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Rasch modeling of the Spanish self-report version of the Liebowitz Social Anxiety Scale for Children and Adolescents (LSAS-CA-SR)[1]

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ABSTRACT. The objective of this instrumental study was to analyze the unidimensional structure of the subscales of fear and avoidance of the Spanish version of the LSAS-CA-SR for children and adolescents under the Rasch models family. The sample was composed by 454 students (236 male and 218 female) from elementary and high schools aged between 10 and 17 years. A rating scale model was applied to the fear and avoidance subscales. The goodness-of-fit statistics (unweighted mean square and weighted mean square) showed values near to those expected by the model, except in the items 10 and 16 for the fear subscale, and items 6, 7, and 21 for the avoidance subscale. Moreover, partitioning the total sample in two random subgroups of 150 persons exhibited that the rating scale model showed an invariant ordering of the item and ability parameters. The study supports the usefulness of the Rasch model and its family in determining the unidimensionality of psychological tests.

KEYWORDS. Rasch model. Social anxiety. Liebowitz scale. Instrumental study.

RESUMEN. El objetivo de este estudio instrumental fue analizar la estructura unidimensional de las subescalas de miedo y evitación de la versión española de la

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escala de ansiedad social LSAS-CA-SR para niños y adolescentes bajo la familia de modelos de Rasch. La muestra estuvo formada por 454 estudiantes (236 varones y 218 mujeres) de educación primaria y secundaria cuya edad variaba entre 10 y 17 años. El modelo de escalas de valoración fue ajustado a los datos de ambas subescalas. Los estadísticos de ajuste (media cuadrática ponderada y media cuadrática no ponderada) mostraron un buen ajuste de los ítems al modelo, excepto en los ítems 10 y 16 en la subescala de miedo, y los ítems 6, 7 y 21 en la subescala de evitación. Además, la subdivisión de la muestra global en dos submuestras aleatorias de 150 personas probó que el modelo de escalas de valoración produjo un ordenamiento invariante de los parámetros de los ítems y de los parámetros de las personas. Este estudio respalda, así, la utilidad del modelo de Rasch y su familia para determinar la unidimensionalidad en un test psicológico.

PALABRAS CLAVE. Modelo de Rasch. Ansiedad social. Escala Liebowitz. Estudio instrumental.

Social phobia is defined as "a marked and persistent fear of one or more social situations in which the person is exposed to unfamiliar people or to possible scrutiny by others" (APA, 2000). The children must show specific characteristics for diagnoses of social phobia, that is, there exists evidence for capacity for social relationships with familiar people and they have to show anxiety in peer situations, not just in interaction with adults (APA, 1994).

Several studies of fear (La Greca, 1998; Zubeidat, Fernández-Parra, Sierra, and Salinas, 2007) have reported that worries of social kind are an important area of anxiety between children from six to twelve years old, and they persist during adolescence. In a consistent way, social phobia usually begins in mid-adolescence; it has a chronic course and interferes in academic, social, family and personal functioning (Beidel, Ferrell, Alfano, and Yeganeh, 2001). The mean age of onset ranges between 10 and 16 years and it affects about 10% of the population. In addition, social phobia is frequently associated to morbid disorders and may have severe consequences in the academic area and personal development of the adolescents and the health aspect (Beidel and Turner, 1998). There is also a higher risk of using legal and illegal drugs (Olivares and Caballo, 2003; Sonntang, Wittchern, Höfler, Kessler, and Stein, 2000).

Research on instruments designed to identify social phobia has also increased (Vera-Villaroel *et al*., 2007). Specific questionnaires to measure social phobia in children and adolescents are few in Spanish-speaking populations. García-López, Olivares, and Vera-Villarroel (2003) have carried out a review of studies on instrument of evaluation of social phobia concluding that SPAI and SAS-A are the suitable tests to assess anxiety social responses in adolescents. The SASC-R is the only instrument has been validated for Spanish-speaking children with social phobia.

