

# Measurement Invariance and Latent Mean Differences Between American, Spanish and Chinese Adolescents Using the Social Anxiety Scale for Adolescents (SAS-A)

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## Abstract

**Background:** Social anxiety is one of the most prevalent disorders among adolescents (Stein et al., 2017). The main aim of this study was to analyze the equivalence of scores on the Social Anxiety Scale for Adolescents (SAS-A) using structural equation modeling and identify differences in latent means of social anxiety in China, Spain, and the USA. **Method:** Random sampling was used to recruit participants, which included 536 Chinese (46% girls), 1,178 Spanish (55.3% girls) and 866 North American (55.1% girls) adolescents. The participants' ages ranged between 14 and 17 years old. **Results:** The SAS-A three-factor correlated model of social anxiety remained invariant between the Spanish and North American adolescents, but results could not be replicated in the Chinese adolescents [ $M2 = \chi^2(36, p) = 4732.56 (36, < .01)$ ]. Analyses of latent differences between Spain and the USA showed that Spanish adolescents had higher scores than North Americans for Fear of Negative Evaluation ( $TS = -9.630$ ;  $d = .44$ ) and for Social Avoidance and General Anxiety towards people ( $TS = -2.717$ ;  $d = .12$ ). **Conclusions:** The results are interpreted according to the cultural traits of individualism-collectivism and self-construal, and practical implications are discussed.

**Keywords:** Anxiety Scale for Adolescents, SAS-A, measurement invariance, social anxiety, cross-cultural.

## Resumen

**Análisis de Invarianza y Diferencias de Medias Latentes Entre Adolescentes Americanos, Españoles y Chinos Usando la Escala de Ansiedad Social para Adolescentes (SAS-A).** **Antecedentes:** la ansiedad social es uno de los trastornos con mayor prevalencia en adolescentes (Stein et al., 2017). Así, el propósito principal de este estudio fue analizar la invarianza de la Escala de Ansiedad Social para Adolescentes (SAS-A) mediante un modelo de ecuaciones estructurales y examinar las diferencias de medias latentes en ansiedad social en adolescentes de China, España y EE.UU. **Método:** los participantes se seleccionaron a través de muestreo aleatorio: 534 chinos (46% chicas), 1.178 españoles (55,3% chicas) y 866 norteamericanos (55,1% chicas), con edades comprendidas entre los 14 y 17 años. **Resultados:** las puntuaciones del modelo de tres factores correlacionados de ansiedad social de la SAS-A resultaron invariantes entre adolescentes españoles y norteamericanos, pero estos resultados no fueron replicados en adolescentes chinos [ $M2 = \chi^2(36, p) = 4732.56 (36, < .01)$ ]. El análisis de medias latentes entre España y EE.UU. mostró que los adolescentes españoles manifestaban niveles más altos de Miedo ante las evaluaciones negativas ( $TS = -9.630$ ;  $d = .44$ ) y Evitación social y ansiedad general hacia las personas ( $TS = -2.717$ ;  $d = .12$ ). **Conclusiones:** estos hallazgos fueron interpretados atendiendo al de individualismo-colectivismo y las concepciones culturales de la propia persona, analizando sus implicaciones prácticas.

**Palabras clave:** Ansiedad Social para Adolescentes, SAS-A, invarianza, ansiedad social, transcultural.

Adolescence is the developmental stage in which great biological, cognitive, and social changes take place, which in turn may increase anxiety (Arnett, 2011; Crawley et al., 2018). One of the most prevalent anxiety disorders among adolescents is Social

Anxiety Disorder (SAD) (Bandelow & Michaelis, 2015; Stein et al., 2017). According to the American Psychiatric Association (APA, 2014), the prevalence of SAD in the USA is 7%, while in Europe it is around 2.3%, with an age of onset during childhood and adolescence (8-15 years). The World Health Organization (WHO, 2019) notes that SAD is characterized by a disproportionate expression of intense fear or anxiety when a person faces social situations such as social interactions, acting in the presence of others or feeling observed while performing an action. The individual is concerned because the behavior or anxiety symptoms they exhibit are negatively evaluated by others (fear of offending

other people). Therefore, individuals tend to avoid these social situations or to face them with high levels of fear or anxiety. SAD symptoms are persistent for several months, causing a clinically significant deterioration in social, family, educational, work and personal functioning.

