Article

Validity and Reliability Evidence and Norms for the Spanish Version of the Sexual Inhibition/Sexual Excitation Scales-Short Form

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ABSTRACT

Background: The Sexual Inhibition/Sexual Excitation Scales-Short Form (SIS/SES-SF) is a brief instrument for assessing the propensity for sexual excitement and inhibition in men and women. The aim of the present study was to provide evidence for the validity and reliability of the Spanish version of the SIS/SES-SF scores by examining invariance, reliability (information function and internal consistency), the relationship between the scores and sexual functioning, and presenting its standard scores. **Method:** A total of 2,223 Spanish heterosexuals (43.41% men and 56.59% women) aged 18 to 83 years (*M* = 39.94, *SD* = 11.95), distributed across age groups (18-34, 35-49, ≥ 50 years old) participated. **Results:** The three-factor structure of the Spanish version of SIS/SES-SF showed weak measurement invariance by sex and strict measurement invariance by age. The scores explained the dimensions of sexual functioning, especially sexual arousal and erection/lubrication. In addition, men and women without difficulties in sexual functioning demonstrated more propensity for sexual excitation and less sexual inhibition. The standard scores are presented by sex and age group. **Conclusions:** The study provides evidence of the validity and reliability of the SIS/SES-SF measures, confirming its usefulness for assessing propensity to sexual excitation and inhibition.

Evidencias de Validez y Fiabilidad y Baremos de la Versión Española de las Sexual Inhibition/Sexual Excitation Scales-Short Form

RESUMEN

Antecedentes: Las Sexual Inhibition/Sexual Excitation Scales-Short Form (SIS/SES-SF) son un instrumento breve que evalúa, en hombres y mujeres, la propensión hacia la excitación e inhibición sexual. El objetivo fue aportar evidencias de validez y fiabilidad a las puntuaciones de la versión española de SIS/SES-SF, examinando la invarianza, la fiabilidad (función de información y consistencia interna), la relación de sus puntuaciones con el funcionamiento sexual, y presentar sus puntuaciones estandarizadas. **Método:** Participaron 2.223 españoles heterosexuales (43,41% hombres y 56,59% mujeres) de 18 a 83 años (*M* = 39,94; *DT* = 11,95), distribuidos en tres grupos de edad (18-34, 35-49, ≥ 50 años). **Resultados:** La estructura trifactorial de la versión española de SIS/SES-SF mostró nivel de invarianza débil por sexo y estricto por edad. Sus puntuaciones explicaron las dimensiones del funcionamiento sexual, especialmente excitación sexual y erección/lubricación. Además, hombres y mujeres sin dificultades en el funcionamiento sexual mostraron más propensión a la excitación sexual y menor inhibición sexual. Se presentan baremos de sus puntuaciones por sexo y grupos de edad. **Conclusiones:** Se aportan adecuadas evidencias de validez y fiabilidad a las medidas de SIS/SES-SF, lo que confirma la utilidad de este instrumento para evaluar la propensión a la excitación e inhibición sexual.

The Dual Control Model (DCM) is a theoretical model which states that the sexual response is the result of the balance of two relatively independent systems: sexual excitatory and sexual inhibitory systems (Bancroft, 1999; Bancroft et al., 2009; Bancroft & Janssen, 2000). An essential feature of this model is individual variability, insofar as individuals are distributed along a continuum of propensity toward sexual arousal (i.e., sexual excitation) or inhibition. Loss of balance between the two systems can lead to maladaptive or dysfunctional sexual behaviors. This means that people with high propensity for sexual excitation and low sexual inhibition could engage in risky sexual behaviors (Retteberger et al., 2016; van Lankveld et al., 2014), whereas those with low propensity for sexual excitation and high propensity for sexual inhibition would be candidates for experiencing difficulties in sexual functioning (Bancroft et al., 2009; Saavedra-Roa & Vallejo-Medina, 2020; Velten et al., 2018). A high level of sexual inhibition is known to be associated with low sexual desire (Bancroft, 1999; Bancroft, Herbenick et al., 2005; Prause et al., 2008), erection problems (Bancroft, Carnes et al., 2005; Bancroft & Janssen, 2000; Quinta-Gomes et al., 2022; Saavedra-Roa & Vallejo-Medina, 2020), premature ejaculation (Bancroft, 1999; Ventus & Jern, 2021), orgasm difficulties (Tavares et al., 2018) and less intensity in the subjective orgasm experience (Arcos-Romero & Sierra, 2020; Cervilla et al., 2022).

