fit index developed by Jöreskog and Sörbom (1984) which is analogous to R-square and performs better than any other absolute fit index regarding the absolute fit of the data (Hoyle & Panter, 1995; Marsh, Balla, & McDonald, 1988). GFI values are between 0 and 1, with 1 indicating a perfect fit. As suggested by Cole (1987) a value of .80 should be considered as the minimum for model acceptance.

Finally, we also reported the Akaike Information Criterion (AIC; Akaike, 1987), the Browne-Cudeck Criterion (BCC; Browne & Cudeck, 1989), and the Expected Cross-Validation Index (ECVI; Browne & Cudeck, 1989). These are all fit measures based on information theory. These indices are not used to judge the fit of a single model, but are used in situations where one has to choose among several realistic but different models. These indices are a function of both model complexity and goodness of fit. For these indices, low scores refer to simple, well-fitting

Models	χ^2	df	Normed χ^2	SRMR	RMSEA	RMSEA 90% CI	GFI	CFI	AIC	BCC	ECVI
Model A	3570.29	1055	3.38	.071	.042	.041–.044	.89	.67	3812.29	3821.46	2.84
Model B	**3102.35**	**1050**	**2.95**	**.048**	**.038**	**.037–.040**	**.90**	**.73**	**3354.35**	**3363.90**	**2.50**
Model C	3687.20	1056	3.49	.062	.043	.042–.045	.89	.66	3927.20	3936.30	2.93
Model D	3268.21	1055	3.10	.051	.040	.038–.041	.90	.71	3510.21	3519.38	2.62
Model E	2047.41	640	3.20	.044	.040	.039–.042	.92	.77	2249.41	2255.45	1.68
Model F	3158.63	1051	3.00	.049	.039	.037–.040	.90	.73	3408.63	3418.11	2.54
Model G	3292.86	1052	3.13	.097	.040	.038–.041	.90	.71	3540.86	3550.26	2.64

[1] Acceptable values of fit: Normed $X^2<3$; SRMR<.08; RMSEA<.05; GFI>.80; CFI>.90; AIC, BCC and ECV=the lower value.

df = degrees of freedom; SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; GFI = Goodness of Fit Index; CFI = Comparative Fit Index; AIC = Akaike Information Criterion; BCC = Browne-Cudeck Criterion; ECVI = Expected Cross-Validation Index. Model B (in bold characters) is the best-fitting model.

Table 1: Fit Index Values[1] for the Different Models Tested (n = 1,343)

models, whereas high scores refer to complex, poorly fitting models. Therefore, in a comparison-model approach, the model with the lower score is to be preferred.

Concerning internal consistency reliability, Cronbach's alpha coefficients for each scale and subscale were calculated. A value of Cronbach's alpha higher than .75 (Nunnally, 1978) demonstrates good internal reliabilities. For convergent and divergent validity, Pearson's correlations between the LSAS-CA-SR scales and other constructs were conducted. Fisher's *r*-to-*z* transformation, with the formula for comparing correlations measured on the same subjects taken from Steiger (1980), was used to assess the difference in Pearson *r*-values.

Results

Structural Validity

Considering the various dimensions identified in the literature, we imposed several structural models of the LSAS-CA-SR on the data and compared them to each other. To be consistent with previous studies, analyses were conducted by modelling correlated errors for each paired fear-avoidance item. For example, the first item of the LSAS-CA-SR is *Telephoning in public*. The participant's fear/anxiety and avoidance are both assessed in this situation. We allowed correlated errors between each pair of answers (24 correlated errors, 1 for each situation) (see Appendix B for summary of the tested structural models).

Model A. We first tested a two-factor model arising from the design of the LSAS-CA-SR: performance and social interaction, combining anxiety and avoidance symptoms for each. Our analyses indicated an acceptable overall fit of the measurement model (see **Table 1**).

Model B. Second, we tested a four-factor model: fear in performance situations, fear in social interaction situations, avoidance in performance situations and avoidance in social interaction situations. Model B fits significantly better than Model A ($\Delta\chi^2$ = 467.938, Δdf = 5, $p < .001$). Moreover, AIC, BCC and ECVI are lower than Model A (see Table 1).

Model C. Then we examined the fit of a single-factor model, for all items, assessing social anxiety. This model showed a reasonably acceptable overall fit, but it is significantly poorer than Model B ($\Delta\chi^2$ = 674.846, Δdf = 6, $p < .001$) (see Table 1).