In the case of adolescents, SAD symptomatology can negatively influence their quality of life (Vidal-Arenas et al., 2021) and their functioning in different areas, such as school performance, self-esteem, and friendship and intimate relationships (Chiu et al., 2021; La Greca & Danzi, 2016; Vilaplana-Pérez et al., 2021). Negative effects have also been reported for subclinical levels of SAD (Delgado et al., 2014). To prevent those adverse effects Gírio-Herrera et al. (2019) suggested implementation of evidence-based interventions in schools, as they will have an impact on the mental health of adolescents and, therefore, on public health.

To understand a psychological or social phenomena, such as social anxiety, it is essential to examine the context in which it occurs (Hofmann et al., 2010; Jefferies & Ungar, 2020). In that sense, cross-cultural studies have highlighted the relevance of attending to individualism-collectivism (Liddell & Williams, 2019; Schreier et al., 2010).

Individualism refers to societies in which individuals do not have close bonds, and where each individual must take care of themselves and their close relatives (Errasti-Pérez et al., 2018). Collectivism, in contrast, refers to societies in which individuals belong to strongly cohesive groups, who take care of the group members in return for their loyalty. Hofstede et al. (2010) found that individuals in the USA showed high scores in individualism whereas those in China showed low scores in individualism, with Spanish individuals in between. Findings from Oyserman et al. (2002) also show, when comparing the Spain and China with the USA, that those in both Spain and China had a moderate magnitude in collectivism (whereas individuals in the USA had lower scores). These differences among cultural groups could influence prevalence and expression of social anxiety. In fact, previous research has shown that social anxiety levels are significantly higher in Asian than in Western cultures (Essau et al., 2011; Krieg & Xu, 2018; Schreier et al., 2010; Woody et al., 2015).

In order to understand social anxiety variation levels among the adolescent populations included in this study (China, Spain, and the USA), it is necessary to consider how adolescents conceive social interaction in these countries. Thus, in Chinese adolescents, shyness, behavioral inhibition, respect, and obedience are considered maturity signs (Arnett, 2011; Chen, 2012) and contribute to adequate group functioning; assertive behaviors or standing out from others is discouraged (Xu et al., 2008). However, North American society values assertiveness, expressiveness, and competitiveness in social contexts (Chen, 2012). Spain is characterized by features of both cultures (Hofstede et al., 2010; Oyserman et al., 2002).

Despite a broad interest in the study of social anxiety in different countries and populations (e.g., Caballo et al., 2016; Caballo et al., 2019; Krieg et al., 2018), previous research that examines the differences among Chinese, Spanish and North American youth are scarce. To our knowledge, only Zhou et al. (2008) addressed this issue, finding that the Chinese adolescents showed significantly higher scores on all SAS-A scales than did Spanish and North American adolescents. However, the model's measurement invariance was not analyzed for all three samples. According to Muñiz and Fonseca-Pedrero (2019) the analysis of

the sources of evidence of the internal structure of an instrument is essential to assess items differential functioning. If a model is not invariant or equivalent across cultural groups, differences could be due to biases in measurements (Dimitrov, 2010) or to different individual characteristics or item interpretations in each group (Byrne, 2008; Byrne & van de Vijver, 2017; Muñiz & Fonseca-Pedrer, 2019). Thus, not taking into account the invariance of the questionnaires among populations of different cultural origin can lead to interpreting differences in results that are not really comparable (Krieg et al., 2018).

One of the main difficulties identified in cross-cultural studies is having a valid measuring instrument in the populations of interest. Despite the numerous studies that analyze social anxiety in adolescents, to our knowledge, the SAS-A (La Greca & López, 1999) is the only instrument that has been validated in the three countries considered in this research: China (Zhou et al., 2008), Spain (García-López et al., 2001; Inglés et al., 2010; Olivares et al., 2005) and the USA (Inderbitzen et al., 2004; Inderbitzen & Walters, 2000; La Greca et al., 2015; Myers et al., 2002; Storch et al., 2004).