Based on the DCM, to assess propensity for sexual inhibition/ excitation, the Sexual Inhibition/Sexual Excitation Scales (SIS/SES) were developed for men (Janssen et al., 2002) and women (Carpenter et al., 2008). Subsequently, Carpenter et al. (2011) developed a shorter equivalent version for both sexes: the Sexual Inhibition/Sexual Excitation Scales-Short Form (SIS/SES-SF). The SIS/SES-SF is made up of 14 items, which form three relatively independent subscales: Sexual excitation (SES; e.g., "When a sexually attractive stranger accidentally touches me, I easily become aroused"); Sexual inhibition due to threat of performance failure (SIS1; e.g., "I cannot get aroused unless I focus exclusively on sexual stimulation"); Sexual inhibition due to threat of performance consequences (SIS2; e.g., "If I am having sex in a secluded outdoor place and I think that someone is nearby, I am not likely to get very aroused"). This short version has been validated in different countries, such as Spain (Moyano & Sierra, 2014), Germany (Rettenberger et al., 2019), Colombia (Saavedra-Roa & Vallejo-Medina, 2020), and Canada (Nolet et al., 2021). All these validations of the SIS/SES-SF have shown strong evidence of a three-dimensional structure, confirming that the SIS/SES-SF measures the same construct postulated by the DCM (see Janssen & Bancroft, 2023). In the case of Spain, the three factors explained 48.47% of the variance (Moyano & Sierra, 2014). In all the mentioned versions, the estimation of the reliability of the scores provided acceptable coefficients.

The Spanish version, validated in both Spain (Moyano & Sierra, 2014) and Colombia (Saavedra-Roa & Vallejo-Medina, 2020), has shown adequate psychometric properties. In both these countries, the three-factor structure presented good adjustment, and was invariant by sex in the Colombian population. The internal consistency reliability coefficients were acceptable, but somewhat lower in scores of SIS2 than scores of SES and SIS1. In the Colombian validation was observed correlations of

sexual functioning with SES in a positive sense with SIS1 and in a negative sense with SIS2 (Saavedra-Roa & Vallejo-Medina, 2020). In the Spanish validation, SES is associated with subjective sexual arousal to sexual stimuli, while SIS1 showed diagnostic capacity regarding sexual functioning (Sierra et al., 2019).

For all the above reasons, the SIS/SES-SF is presented as a useful instrument in clinical sexological evaluations. The main goal of this study is to provide more validity evidence to scores of the Spanish version of the SIS/SES-SF. To do so, by taking the recommendations of use for this study type (Hernández et al., 2016; Muñiz & Fonseca-Pedrero, 2019; Sireci & Benítez, 2023), we proposed the following specific objectives: (1) examine measurement invariance by sex and age; (2) examine reliability; (3) examine the explanatory capacity SES, SIS1 and SIS2 scores on the sexual functioning dimensions; (4) compare SES, SIS1 and SIS2 scores between people with and without difficulties in sexual functioning; (5) present the standard SIS/SES-SF scores. Based on previous studies, we hypothesized that: (1) SIS/SES-SF will appear as an invariant measure by sex and age; (2) SES in a positive sense, and SIS1 and SIS2 in a negative sense, would have the capacity to explain a significant percentage of the variance of sexual functioning; (3) compared to the people with sexual functioning difficulties, those without difficulties would score higher on SES and lower on SIS1 and SIS2.