The Liebowitz Social Anxiety Scale for Children and Adolescents (LSAS-CA; Masia, Hofmann, Klein, and Liebowitz, 1999) is a frequently used instrument in the diagnostic and study of social phobia (Masia-Warner *et al*., 2003). The items are situations modified from an adult version whose developmental characteristics were considered appropriate to children or adolescents. The LSAS-CA items were constructed from two sources. First, items were formed from reports of the 10 most feared situations of a group of 33 adolescents with social phobia (Hofmann *et al*., 1999). Second, items in the adult version that were not generated by the first method were included with slight wording changes if they were considered developmentally appropriate. For example, the LSAS question, "*Participating in small groups*", was modified to "*Participating in work groups in the classroom*". The majority of the LSAS-CA items (15) were consistent across both sources. The resulting measure was 24 items: 12 social interaction situations (*e.g*., "*Looking at people you don't know well in the eye*") and 12 performance situations (*e.g*., "*Asking questions in class*"). The administration procedure, rating scales, and scoring structure from the adult LSAS were retained. The LSAS-CA contains 24 items: 12 items are social interaction situations, and the other 12 are performance situations. Each item measures the fear level and the avoidance level with a polytomous scale: Clinician ratings of anxiety were 0 (*none*), 1 (*mild*), 2 (*moderate*), 3 (*severe*); and of avoidance were 0 (*never*), 1 (*occasionally*), 2 (*often*), 3 (*usually*).

Measurement models based on true score model (McDonald, 1999) rely on population statistics to obtain properties of the scales (Embretson and Reise, 2000). Thus, steps need to be taken to ensure that the scores on the scales are valid when employed in contexts other than those for which they were originally validated. In the true score model, the properties of the items, such as difficulty and discrimination indexes may change from one sample to another. Similarly, other scale properties such as reliability coefficient, validity coefficients, and standard error estimation depend upon sample statistics, even norms of the scores can be found in each scale adaptation.

Psychometric research has shown that LSAS-CA is a reliable instrument for measuring social anxiety, in both the fear subscale and the avoidance subscale (Masia-Warner *et al*., 2003, Olivares, Sánchez-García, and López-Pina, 2007, and their correlations with other measures (SPAI-C, SAS-A, SPS, and SPSS) were and from .44 to .77 for Spanish children and adolescents. Olivares *et al*. (2007) applied a principal component factor analysis on a polychoric correlation matrix for the fear subscale and avoidance subscale. The results showed a unidimensional structure in the two subscales, that is, the two subscales were methodologically similar versions of the same construct, although clinically they could be different.

To obtain more support for the unidimensional structure of LSAS-CA in the two subscales, the Rasch model (Rasch, 1980) was applied to the Spanish data. The Rasch model uses raw scores to estimate trait ability and places them on an equal metric with item difficulty parameters. Since the Rasch model use only one difficulty parameter for the item and only one ability parameter for the person, it is a requirement that the trait measured be unidimensional (Bond and Fox, 2001; Wright and Stone, 1979). An important feature of Rasch model is the invariant nature of the parameter estimation when the data fit the model. Thus, if the Rasch model fit the data, the ability parameters are independent of the item parameters, and the item parameters are independent of the ability parameters. The overlap between trait ability and item difficulty distributions on the logit scale can then be examined to test whether the instrument is appropriate for the given sample.