Based on prior research, the SAS-A appears to be an appropriate instrument to evaluate and compare social anxiety among adolescents from China, Spain, and the USA. For this reason, the main aim of this study was to analyze the equivalence of scores on the Social Anxiety Scale for Adolescents (SAS-A) using structural equation modeling and identifying latent means differences of social anxiety in China, Spain, and the USA. Based on the differences that previous literature has revealed regarding the functioning of these cultural groups, it is expected that: (a) the SAS-A three-factor correlated model of social anxiety will be invariant in youth across the three countries, as validation studies in these countries have confirmed its three-factorial structure, and; (b) there will be statistically significant differences in latent means among adolescents from the three countries studied, with higher levels of social anxiety occurring in adolescents from collectivistic cultures.

## Method

### Participants

The initial sample consisted of 2634 adolescents from 9th to 12th grade from public and private schools in China, Spain and the USA, all from community samples. A total of 54 participants were eliminated due to omissions or errors in the answers and/or for not obtaining parental informed consent (China: 2.6% = 14 adolescents; Spain: 2.1% = 25 adolescents; USA: 1.7% = 15 adolescents). For the 54 eliminated participants, using the Mahalanobis distance (Field, 2018), 4 atypical multivariate values were detected and excluded; other incomplete cases were removed because of their small percentage of the final sample and because more than 60% of the SAS-A items were incomplete. The final sample consisted of 2580 adolescents ( $M = 14.32$ ,  $SD = 4.38$ ): 536 Chinese (45.9% female), 1178 Spanish (55.3% female) and 866 North American adolescents (55.1% female), aged between 14 and 17 years (China:  $M = 14.35$ ,  $SD = 1.21$ ; Spain:  $M = 15.45$ ,  $SD = 1.28$ ; the USA:  $M = 16.57$ ,  $SD = 1.02$ ). Chi-square tests confirmed homogeneity of the samples across the countries based on sex and age (China:  $\chi^2 = .37$ , Spain:  $\chi^2 = .97$ , the USA:  $\chi^2 = .08$ ).

For data collection, a random cluster sampling of the schools in the participating cities was used, identifying rural and urban

areas and diverse socioeconomic levels. In the schools, a random sample of classrooms was conducted depending on the number of classrooms per academic year. Adolescents were included in the study, if they: (a) were born in the country of analysis; (b) their parents were born in that same country; and (c) they lived in that country for at least the last 8 years.

### Instruments

*Social Anxiety Scale for Adolescents* (SAS-A; La Greca & López, 1999). This questionnaire assesses social anxiety in adolescents. The SAS-A contains 22 items rated on a 5-point Likert scale (ranging from 1 = not at all to 5 = all the time). The questionnaire includes three subscales: Fear of Negative Evaluation (FNE; 8 items) that assesses concerns and fears related to negative peer evaluation (e.g.: “I worry about what others say about me”); Social Avoidance and Distress in New Situations (SAD – New; 6 items) that assesses adolescents’ degree of discomfort and avoidance in new situations or with unfamiliar peers (e.g.: “I get nervous when I talk to peers I don’t know very well”); and Social Avoidance and Distress – General (SAD – General; 4 items) that assesses discomfort and avoidance in any social situation (e.g.: “I’m quiet when I’m with a group of people”). The remaining four items are fillers. Items from each subscale are summed to obtain a subscale score and those subscales are added to obtain a total score for social anxiety. Higher scores reflect greater social anxiety. The Spanish and Chinese adaptations of the SAS-A confirmed that psychometric properties of the scores of the scale were adequate in both populations and the three-dimensional structure was replicated (García-López et al., 2001; Olivares et al., 2005; Zhou et al., 2008). In addition, sources of convergent validity of the scores of the SAS-A have been confirmed in several studies (García-López et al., 2001; Inderbitzen et al., 2004; Inderbitzen & Walters, 2000; Storch et al., 2004; Zhou et al., 2008). For the current study, the American (La Greca & López, 1999), Chinese (Zhou et al., 2008) and Spanish (Ingles et al., 2010) versions of the scale were employed.