Model D. Model B was also compared with a two-factor model (Model D): one factor for the fear/anxiety scale and one for the avoidance scale (combining performance and social interaction situations). This model fits significantly worse than Model B ($\Delta\chi^2$ = 165.858, Δdf = 5, $p < .001$) (see Table 1).

Model E. Finally, we tested a two-factor model (social factor and school performance factor) for anxiety and avoidance separately, not involving all items (items 10, 16 and 21 were removed, see appendix). Some of them were removed by the authors (Storch et al., 2006) to improve the clarity of the model (factors loadings less than .30) and the meaningfulness. Model E had an overall acceptable fit, with higher GFI and CFI and lower AIC, BCC and ECVI than in the previous models. However, the RMSEA in Model B is still better than in Model E (see Table 1). Furthermore, Model E does not include all items. Overall, Model B fits significantly better than Model E ($\Delta\chi^2$ = 1054.549, Δdf = 410, $p < .001$).

Models F and G. When tested in a confirmatory factor analysis, Model B showed the best fit relative to the other previously published models. Given these results and the high correlation between fear and avoidance factors, however, two additional models with a second-order level of data measurement were considered. Model F involves fear in performance situations, fear in social interaction situations, avoidance in performance situations and avoidance in social interaction situations, with fear and avoidance as second-order factors. Given this rationale, we also tested a model with Model B as first-order latent variable and a single-factor solution a second-order latent variable: Model G (fear in performance situations, fear in social interaction situations, avoidance in performance situations and avoidance in social interaction situations – social anxiety). These two additional models were compared with Model B.

As shown in Table 1, Model F showed an acceptable fit. However, Model B fits significantly better than Model F ($\Delta\chi^2$ = 56.277, Δdf = 1, $p < .001$). As for Model G, although overall acceptable fit indices were observed, Model B remained significantly better ($\Delta\chi^2$ = 190.505, Δdf = 2, $p < .001$).

Moreover, Model B showed statistically significant (all *ps* < .001) standardized factor loadings ranging from .460 to .793 (see Appendix C for all loadings). Nevertheless, one item showed a loading below .40 (i10-fear and i10-avoidance). Therefore, we reran all analyses without this item, and the results did not show any significant change. In order to be consistent with the initial scale, we did not exclude this item.

Descriptive Statistics and Internal Consistency Reliability

Mean scores, standard deviations and Cronbach's alpha coefficients are reported for each scale of Model B, STAIC-T and CES-D in **Table 2**. With Cronbach's alpha values higher than .75 for all factors, Model B's subscales demonstrated good internal reliability.

Correlations between the LSAS-CA-SR and Other Constructs

Pearson's correlations between the dimensions of the LSAS-CA-SR, the STAIC-T and the CES-D were computed (see **Table 3**). The total LSAS-CA-SR scores more significantly correlated with the STAIC-T than with the CES-D (Z = 3.55, $p < .001$). Although these correlations are low (respectively .47 and .40), these results suggest that the French version of the LSAS-CA-SR should have respectable construct validity. In addition, the total LSAS-CA-SR only weakly correlates with the depression scale. This is an indication of an acceptable divergent validity. However, it makes sense to find significant correlations between these constructs insofar as both of these emotional disorders are frequently associated with social anxiety (see literature above). The fear in social interaction situations subscale more significantly correlated with the STAIC-T than with the CES-D (Z = 4.89, $p < .001$). In addition, the STAIC-T correlated significantly more than

Dimensions	Items	Minimum	Maximum	M	SD	α
Social interaction (fear)	12	0.00	30.00	6.86	5.70	.84
Social interaction (avoidance)	12	0.00	33.00	7.00	5.91	.81
Performance (fear)	12	0.00	32.00	6.96	5.72	.82
Performance (avoidance)	12	0.00	35.00	7.34	6.60	.82
STAIC-T	20	20.00	60.00	35.07	7.31	.84
CES-D	20	0.00	58.00	14.21	9.72	.88

M = mean; SD = standard deviation; α = Cronbach's alpha; STAIC-T = State-Trait Anxiety Inventory for Children – Trait version; CES-D = Center for Epidemiologic Studies Depression Scale

Table 2: Descriptive Statistics and Cronbach's Alpha for Each Scale of Model B and Other Constructs (n = 1,343)