A number of unidimensional models have been developed within the Rasch model according to item format. Thus, if the items are scored polytomously we can use two models: the Partial Credit Model (PCM, Masters, 1982, 1999; Wright and Masters, 1982) and the Rating Scale Model (RSM, Andrich, 1978; Wright and Masters, 1982). Assuming that the rating scale model can be used to analyze questionnaries in which a fixed set of responses is used with every item in the questionnaries, in this instrumental study (Carretero-Dios and Pérez (2007); Montero and León, 2007) we test the fit of RSM to the data of LSAS-CA subscales. The RSM assumes that each item with *k* categories has *k-1* response categories. The mathematical function for this model is:

$$P(\beta,\delta,\tau) = \frac{\exp \sum_{j=0}^{x} (\beta - \delta + \tau_k)}{\sum_{k=0}^{m} \exp \sum_{j=0}^{k} (\beta - \delta + \tau_k)}$$

where the β term is the ability parameter, δ is the difficulty parameter, and τ_k is the *k* response category. RSM restricts the category structure to being the same for all items (Wright and Masters, 1982), thus a common set of parameters is estimated.

To test if the data of LSAS-CA in the Spanish sample can be predicted by RSM, we must estimate the difficulty parameters, ability parameters, and the item-fit indices. Furthermore, we will use the separation reliability coefficient as an index on whether the item and ability parameters make a good Rasch scale.

Method

Participants

Participants were 454 (236 male and 218 female) children and adolescents from primary and secondary schools in Spain. Participants were a community sample. The mean age of participants was 13.5 (*SD* = 2.25), with a range from 10 to 17 years.

Procedure

The original English version of the LSAS-CA was first translated to Spanish by the two first authors of the present study. Then, the Spanish version was back-translated into English by bilingual personnel who had not seen the original English version. The two versions were compared and the divergences in some items were solved by the researchers. High convergence between the two versions was obtained. All participants completed the LSAS-CA. Each item was rated on a 4-point scale for fear and avoidance scales.

Analysis

To estimate the ability and difficulty parameters, the ConQuest software (Wu, Adams, and Wilson, 1998) was used. ConQuest is a computer program for fitting item response models, covering a broad spectrum of unidimensional and multidimensional dichotomous, and polytomous item response models. ConQuest uses a marginal maximum likelihood algorithm to estimate the ability and difficulty parameters in order to alleviate the inconsistent estimates.

Results

Fear scale

To provide evidence in support of item fit, ConQuest provides two residual statistics (MNSQ), weighted (infit) and unweighted (outfit). The outfit statistic is an average of the standardized residual variance across items. This statistic weight unexpected responses far from item's measure (Wright and Masters, 1982), while the infit statistic weight unexpected responses close to item's measure. Item MNSQ values of 1 are ideal by Rasch specifications. Higher values may indicate a lack of construct homogeneity with other items in a scale (Green, 1996). Smaller values may indicate item redundancy, although the cut-off values can vary according to which the ratings are used (Karabatsos, 1997). There is no standard guide for these statistics. Doble and Fisher (1998) used cut-off values between .6 and 1.4 to select items that fit the Rasch model but Smith, Schumacker, and Bush (1998) found that unacceptable departures from expectations include items whose mean square infit or outfit values are greater than 1.3 for samples less than 500, 1.2 for samples between 500 and 1000, and 1.1 for samples larger than 1000. The sample of this study is near to 500 so we will use .7 to 1.3 values to accept that items fit the RSM. All items (Tables 1 and 2) except item 10 and 16 showed mean squares infit and outfit within this interval. Furthermore, an item separation reliability coefficient is provided by ConQuest to know if the items (or persons) are well separated in the measured variable. In the fear scale, the value was .988, showing that the item parameters were well separated in this scale.

TABLE 1. Item parameter estimations and fit statistics of fear subscale.

			Unweighted fit		*Weighted fit*	
Item	*Estimate*	*Error*	*MNSQ*	*T*	*MNSQ*	*T*
1	1.267	.072	1.09	1.4	1.14	1.4
2	.526	.063	1.07	1.0	1.19	2.0
3	.431	.062	1.03	.4	1.25	2.6
4	-.284	.055	.98	-.3	1.07	.7
5	-.638	.053	1.00	.0	1.04	.5
6	.951	.068	1.10	1.4	1.27	2.6
7	.108	.059	1.15	2.2	1.17	1.9
8	-.392	.055	1.04	.6	1.10	1.2
9	-.625	.053	.97	-.4	1.06	.8
10	.517	.063	1.36	4.8	1.41	4.0
11	-.182	.056	1.01	.2	1.08	.9
12	-.254	.056	1.12	1.7	1.20	2.3
13	.179	.060	.76	-3.8	.84	-1.9

TABLE 1. Item parameter estimations and fit statistics of fear subscale. *(Cont.)*.