### Procedure

The SAS-A questionnaire was answered collectively and voluntarily in the classroom. Informed written consent was requested from families or legal guardians for the participation of minors. In all the countries, a member of the research team was always present during the SAS-A administration process to ensure the adolescents answered the questionnaire independently and to solve any problems that could arise. The research was approved by the ethical committees of the involved institutions and was in accordance with the Helsinki ethical standards. The questionnaire was administered in the native language of the participating country (Chinese, Spanish, and English, respectively), following the International Testing Commission (ITC) guidelines for test adaptation (Hernández et al., 2020; Muñoz et al., 2013), in order to avoid possible biases due to questionnaire language.

### Data Analysis

Confirmatory factor analyses were performed to analyze the internal structure of the three-factor correlated model on the scores of the SAS-A items. The Robust Maximum Likelihood procedure was used because the kurtosis multivariant coefficient for the total sample

was 116.15, higher than the 5 points proposed by Bentler (2005). Statistical properties of the confirmatory analysis were assessed using the following goodness of fit indexes:  $\chi^2(S-B\chi^2)$ , *R-RMSEA* (< .08 acceptable fit), *SRMR* (near .08 acceptable fit), *R-CFI* (near to .90 acceptable fit) and *TLI* (>.90 good fit) (Brown, 2006). Cronbach’s alpha coefficient and Omega coefficients (McDonald, 1999) were used to analyze reliability of each factor, with values higher than .70 considered as acceptable (Cho & Kim, 2015).

Subsequently, invariance analyses among China, Spain and the USA groups were performed through multi-group confirmatory factor analyses following the hierarchic method. The Robust Maximum Likelihood procedure was also used. To analyze the invariance of the model, firstly, the psychometric properties of the model were analyzed and, after that, restrictions to the preceding model were included. Thus, consistent with Dimitrov (2010), the first model (M0) analyzed configural invariance and did not include any restriction. Model 1 imposed equal factor loadings to M0. Model 2 imposed the equivalence of intercepts to Model 1. Model 3 imposed the equality of error variances and covariances to Model 2. Finally, Model 4 imposed equal factor variances and covariances to Model 2. In order to consider that nested models are invariant the following criteria need to be met: (a) values of goodness of fit indexes are acceptable; (b)  $\Delta S-B\chi^2$  is non-significant ( $p > .05$ ); and (c)  $\Delta R-CFI$  is higher than -.01.

If invariances are confirmed, latent means analyses would be performed comparing China, Spain, and the USA. In order to perform those analyses, one of the groups is set as the reference group and is fixed to 0 (here the reference group is Spain). The Critical Ratio (CR) is used to assess differences compared to the reference group, considering scores higher than 1.96 or lower than -1.96 as statistically significant (Tsaousis & Kazi, 2013). The magnitude of the differences was analyzed according to the typified mean difference, criteria stated by Cohen (1988).

## Results

### Descriptive Statistics and Reliability of Scores

For all the samples, Cronbach’s alpha coefficients were: .87 (FNE), .80 (SAD-New) and .73 (SAD-General), and Omega coefficients [95% CI] were: .87 [.86, .88] (FNE), .80 [.79, .81] (SAD-New) and .74 [.72, .75] (SAD-General). For the Chinese sample, Cronbach’s alpha coefficients were: .80 (FNE), .76 (SAD-New) and .59 (SAD-General), and Omega coefficients [95% CI] were: .79 [.75, .82] (FNE), .76 [.73, .80] (SAD-New) and .60 [.52, .65] (SAD-General). For the Spanish sample, Cronbach’s alpha coefficients were: .86 (FNE), .79 (SAD-New) and .73 (SAD-General), and Omega coefficients [95% CI] were: .86 [.84, .87] (FNE), .79 [.77, .81] (SAD-New) and .74 [.71, .77] (SAD-General). For the North-American sample, Cronbach’s alpha coefficients were: .89 (FNE), .82 (SAD-New) and .70 (SAD-General), and Omega coefficients [95% CI] were: .89 [.88, .91] (FNE), .83 [.80, .84] (SAD-New) and .70 [.67, .74] (SAD-General). The descriptive statistics for the items of the SAS-A, their factor loadings, and their discrimination indexes for the total sample and each country can be seen in Tables 1 and 2. A summary of this information across countries is as follows: China ( $M = 2.03, 3.44; SD = 1.02, 1.19$ ; Factor loadings = .323, .791; Discrimination indexes = .276, .660), Spain ( $M = 1.37, 2.81; SD = .73, 1.21$ ; Factor loadings = .390, .789; Discrimination indexes = .388, .735) and North America ( $M = 1.48, 2.86; SD = .82, 1.24$ ; Factor loadings = .405, .881;