Dimensions	SI (F)	SI (AV)	P (F)	P (AV)	F (SI+P)	AV (SI+P)	LSAS-CA-SR
SI (F)	1.00	.65	.70	.43	.92	.58	.82
SI (AV)		1.00	.48	.69	.61	.91	.84
P (F)			1.00	.60	.92	.59	.83
P (AV)				1.00	.56	.92	.83
F (SI+P)					1.00	.64	.89
AV (SI+P)						1.00	.91
STAIC-T	.45*	.34*	.47*	.32	.50	.36	.47
CES-D	.37	.28	.41	.31	.42	.32	.40

SI = social interaction; P = performance; F = fear; AV = avoidance.
All correlations are statistically significant with *ps* < .001.
* The STAIC-T correlated significantly more than the CES-D with these subscales.

Table 3: Bivariate Correlations between Scales, Subscales and Other Psychological Constructs (n = 1,343)

the CES-D with the fear in performance situations ($Z = 3.55$, $p < .001$) and avoidance in social interaction ($Z = 3.44$, $p < .001$) subscales. For the avoidance in performance situations subscale, however, there was no significant difference between the strength of its associations with the STAIC-T and the CES-D ($Z = 0.08$, $p = .211$).

Discussion

The main goal of the present study was to answer two questions. First, which factor structure for the LSAS-CA-SR best fits a sample of French-speaking adolescents? Second, does the French version of the LSAS-CA-SR exhibit good psychometric properties (i.e., internal consistency, convergent validity)?

Regarding the factor structure of the LSAS-CA-SR, we investigated the models previously identified by Masia-Warner et al. (2003) and Storch et al. (2006). Confirmatory factor analyses demonstrated an acceptable overall fit for all tested models, but the best fit was a four-factor solution. However, with a CFI below .90, the adequacy of all models remains relative. The best model includes

the following factors: anxiety in performance situations, anxiety in social interaction situations, avoidance in performance situations and avoidance in social interaction situations. These first-order factors replicate the structure found by Masia-Warner et al. (2003). Models including second-order factors also showed acceptable fit, although not better than this four-factor model. Based on the typical scoring method (Masia-Warner et al., 2003), these data suggest that the best way to interpret LSAS-CA-SR scores would be to consider four separate subscores: fear/anxiety in performance situations, fear/anxiety in social interaction situations, avoidance in performance situations and avoidance in social interaction situations. However, although the other tested models are somewhat less adequate, the use of a total fear/anxiety score, a total avoidance score and an overall social anxiety score would still be relevant to the scoring system (as shown by the acceptable overall fit indices and internal consistency of these subscales).

The psychometric properties of the French version of the LSAS-CA-SR were also assessed. Regarding its internal reliability, although the Cronbach's α coefficients tended to be moderate rather than high, good scale and subscale score reliability was observed, with high Cronbach's alphas for the best four-factor model (.81–.84). These findings converge with prior research (Masia-Warner et al., 2003; Olivares et al., 2009; Storch et al., 2006), suggesting that, for each factor, items are similar in their content and measure the same dimension.

With respect to convergent validity, and consistent with these previous studies, we found stronger correlations between the LSAS-CA-SR and measures of anxiety proneness than with depression scales. The same pattern of results was observed for the different subscales. This suggests that the LSAS-CA-SR taps behaviours that are more associated with and more characteristic of anxiety than of depression. It is noteworthy that the low correlation between the STAIC-T and the avoidance of performance situations runs counter to this conclusion. However, the LSAS-CA-SR as a whole assesses behaviours that are characteristic of clinical social anxiety rather than fear of specific performance situations (as assessed by avoidance of performance situations subscale). The fact that we did not recruit a clinical sample of socially anxious participants might therefore account for these low correlations. Future studies are needed to examine whether this phenomenon also occurs in clinical samples.

At a fundamental level, the results of the structural modelling, which point to the need for a distinction between fear and avoidance ratings, are congruent with Mowrer's (1939, 1960) two-stage theory of the acquisition and maintenance of anxiety disorders. According to Mowrer (1960), fear and avoidance behaviours are functionally different. In the first stage, a neutral event becomes, through classical conditioning processes, associated with fear by being paired with a stimulus that by its nature induces discomfort or anxiety. In the second stage, escape or avoidance responses are developed to reduce the anxiety or discomfort evoked by the various conditioned stimuli; these responses are maintained by their success in doing so. This functional distinction is clinically critical. Indeed, from a cognitive behavioural therapy perspective, clients must be exposed to a feared situation, while escape behaviours in such situations must be detected and strictly prevented. Therefore, a measure that rates fear and avoidance separately may be more appropriate for customized treatments and an idiographic approach to clinical change. In contrast, our findings are inconsistent with those of Heimberg et al. (1999), who suggested that fear and avoidance ratings might not measure separate constructs. However, it should be noted that Heimberg et al.'s (1999) observation was made on the basis of a clinical sample of social phobics. One cannot exclude that the internal structure of LSAS-SR collected among individuals who suffer from clinical

social phobia differ from that observed in non-clinical individuals.