			Unweighted fit		*Weighted fit*	
Item	*Estimate*	*Error*	*MNSQ*	*T*	*MNSQ*	*T*
14	-.028	.058	.85	-2.3	.98	-.2
15	.160	.060	.99	-.1	1.11	1.3
16	-.862	.051	1.32	4.3	1.35	4.2
17	-.056	.057	1.07	1.0	1.21	2.3
18	-.323	.055	.99	-.1	1.04	.6
19	-.253	.056	1.02	.4	1.03	.4
20	-.308	.055	1.02	.2	1.12	1.5
21	-.550	.053	1.03	.4	1.17	2.1
22	.647	.065	1.01	.1	1.10	1.1
23	-.528	.053	1.09	1.3	1.14	1.8
24	.495*					

* This parameter estimate has been constrained by the mean to be 0.

TABLE 2. Item category parameters in the fear subscale.

			Unweighted fit		*Weighted fit*	
Item	*Estimate*	*Error*	*MNSQ*	*T*	*MNSQ*	*T*
1	-.882	.023	1.72	8.6	1.80	9.2
2	.391	.038	1.07	1.0	1.20	2.1
3	1.491*					

* This parameter is constrained by the sum to be 1.

Table 3 presents the map of latent distributions and response model parameter estimates. On the left, we have the latent ability distribution for the participants in this study; in the centre, we have the item difficulty parameters, and on the right, we have the step parameters. This map enables a comparison of feelings of fear of this sample *versus* how each item measures the fear. A high degree of overlap is thus expected in order to describe adequately the sample. In the Table 3, we see too that this overlap is produced above the sample distribution, indicating that the participants did not show strong fear feelings.

TABLE 3. Map of latent distributions and response model parameter estimates.

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                                  Terms in the Model Statement

                               +item                              +step
----------------------------------------------------------------------------------------
                 |                                  |                                  |
                 |                                  |                                  |
                 |                                  |                                  |
    2            |                                  |                                  |
                 |                                  |                                  |
                 |                                  |                                  |
                 |                                  |                                  |
                 |                                  |                                  |
                 |                                  |                                  |
                 |1                                 |                                  |
                 |                                  |                                  |
    1            |6                                 |                                  |
                 |                                  |                                  |
                 |22                                |                                  |
                X|2 10 24                           |                                  |
                X|3                                 |2                                 |
                X|13                                |                                  |
               XX|7 15                              |                                  |
    0        XXXX|14 17                             |                                  |
              XXX|11                                |                                  |
              XXX|4 12 18 19 20                     |                                  |
             XXXX|8                                 |                                  |
           XXXXXX|5 9 21 23                         |                                  |
            XXXXX|                                  |                                  |
           XXXXXX|16                                |1                                 |
   -1     XXXXXXX|                                  |                                  |
       XXXXXXXXXX|                                  |                                  |
       XXXXXXXXXX|                                  |                                  |
       XXXXXXXXXX|                                  |                                  |
         XXXXXXXX|                                  |                                  |
          XXXXXXX|                                  |                                  |
         XXXXXXXX|                                  |                                  |
   -2     XXXXXXX|                                  |                                  |
         XXXXXXXX|                                  |                                  |
       XXXXXXXXXX|                                  |                                  |
           XXXXXX|                                  |                                  |
            XXXXX|                                  |                                  |
              XXX|                                  |                                  |
              XXX|                                  |                                  |
   -3       XXXXX|                                  |                                  |
               XX|                                  |                                  |
               XX|                                  |                                  |
               XX|                                  |                                  |
               XX|                                  |                                  |
                X|                                  |                                  |
                X|                                  |                                  |
   -4           X|                                  |                                  |
                X|                                  |                                  |
                 |                                  |                                  |
                X|                                  |                                  |
                X|                                  |                                  |
                 |                                  |                                  |
                 |                                  |                                  |
                 |                                  |                                  |
   -5            |                                  |                                  |
                 |                                  |                                  |
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Note. Each ‘X’ represents 2.7 cases.