Discrimination indexes = .394, .798). Regarding the correlations among factors, the following data were obtained: Total Sample (FNE and SAD-N = .666, FNE and SAD-G = .692, SAD-N and SAD-G = .747), Chinese Sample (FNE and SAD-N = .694, FNE

and SAD-G = .605, SAD-N and SAD-G = .723), Spanish Sample (FNE and SAD-N = .654, FNE and SAD-G = .623, SAD-N and SAD-G = .705) and North American Sample (FNE and SAD-N = .692, FNE and SAD-G = .694, SAD-N and SAD-G = .768).

*Table 1*  
Descriptive Statistics for Each Item of the SAS-A of the Three Countries and the Total Sample

Items	Mean				SD			
	China	Spain	USA	General	China	Spain	USA	General
1	2.66	2.80	2.59	2.70	1.12	1.05	1.04	1.07
3	3.10	2.81	2.31	2.71	1.12	1.15	1.14	1.18
4	3.06	2.75	2.86	2.85	1.13	1.15	1.18	1.16
5	2.85	2.23	2.57	2.48	1.19	1.10	1.24	1.19
6	2.58	2.30	2.32	2.37	1.05	1.06	1.11	1.08
8	3.44	2.80	2.49	2.84	1.06	1.21	1.19	1.22
9	3.08	2.38	2.14	2.45	1.17	1.05	1.13	1.16
10	2.81	2.32	2.30	2.42	1.19	1.07	1.10	1.13
12	2.85	2.74	2.23	2.60	1.11	1.20	1.11	1.18
13	2.70	2.34	2.38	2.43	1.06	1.13	1.10	1.11
14	2.96	2.58	2.02	2.48	1.10	1.20	1.04	1.18
15	2.98	2.30	2.32	2.46	1.08	1.05	1.13	1.12
17	2.47	1.87	1.77	1.97	1.02	.92	.90	.97
18	2.71	2.16	1.85	2.18	1.11	1.11	1.00	1.12
19	2.81	1.90	1.62	2.01	1.08	1.03	.93	1.10
20	2.94	2.31	2.47	2.50	1.05	.96	1.03	1.04
21	2.03	1.37	1.48	1.55	1.08	.73	.82	.89
22	2.45	1.85	1.83	1.98	1.14	.96	1.05	1.06

*Confirmatory Factor Analyses in China, Spain, and the USA*

The three-factor correlated model achieved adequate fit indexes values (*R-RMSEA* [90% CI] = .054 [.051, .057]; *SRMR* = .053; *RCFI* = .935; *TLI* = .923) for the total sample, composed by Chinese, Spanish, and North-American participants.

*Factorial Invariance Among Adolescents From China, Spain and the USA*

Table 3 includes data for the model in each country as well as configural, measurement, and structural invariance values. As shown, the model did not achieve an adequate fit in the Chinese population, as *TLI* and *R-CFI* are lower than .90. Furthermore, invariance analyses showed that the inclusion of restrictions (M1 and M2) made  $\Delta S-B\chi^2$  significant, despite the adequate fit of configural model (M0). Together, these data show the lack of invariance of the model among the three groups of adolescents (from China, Spain and the USA). However, because the model fit indexes were acceptable for Spain and the USA, invariance between those populations was checked.

*Confirmatory Factor Analysis in Spain and the USA*

Fit values for the total sample (composed by participants from Spain and the USA) were adequate (*R-RMSEA* [90% CI] = .054 [.050, .057]; *SRMR* = .055; *RCFI* = .934; *TLI* = .923). Cronbach's alpha coefficients were: .87 (FNE), .80 (SAD-New) and .71 (SAD-General).