The present study is affected by several limitations and provides guidance for future researches. First, we did not specifically recruit a clinical sample. Future studies should assess the structural validity of the LSAS-CA-SR in a sample of individuals suffering from clinical social phobia. This approach would provide more information on its discriminant validity. Second, our participants were all teenagers. Future studies should examine the psychometric properties of the French version of the LSAS-CA-SR with a sample of children. Indeed, adolescence constitutes a particular developmental period, quite distinct from childhood and adulthood, characterized by a stressful shift (Buchanan, Eccles, & Becker, 1992; Larson, Asmussen, & Anger, 1991; Spear, 2000). The LSAS-CA-SR might have different psychometric properties in this specific population of children, such that a validation in a sample of children is needed to expand its use. Third, we assessed divergent validity with self-report measures. Although the French version of the LSAS-CA-SR correlates with the STAIC-T, constructive validity must be confirmed by correlating this scale with other validated French scales assessing constructs convergent with social anxiety (e.g., Bouvard et al., 1999; Heeren et al., 2013). Furthermore, it would be useful for future studies to examine the associations between responses on the LSAS-CA-SR and non-self-reported indices of social anxiety (for examples of multimodal assessment in studies of social anxiety, see Heeren et al., 2012; Rossignol et al., 2012). Fourth, we did not assess the test-retest reliability of the French version of the LSAS-CA-SR. Future studies should assess it. Fifth, the respondents were only selected from the French-speaking part of Belgium, thereby limiting the potential for generalization of our findings to other French-speaking countries. Additionally, it would have been interesting to have data on factorial invariance across age and educational level; this would allow the examination of equivalence between scores on each subsample in order to improve the degree of generalization. However, the age (i.e., $M = 15.70$, $SD = 0.88$) of the participants in the present sample follows a distribution that do not allow the use of such a statistical procedure. Future studies should further explore this issue. Sixth, one item showed loadings below .40. Although our additional analyses suggested that the removal of this item did not significantly change the fit indices of the factor solution, future studies are clearly needed to ensure that this item does not weaken the scale's psychometric validity. Finally, none of the models reported in Table 1 appears to provide a very optimal fit. Specifically, the CFI values were below .90 in all cases. However, the CFI is an incremental measure of fit that may not be particularly informative if the RMSEA of the null model is less than .158, as would generate an overly small value of fit (Barrett, 2007). As the RMSEA of the null model of our data is .07, one cannot exclude the possibility that our low CFIs are the result of this phenomenon. Consequently, in such a situation, the chi-square comparison and absolute fit indices should be preferred for model comparison (e.g., SRMR, RMSEA).

In conclusion, for French-speaking clinicians and researchers, the French version of the LSAS-CA-SR has acceptable validity as a measure of social anxiety in adolescents. Concerning its structural validity, despite some limitations, confirmatory factor analyses point to the four-factor model as the best fit, corroborating the findings of Masia-Warner et al. (2003). The model includes the following factors: fear/anxiety in social interaction situations, avoidance in social interaction situations, fear/anxiety in performance situations and avoidance in performance situations. These four factors can be interpreted as corresponding to the four subscales for the purposes of scoring. Good subscale reliability was also observed for each factor. However, given the relatively acceptable fit of the other suggested models, more factors can be soundly and carefully used,

such as global social anxiety, global anxiety/avoidance and anxiety/avoidance in social or school performance situations, according to the most suitable outcomes of the clinicians or the researchers. These findings have important consequences for the evaluation of social anxiety in adolescents.

Appendix A

French Adaptation of the Scale

Pour chacune des situations ci-dessous, entoure le niveau de peur ou d'**anxiété** que tu éprouves **et** le niveau d'**évitement** (tendance à vouloir fuir cette situation) auquel tu es confronté.