Item invariant ordering in the fear subscale

If the data fit the Rasch model, then the model produces parallel Item Characteristics Curves (ICCs) for all items of the test. If the ICCs do not cross, the joint set of items will not violate the independence axiom of conjoint measurement theory (Bond and Fox, 2001), so interval scales of each are possible. The Rasch model does not have any direct test to test the item invariant ordering, but we can use an indirect procedure. Thus, we ordered the data matrix by difficulty parameters and abilitiy parameters for the 22 items that fitted the Rasch model. We used two samples to test the items invariant ordering. One sample was made up by the 150 persons of higher ability, and the other by the 150 persons of lower ability. Then we calculated the difficulty parameters in the two samples and we compared with the estimation in the total sample. Pearson's correlation coefficients were .986 in the sample of higher ability and .961 in the sample of lower ability. These values showed a high consistency in the item difficulty parameter ordering, independently of the degree of social anxiety showed.

Avoidance scale

Tables 4 and 5 present the item parameter estimates, standard errors, and residual statistics (weighted and unweighted) for the avoidance scale. Two items (10 and 16) obtained weighted and unweighted fit statistics higher than 1.3. The weighted fit statistics for 6, 7 and 21 items were also higher than 1.3. It seems relatively clear that items 10 and 16 do not measure the same unidimensional construct as the other items in the avoidance scale and that items 6, 7, and 21 need some review. Furthermore, the item separation reliability coefficient in avoidance scale was .980, showing that the item parameters were well separated.

TABLE 4. Item parameter estimations and fit statistics of avoidance subscale.

			Unweighted fit		*Weighted fit*	
Item	*Estimate*	*Error*	*MNSQ*	*T*	*MNSQ*	*T*
1	.770	.059	1.01	.2	1.07	.7
2	.368	.054	1.03	.4	1.22	2.3
3	.339	.054	1.09	1.3	1.23	2.4
4	-.238	.048	.87	-2.0	.96	-.5
5	-.501	.046	1.05	.7	1.12	1.5
6	.785	.059	1.16	2.2	1.33	3.1
7	.059	.051	1.21	2.9	1.32	3.4
8	-.074	.050	.96	-.5	1.05	.6
9	-.364	.047	.99	-.1	1.06	.8
10	-.346	.047	1.41	5.3	1.39	4.5
11	-.176	.049	1.01	.2	1.08	1.0
12	-.172	.049	1.11	1.5	1.20	2.3
13	.018	.051	.78	-3.4	.92	-.9
14	.074	.051	.87	-1.9	1.06	.7
15	.117	.052	1.08	1.1	1.24	2.6
16	-.112	.049	1.51	6.4	1.51	5.3
17	-.322	.047	1.13	1.8	1.25	3.0
18	-.373	.047	.97	-.4	.99	-.1
19	-.240	.048	1.04	.7	1.19	2.3
20	-.186	.049	1.13	1.8	1.20	2.3
21	-.217	.048	1.17	2.4	1.33	3.7
22	.570	.057	1.07	1.1	1.24	2.4
23	-.143	.049	.99	-.1	1.09	1.1
24	.355*					

*This parameter estimate has been constrained by the mean to be 0.

TABLE 5. Item category parameters in the avoidance subscale.