*Table 2*  
Standardized factor loadings and discrimination indexes of the Chinese, Spanish and USA samples

Items	Factor loadings [Discrimination index]											
	China	Spain	USA	General	China	Spain	USA	General	China	Spain	USA	General
1					.323 [.276]	.550 [.452]	.522 [.450]	.458 [.388]				
3	.592 [.513]	.661 [.605]	.658 [.628]	.669 [.622]								
4					.716 [.609]	.683 [.610]	.688 [.652]	.683 [.628]				
5					.539 [.464]	.436 [.388]	.493 [.460]	.496 [.443]				
6	.332 [.350]	.390 [.404]	.405 [.415]	.389 [.400]								
8	.527 [.517]	.712 [.684]	.760 [.720]	.726 [.695]								
9	.642 [.562]	.722 [.658]	.866 [.790]	.778 [.708]								
10					.612 [.523]	.742 [.665]	.785 [.683]	.743 [.647]				
12	.593 [.498]	.765 [.735]	.808 [.773]	.740 [.705]								
13					.740 [.642]	.692 [.603]	.801 [.709]	.743 [.655]				
14	.791 [.660]	.784 [.700]	.881 [.798]	.825 [.744]								
15									.496 [.312]	.533 [.427]	.499 [.394]	.562 [.442]
17	.438 [.436]	.504 [.507]	.586 [.599]	.560 [.555]								
18	.586 [.511]	.607 [.531]	.616 [.567]	.643 [.576]								
19									.574 [.332]	.789 [.616]	.721 [.547]	.748 [.576]
20					.626 [.493]	.630 [.513]	.688 [.585]	.671 [.549]				
21									.472 [.389]	.500 [.428]	.610 [.515]	.574 [.493]
22									.488 [.466]	.757 [.624]	.658 [.524]	.675 [.584]

*Factorial Invariance Between Spain and the USA*

Table 4 shows configural, measurement, and structural invariance between Spain and the USA. The model showed adequate fit indexes despite subsequent constraints applied to the initial model (M0).

*Latent Mean Differences Between Spain and the USA*

In the analysis of latent means, adolescents from Spain was considered as the reference group (fixed to 0) and the USA data was freely estimated. Goodness of fit indexes of the model were appropriate ( $S-B\chi^2 = 1410.56$ ;  $df = 290$ ;  $R-CFI = .929$ ;  $TLI = .916$ ;

established three-factor correlated model in the three samples, consistent with previous studies with Chinese (Zhou et al., 2008), Spanish (Inglés et al., 2010) and North American (La Greca et al., 2015) adolescents. However, the first hypothesis was not supported because analyses failed to confirm measurement invariance across the three groups. These results potentially suggest a different interpretation of the construct of social anxiety in Chinese adolescents, compared to those in Spain and the USA. In addition, alpha and omega coefficients reached acceptable values for all SAS-A scales in the general population. However, scores on the SAD-General scale in Chinese adolescents were lower than .70, indicating a low internal consistency for this scale (in line with

*Table 3*  
Goodness-of-fit Indexes for SAS-A Models in China, Spain and the USA

	$\chi^2$	S-B $\chi^2$	df	TLI	R-CFI	R-RMSEA [90% CI]	SRMR	$\Delta S-B\chi^2$ ( $\Delta df, p$ )	$\Delta R-CFI$
China	685.409	495.440	130	.811	.840	.070 [.064, .077]	.076		
Spain	835.267	618.699	130	.907	.921	.057 [.052, .061]	.060		
USA	523.503	433.123	130	.935	.945	.052 [.047, .057]	.050		
M0	2044.228	1555.646	390	.902	.917	.034 [.032, .036]	.063		
M1	2192.345	1694.992	420	.901	.909	.034 [.032, .036]	.072	144.60 (30, < .01)	-.008
M2	3403.881	2809.739	456	.904	.919	.044 [.043, .046]	.131	4732.56 (36, < .01)	.010