		Peur ou anxiété				**Evitement**			
		0 = Aucune **1 = Légère** **2 = Moyenne** **3 = Sévère**				**0 = Jamais** **1 = Occasionnel** **2 = Fréquent** **3 = Habituel**			
1.	Parler à tes camarades de classe ou à d'autres personnes au téléphone.	0	1	2	3	0	1	2	3
2.	Participer à des groupes de travail en classe.	0	1	2	3	0	1	2	3
3.	Manger devant les autres (par exemple à la cafétéria de l'école, au restaurant).	0	1	2	3	0	1	2	3
4.	Demander de l'aide à un adulte que tu ne connais pas bien, comme un employé de magasin, un directeur ou un policier (par exemple pour demander ton chemin ou t'expliquer quelque chose que tu ne comprends pas).	0	1	2	3	0	1	2	3
5.	Faire un rapport oral ou une présentation en classe (par exemple un exposé).	0	1	2	3	0	1	2	3
6.	Aller à des fêtes, des soirées dansantes, ou activités scolaires.	0	1	2	3	0	1	2	3
7.	Ecrire au tableau ou devant d'autres personnes.	0	1	2	3	0	1	2	3
8.	Parler avec d'autres jeunes que tu ne connais pas bien.	0	1	2	3	0	1	2	3
9.	Commencer une conversation avec des gens que tu ne connais pas bien.	0	1	2	3	0	1	2	3
10.	Utiliser les toilettes publiques ou celles de l'école.	0	1	2	3	0	1	2	3
11.	Entrer dans une classe ou dans un autre endroit (par exemple l'église, la cafétéria) quand d'autres personnes sont déjà assises.	0	1	2	3	0	1	2	3
12.	Etre le centre d'attention (par exemple ta propre fête d'anniversaire).	0	1	2	3	0	1	2	3
13.	Poser des questions en classe.	0	1	2	3	0	1	2	3
14.	Répondre à des questions en classe.	0	1	2	3	0	1	2	3
15.	Lire à haute voix en classe.	0	1	2	3	0	1	2	3
16.	Passer des tests.	0	1	2	3	0	1	2	3
17.	Dire "non" aux autres quand ils te demandent de faire quelque chose que tu ne veux pas faire (comme t'emprunter quelque chose ou regarder tes devoirs).	0	1	2	3	0	1	2	3
18.	Dire à d'autres que tu es en désaccord ou que tu es en colère contre eux.	0	1	2	3	0	1	2	3
19.	Regarder des gens que tu ne connais pas bien dans les yeux.	0	1	2	3	0	1	2	3
20.	Rapporter quelque chose dans un magasin (par exemple pour l'échanger).	0	1	2	3	0	1	2	3
21.	Pratiquer un sport ou réaliser une performance devant d'autres personnes (par exemple, cours de gymnastique, spectacle à l'école, concert musical).	0	1	2	3	0	1	2	3
22.	Rejoindre un club ou une organisation.	0	1	2	3	0	1	2	3
23.	Rencontrer de nouvelles personnes ou des étrangers.	0	1	2	3	0	1	2	3
24.	Demander à un professeur la permission de quitter la classe (comme pour aller à la toilette ou à l'infirmerie).	0	1	2	3	0	1	2	3