			Unweighted fit		*Weighted fit*	
Item	*Estimate*	*Error*	*MNSQ*	*T*	*MNSQ*	*T*
1	-.437	.022	2.03	11.6	2.18	12.7
2	.468	.038	1.37	4.9	1.65	6.2
3	.969*					

*This parameter is constrained by the sum to be 1.

Table 6 presents the map of latent distributions and response model parameter estimation. The overlap degree between the sample latent distribution and the parameter estimation was again in the upper half of the distribution, showing that this sample did not show strong avoidance feelings.

TABLE 6. Map of latent distributions and response model parameter estimates.

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                                 Terms in the Model Statement

                              +item                              +step
---------------------------------------------------------------------------------------
                |                                  |                                  |
                |                                  |                                  |
   2            |                                  |                                  |
                |                                  |                                  |
                |                                  |                                  |
                |                                  |                                  |
                |                                  |                                  |
                |                                  |                                  |
                |                                  |                                  |
                |                                  |                                  |
                |                                  |                                  |
   1            |                                  |                                  |
                |                                  |                                  |
                |1  6                              |                                  |
               X|22                                |                                  |
               X|                                  |2                                 |
               X|2  3  24                          |                                  |
              XX|                                  |                                  |
              XX|14  15                            |                                  |
   0         XXX|7  13                             |                                  |
             XXX|8  16  23                         |                                  |
            XXXX|4  11  12  19  20  21             |                                  |
         XXXXXXX|9  10  17  18                     |                                  |
         XXXXXXX|5                                 |1                                 |
         XXXXXXX|                                  |                                  |
        XXXXXXXX|                                  |                                  |
       XXXXXXXXX|                                  |                                  |
  -1     XXXXXXX|                                  |                                  |
      XXXXXXXXXX|                                  |                                  |
        XXXXXXXX|                                  |                                  |
           XXXXX|                                  |                                  |
          XXXXXX|                                  |                                  |
          XXXXXX|                                  |                                  |
        XXXXXXXX|                                  |                                  |
         XXXXXXX|                                  |                                  |
           XXXXX|                                  |                                  |
  -2       XXXXX|                                  |                                  |
             XXX|                                  |                                  |
             XXX|                                  |                                  |
             XXX|                                  |                                  |
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TABLE 6. Map of latent distributions and response model parameter estimates. *(Cont.)*

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              XX|                                    |                                    |
              XX|                                    |                                    |
              XX|                                    |                                    |
              XX|                                    |                                    |
 -3           XX|                                    |                                    |
               X|                                    |                                    |
               X|                                    |                                    |
               X|                                    |                                    |
               X|                                    |                                    |
               X|                                    |                                    |
                |                                    |                                    |
                |                                    |                                    |
                |                                    |                                    |
 -4             |                                    |                                    |
                |                                    |                                    |
                |                                    |                                    |
                |                                    |                                    |
                |                                    |                                    |
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                |                                    |                                    |
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Note. Each 'X' represents 2.9 cases.

Item invariant ordering in the avoidance subscale

In the avoidance subscale, the same two samples of 150 people (one of higher ability and the other of lower ability) were used to estimate anew the items parameters. Thus, we obtained Pearson correlation coefficients between the difficulty parameters estimates in the two samples and the total sample. Theses correlations were .972 (in the sample of higher ability) and .849 (in the sample of lower ability) showing a high consistency in the item difficulty parameter ordering in the avoidance subscale.