*Note:* Model 0 = free model; Model 1 = Model 0 with factor loadings; Model 2 = Model 1 with intercepts; S-B $\chi^2$  = Satorra-Bentler  $\chi^2$  escalated; df = degrees of freedom; TLI = the Tucker-Lewis Index; R-CFI = robust comparative fit index; R-RMSEA = robust root mean square error of approximation; SRMR = standardized root mean square residual;  $\Delta R-CFI$  = robust comparative fit index difference test.  $\Delta S-B\chi^2 = \chi^2$  difference model comparison test

*Table 4*  
Goodness-of-fit Indexes for SAS-A Models in Spain and the USA

	$\chi^2$	S-B $\chi^2$	df	TLI	R-CFI	R-RMSEA [90% CI]	SRMR	$\Delta S-B\chi^2$ ( $\Delta df, p$ )	$\Delta R-CFI$
Spain	835.267	618.699	130	.907	.921	.057 [.052, .061]	.060		
USA	523.503	433.123	130	.935	.945	.052 [.047, .057]	.050		
M0	1358.779	1062.081	260	.919	.932	.039 [.036, .041]	.055		
M1	1382.117	1088.546	275	.922	.930	.038 [.036, .041]	.057	21.19 (15, .131)	-.002
M2	1400.338	1109.927	293	.920	.930	.038 [.036, .040]	.057	16.01 (18, .592)	.000
M3	1441.638	1128.049	313	.921	.930	.037 [.035, .040]	.058	27.20 (20, .130)	.000
M4	1411.145	1119.676	299	.921	.930	.038 [.036, .040]	.060	9.03 (6, .172)	.000

*Note:* Model 0 = free model; Model 1 = Model 0 with factor loadings; Model 2 = Model 1 with intercepts; Model 3 = Model 2 with error variances; Model 4 = Model 2 with factor variances and covariances; S-B $\chi^2$  = Satorra-Bentler  $\chi^2$  escalated; df = degrees of freedom; TLI = the Tucker-Lewis Index; R-CFI = robust comparative fit index; R-RMSEA = robust root mean square error of approximation; SRMR = standardized root mean square residual;  $\Delta R-CFI$  = robust comparative fit index difference test.  $\Delta S-B\chi^2 = \chi^2$  difference model comparison test

$R-RMSEA$  [90% CI] = .044 [.041, .046];  $SRMR = .061$ ). Table 5 shows that statistically significant differences were found between both groups in FNE and SAD-General. Adolescents from the USA reported significantly lower social anxiety scores than did adolescents from Spain, with small and insignificant effect sizes for FNE and SAD-General, respectively, according to Cohen’s criteria.

**Discussion**

The main aim of the study was to analyze the equivalence of scores on the SAS-A using structural equation modeling and to identify latent means differences of adolescent social anxiety in China, Spain, and the USA. Data showed an acceptable fit to the

*Table 5*  
Latent Mean Scores Between Spain and the USA in SAS-A

	FNE	SAD-New	SAD-General
Spain (reference)			
USA			
ME	-.367	.040	-.079
SE	.038	.028	.029
CR	-9.630*	1.470	-2.717*
d	.44	-	.12

*Note:* ME = Mean estimate; SE = Standard error; CR = Critical Ratio; d = effect size; FNE = Fear of Negative Evaluation; SAD-New = Social Avoidance and Distress in New Situations; SAD-General = Social Avoidance and Distress-General; \* = Statistically significant difference (>1.96 or <-1.96)

the adapted version; Zhou et al., 2008). A possible explanation of this finding is that western definitions of social anxiety include symptoms (e.g., shyness) that are considered as acceptable or normative in eastern cultures. It may be the case that some items of the SAS-A may not represent social anxiety symptomatology in China in the same ways they do in western countries, thereby contributing to the lack of model invariance among Chinese adolescents. Further examination of the social anxiety construct among Chinese adolescents would be important and desirable.