Appendix B

Summary of the Structural Models

Model	Factor(s)	Items	References
A	Performance situations	2, 3, 5, 7, 10, 11, 13, 14, 15, 16, 21, 24	Masia-Warner et al. (2003)
	Social interaction situations	1, 4, 6, 8, 9, 12, 17, 18, 19, 20, 22, 23	
B	Fear/anxiety in performance situations	2, 3, 5, 7, 10, 11, 13, 14, 15, 16, 21, 24	Masia-Warner et al. (2003) Storch et al. (2006) Olivares et al. (2009)
	Fear/anxiety in social interaction situations	1, 4, 6, 8, 9, 12, 17, 18, 19, 20, 22, 23	
	Avoidance in performance situations	2, 3, 5, 7, 10, 11, 13, 14, 15, 16, 21, 24	
	Avoidance in social interaction situations	1, 4, 6, 8, 9, 12, 17, 18, 19, 20, 22, 23	
C	Global social anxiety	All (1–24 for fear/anxiety and avoidance)	Masia-Warner et al. (2003)
D	Fear/anxiety	All (1–24 for fear/anxiety)	Masia-Warner et al. (2003) Lopez-Pina et al. (2008) Olivares et al. (2009)
	Avoidance	All (1–24 for avoidance)	
E	Fear/anxiety in social situations	1, 2, 3, 4, 6, 8, 9, 12, 17, 18, 19, 20, 22, 23	Storch et al. (2006)
	Fear/anxiety in school performance situations	7, 13, 14, 15, 24	
	Avoidance in social situations	1, 4, 6, 8, 9, 17, 18, 19, 22, 23	
	Avoidance in school performance situations	2, 5, 7, 11, 12, 13, 14, 15	
F	Fear/anxiety in performance situations	2, 3, 5, 7, 10, 11, 13, 14, 15, 16, 21, 24	Masia-Warner et al. (2003)
	Fear/anxiety in social interaction situations	1, 4, 6, 8, 9, 12, 17, 18, 19, 20, 22, 23	
	Avoidance in performance situations	2, 3, 5, 7, 10, 11, 13, 14, 15, 16, 21, 24	
	Avoidance in social interaction situations	1, 4, 6, 8, 9, 12, 17, 18, 19, 20, 22, 23	
	Fear/anxiety	All (1–24 for fear/anxiety)	
	Avoidance	All (1–24 for avoidance)	
G	Fear/anxiety in performance situations	2, 3, 5, 7, 10, 11, 13, 14, 15, 16, 21, 24	Masia-Warner et al. (2003)
	Fear/anxiety in social interaction situations	1, 4, 6, 8, 9, 12, 17, 18, 19, 20, 22, 23	
	Avoidance in performance situations	2, 3, 5, 7, 10, 11, 13, 14, 15, 16, 21, 24	
	Avoidance in social interaction situations	1, 4, 6, 8, 9, 12, 17, 18, 19, 20, 22, 23	
	Global social anxiety	All (1–24 for fear/anxiety and avoidance)	

Appendix C

Standardized Factor Loadings of Each Item after the Analysis of the Four-Factor Model

Items	Latent facets	Loadings
i1-fear / i1-avoidance	Social Interaction (fear) / Social interaction (avoidance)	.49/.50
i4-fear / i4-avoidance	Social Interaction (fear) / Social interaction (avoidance)	.54/.55
i6-fear / i6-avoidance	Social Interaction (fear) / Social interaction (avoidance)	.52/.51
i8-fear / i8-avoidance	Social Interaction (fear) / Social interaction (avoidance)	.79/.78
i9-fear / i9-avoidance	Social Interaction (fear) / Social interaction (avoidance)	.76/.76
i12-fear / i12-avoidance	Social Interaction (fear) / Social interaction (avoidance)	.48/.49
i17-fear / i17-avoidance	Social Interaction (fear) / Social interaction (avoidance)	.55/.50
i18-fear / i18-avoidance	Social Interaction (fear) / Social interaction (avoidance)	.57/.58
i19-fear / i19-avoidance	Social Interaction (fear) / Social interaction (avoidance)	.48/.46
i20-fear / i20-avoidance	Social Interaction (fear) / Social interaction (avoidance)	.52/.47
i22-fear / i22-avoidance	Social Interaction (fear) / Social interaction (avoidance)	.53/.53
i23-fear / i23-avoidance	Social Interaction (fear) / Social interaction (avoidance)	.65/.60
i2-fear / i2-avoidance	Performance (fear) / Performance (avoidance)	.60/.57
i3-fear / i3-avoidance	Performance (fear) / Performance (avoidance)	.41/.52
i5-fear / i5-avoidance	Performance (fear) / Performance (avoidance)	.60/.56
i7-fear / i7-avoidance	Performance (fear) / Performance (avoidance)	.56/.58
i10-fear / i10-avoidance	Performance (fear) / Performance (avoidance)	.30/.25
i11-fear / i11-avoidance	Performance (fear) / Performance (avoidance)	.52/.54
i13-fear / i13-avoidance	Performance (fear) / Performance (avoidance)	.78/.77
i14-fear / i14-avoidance	Performance (fear) / Performance (avoidance)	.79/.78
i15-fear / i15-avoidance	Performance (fear) / Performance (avoidance)	.62/.64
i16-fear / i16-avoidance	Performance (fear) / Performance (avoidance)	.45/.53
i21-fear / i21-avoidance	Performance (fear) / Performance (avoidance)	.54/.56
i24-fear / i24-avoidance	Performance (fear) / Performance (avoidance)	.56/.52

Notes

[1] This study is part of a larger longitudinal study.

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