Discussion

Previous studies on scores observed with exploratory factorial analysis on the LSAS-CA-SR (Olivares *et al*., 2007) support the idea of an underlying unidimensional construct in both scales (fear and avoidance). This unidimensional structure is supported in this study since the data appear to fit the rating scale model (RSM) relatively well, with the exception of items 10 ("*Using school toilets or other public conveniences*") and 16 ("*Taking exams*"), which were defective in both subscales. These items are not in themselves social situations where there may be a negative judgement on the part of others, which is the number one fear of subjects who suffer social phobia. With respect to item 10, the children or adolescents can decide to mark a certain degree of fear or avoidance for other reasons, *i.e*., not using the toilets because they find them "disgusting or repugnant", because these are not properly equipped, or through fear of infection or illness. In such cases the scores for this item will not measure social anxiety. "*Taking exams*" (item 16), may be measuring a specific type of anxiety and not so much a social fear, since for a social situation to be considered as one of action, certain circumstances need to be taken into account, *e.g*., the type of exam (individual o collective) or the nature of the exam (oral or written). Besides these items, a deep review of the following ones is also required in the subscale of avoidance: item 6 ("*Going to end of term parties, birthday parties or to other school activities*"), item 7 ("*Writing on the chalkboard or in front of others*") and item 21 ("*Practising sport or performing in front of others -e.g., in P.E. class, a dance show, a football match or concert-*").

This study confirms the usefulness of the Rasch to test unidimensionality in a psychometric test. The Rasch model allows direct comparison of the population under assessment with the difficulty of the items and gives a very clear view as to the degree of the presence of the attribute measured in the population. Depending on the fit obtained, the Rasch model provides estimations of people's abilities on a scale of interval. These estimations are independent of the characteristics of the test and they allow us to express the behaviour of people in terms of an explicit model and under determined suppositions, thus overcoming the traditional indecisiveness of the score observed which is randomly constructed, with no underlying model.

The literature on the Rasch model states that it is difficult to find a set of data which fits the model perfectly, since it starts from very restrictive suppositions such as underlying unidimensionality and parallel ICCs. However, the results of this study confirm that a good theoretical study of the test (recall the sources used by Liebowitz to construct the scale) lead to a set of data that fits the only model considered as a probabilistic expression of the conjoint additive measure quite well. Obviously, some items always present a certain misfit, which requires further research, since it may be due to their measuring a different attribute or maybe even more than one latent attribute, which would explain the misfit. A third reason could be the expected rate of type I error of the statistics of the quadratic averages. In a test of 24 items, the expected type I error rate at an alpha of .05 would be found between 1 and 2 items, which is exactly what we have found in our study.

References

American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders, (DSM IV).* Washington, DC: Author.

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders, (DSM IV-TR).* Washington, DC: Author.

Andrich, D. (1978). Rating formulation for ordered response categories. *Psychometrika*, *43*, 561-573.

Beidel, D.C., Ferrell, C., Alfano, C.A., and Yeganeh, R. (2001). The treatment of childhood social anxiety disorder. *Psychiatric Clinics of North America, 24,* 831-846.

Beidel, D.C. and Turner, S.M. (1998). *Shy children, phobic adults. Nature and treatment of social phobia*. Washington, DC: APA.

Bond, T.G. and Fox, C.M. (2001). *Applying the Rasch model: Fundamental measurement in the human sciences*. Mahwah, NJ: Lawrence Erlbaum.

Carretero-Dios, H. and Pérez, C. (2007). Standards for the development and the review of instrumental studies: Considerations about test selection in psychological research. *International Journal of Clinical and Health Psychology, 7*, 863-882.

Doble, S.E. and Fisher, A.G. (1998). The dimensionality and validity of the Older Americans Resources and Services (OARS) Activities of Daily Living (ADL) scale. *Journal of Outcome Measurement*, *2*, 4-24.

Embretson, S.E. and Reise, S.P. (2000). *Item response theory for psychologists*. Mahwah, NJ: Lawrence Erlbaum.

García-López, L.J., Olivares, J., and Vera-Villarroel, P.E. (2003). Revisión de instrumentos de evaluación de la fobia social validados para población de habla española. *Revista Latinoamericana de Psicología*, *35*, 151-160.

Green, K.E. (1996). Dimensionality analysis of complex data. *Structural Equation Modeling*, *3*, 50-61.