Furthermore, there are differences among disorders included in the Chinese Classification and Diagnostic Criteria of Mental Disorders (3<sup>rd</sup> ed.; CCMD-3; Chinese Society of Psychiatry, 2001) and those of western manuals, such as the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association, 2014) or the International Classification of Diseases (11<sup>th</sup> ed.; ICD- 11; WHO, 2019). The lack of an independent categorization of social anxiety disorder in the Chinese classification system makes difficult the consensus about symptoms or reactions that could integrate this complex emotional response in Chinese population. The present study points out the relevance of attending to the Chinese cultural context to improve the comprehension of social anxiety as a prerequisite for group comparisons.

Although the findings for Chinese adolescents differed, the invariance analyses between Spanish and North-American adolescent groups showed that the three-factor correlated model was equivalent in both populations. Thus, the three dimensions of FNE, SAD-New and SAD-General, identified in previous validation research in these countries, were also confirmed (Inderbitzen et al., 2004; Inderbitzen & Walters, 2000; Myers et al., 2002; Storch et al., 2004; La Greca & López, 1999; García-López et al., 2001; Inglés et al., 2010; Olivares et al., 2005). These data suggest that social anxiety, as measured by the SAS-A, is understood similarly across Spanish and North-American adolescents, which might reflect how individualism influences self-interpretation and the value of social interactions in western societies.

Regarding the second hypothesis, latent mean differences were analyzed only for Spanish and North-American samples and revealed significant differences between groups in FNE and SAD-General factors of social anxiety. Spanish adolescents received higher scores on these factors than North-American youth. Perhaps the greater emphasis on collectivism in Spanish culture could explain this finding, in that family attachment and sense of belonging are more salient. Thus, Spanish adolescents might be more fearful of not meeting the expectations of significant others or feel more pressured by the peer group. Those situations could contribute to high levels of fear of negative evaluations or discomfort in general social situations when not fitting the established standard (Ohannessian et al., 2017; Zhou et al., 2008).

The present study provides valuable information regarding differences in the social anxiety construct in Chinese, Spanish and

North-American adolescents. However, the study was performed using community samples, without considering clinical pathologies in participants. Attending to clinical information and including adolescents with SAD diagnoses would help to increase construct validity of SAS-A. Another limitation is that cultural characteristics of each country were not directly measured. However, previous studies have shown that the country of analysis is a crucial factor to assess the individualism-collectivism dimension, and thus, cultural differences among groups (Hofmann et al., 2010; Woody et al., 2015). The use of specific self-reported measures to assess individualism-collectivism has been questioned because of being influenced by culture (Chen et al., 2015) or by self-construal (Cross et al., 2011), as culture gives structure to behaviors without individual's consciousness of it (Morris et al., 2008). For that reason, Morris et al. proposed the analysis of interpersonal nets to understand social relations in social groups. Attending to such a perspective in future research and considering different cultural dimensions (i.e., power distance, uncertainty avoidance, and masculinity) will help to provide a more in-depth analysis of cross-cultural invariance among countries.

One of the main contributions of validation studies is to support the use of assessment tools in different population groups, not only for use in research studies but also to identify symptomatology and facilitate early intervention. In the research field, the present study has shown that scores on the SAS-A are valid for the assessment and comparison of the social anxiety construct in Spanish and North-American adolescents. In the applied area, the present results show that the SAS-A could be used as a screening questionnaire in educational contexts to identify those adolescents who need individual attention. Adolescents suffering from social anxiety rarely seek professional help, so it is difficult to identify them in clinical contexts. In that sense, La Greca et al. (2016) have adapted preventive programs (i.e., UTalk) for use with adolescents in educational settings, in order to identify those with social anxiety symptomatology and help them to manage it. Cultural group differences would help to identify the most representative features of social anxiety for a specific cultural group when planning interventions (Jankowska, 2019). Thus, it would be useful to focus on specific contents in cognitive restructuring (e.g., to work more in depth on the relevance of significant-others' opinions) or exhibition to fear situations (e.g., to include situations where adolescents have to show opinions contrary to the reference group).

Our results indicate that the social anxiety construct is not conceived similarly in China as in western countries. Thus, the manifestation of social anxiety symptomatology and its intensity may be influenced by cultural values and social norms. That finding highlights the use of sound validated measures, like the SAS-A, to improve efficacy of social anxiety programs in clinical and educational areas attending to cultural differences.

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