Hofmann, S.G., Albano, A.M., Heimberg, R.G., Tracey, S., Chorpita, B.F., and Barlow, D.H. (1999). Subtypes of social phobia in adolescents. *Depresion and Anxiety*, *9*, 15–18.

Karabatsos, G. (1997). The sexual experiences survey: Interpretation and validity. *Journal of Outcome Measurement*, *1*, 305-328.

La Greca, A.M. (1998). *Manual of the social anxiety scales for children and adolescents.* Miami, FL: Author.

Masia, C.L., Hofmann, S.G., Klein, R.G., and Liebowitz, M.R. (1999), *The Liebowitz Social Anxiety Scale for Children and Adolescents (LSAS-CA)* (available from Carrie Masia-Warner, NYU Child Study Center, 215 Lexington Avenue, 13th floor, New York, NY 10016).

Masia-Warner, C., Storch, E., Pincus, D., Klein, R., Heimberg R.G., and Liebowitz, M.R. (2003). The Liebowitz Social Anxiety Scale for Children and Adolescents: An Initial Psychometric Investigation. *Journal of the American Academic of Child and Adolescent Psychiatry*, *42*, 1076-1084.

Masters, G.N. (1982). A Rasch model for partial credit scoring. *Psychometrika*, *47*, 149-174.

Masters, G.N. (1999). Partial credit model. In G.N. Masters and J.P. Keeves (1999). *Advances in measurement in educational research and assessment*. Amsterdam: Pergamon.

McDonald, R.P. (1999). *Test theory: A unified treatment*. Mahwah, NJ: LEA.

Montero, I. and León, O.G. (2007). A guide for naming research studies in Psychology. *International Journal of Clinical and Health Psychology*, *7*, 847-862.

Olivares, J. and Caballo, V.E. (2003). Un modelo tentativo sobre la génesis, desarrollo y mantenimiento de la fobia social. *Psicología Conductual, 11*, 483-515.

Olivares, J., Sánchez-García, R., and López-Pina, J.A. (2007). *The Liebowitz Social Anxiety Scale for Children and Adolescents (LSAS-CA): Psychometric properties in a Spanish community population*. Manuscript under review.

Rasch, G. (1980). *Probabilistic models for some intelligence and attainment tests*. Chicago: The University of Chicago Press (expanded edition, original work published 1960).

Smith, R.M., Schumacker, R.E., and Bush, M.J. (1998). Using item mean squares to evaluate fit to the Rasch model. *Journal of Outcome Measurement*, *2*, 66-78.

Sonntag, H., Wittchen, H.-U., Höfler, M., Kessler, R.C., and Stein, M.B. (2000). Are social fears and DSM-IV social anxiety disorder associated with smoking and nicotine dependence in adolescents and young adults? *European Psychiatry, 15,* 67-74.

Vera-Villaroel, P., Olivares-Rodríguez, J., Kuhne, W., Rosa-Alcázar, A.I., Santibáñez, C., and López-Pina, J.A. (2007). Propiedades psicométricas de la Escala para la Detección de la Ansiedad Social (EDAS) en una muestra de adolescentes chilenos. *International Journal of Clinical and Health Psychology*, *7*, 795-806.

Wright, B.D. and Masters, G.N. (1982). *Rating scale analysis*. Chicago: MESA Press.

Wright, B.D. and Stone, M. (1979). *Best test design*. Chicago: MESA Press.

Wu, M.L., Adams, R.J., and Wilson, M.R. (1998). *ACER ConQuest: Generalised item response modelling software*. Melbourne, Australia: Australian Council for Educational Research.

Zubeidat, I., Fernández-Parra, A., Sierra, J.C., and Salinas, J.M. (2007). Ansiedad social específica y generalizada: ¿variantes del mismo trastorno o categorías diferentes con características similares? *International Journal of Clinical and Health Psychology*, *7*, 709-724.