Method

Participants

First, a non-probabilistic sampling by age quotas was carried out (18-34 years old; $n = 718$; 35-49 years old; $n = 889$; and 50 years old or older; $n = 616$). The total sample was composed of 2,223 participants (43.41% men and 56.59% women) whose age range went from 18 to 83 years. The inclusion criteria were: (a) having Spanish nationality; (b) being sexually active when participating in the study; (c) having heterosexual orientation. Table 1 presents the participants' socio-demographic characteristics.

Table 1
Sociodemographic Characteristics of the Participants

Variables	Total $N = 2,223$	Men $n = 965$	Women $n = 1,258$
Age M (SD)	39.94 (11.95)	41.17 (12.57)	39 (11.36)
Educational level n (%)			
Primary education	126 (5.90)	57 (6.10)	69 (5.70)
Secondary education	740 (34.60)	349 (37.20)	391 (32.50)
University degree (ongoing or completed)	1,275 (59.60)	532 (56.60)	743 (61.80)
Partner n (%)			
Yes	1,799 (80.90)	825 (85.50)	974 (77.40)
No	424 (19.10)	140 (14.50)	284 (22.60)
Age of first sexual experience M (SD)	17.66 (3.30)	17.89 (3.48)	17.48 (3.15)
Number of sexual partners M (SD)	11.76 (19.02)	12.20 (23.27)	11.43 (14.97)

Instruments

Socio-Demographic and Sexual History Questionnaire. It includes information about sex, age, level of education, nationality, sexual orientation, relationship status, age when first sexual intercourse occurred and number of sexual partners.

Spanish Version of the Sexual Inhibition/Excitation Scales-Short Form (SIS/SES-SF; Carpenter et al., 2011; Moyano & Sierra, 2014). Its 14 items, distributed on the three SES, SIS1 and SIS2 subscales described in the Introduction, are answered on a 4-point Likert scale (1 = *strongly agree*; 4 = *strongly disagree*). Higher scores indicate higher propensity for sexual excitation/inhibition. The scores of the Spanish version showed adequate internal consistency reliability indices, with Cronbach's alpha values of .72 for SES, .69 for SIS1, and .60 for SIS2 in men; in women the values were: .71 for SES, .64 for SIS1, and .62 for SIS2.

Spanish Version of the Arizona Sexual Experience Scale (ASEX; McGahuey et al., 2000; Sánchez-Fuentes et al., 2019). It consists of five items that assess sexual desire, sexual arousal, erection (for men), vaginal lubrication (for women), ability to reach orgasm, and satisfaction with orgasm. It is answered on a 6-point Likert scale (1 = *hyperfunction*; 6 = *hypofunction*), with higher scores indicating poorer sexual functioning. In the present study, ordinal alphas of .71 for men and .72 for women were obtained.

Procedure

The questionnaire battery was created using the Limesurvey® software (Limesurvey GmbH Hamburg, Germany) and the access link was distributed through virtual platforms (Facebook®, Twitter®, WhatsApp® and email distribution lists). To access the battery, the participants were asked to answer a random number of questions to avoid automatic answers. Then they had to read the informed consent form and confirm whether or not they agreed to participate in the study. Responses were anonymous to, thus, guarantee the privacy of the collected data. The participants were volunteers and did not receive any compensation for their participation. To rule out anomalous or inconsistent responses, three control items were included throughout the survey, and response patterns were thoroughly examined. The study was approved by the Ethics Committee on Human Research of the University of Granada (Ref. No. 682/CEIH/2018).

Data Analysis

Missing values were first imputed using an algorithm based on decision trees. Next the factorial invariance of the SIS/SES-SF was examined by sex and age group (18-34, 35-49, ≥ 50 years old) using the factor structure proposed by Moyano and Sierra (2014). As the items do not meet assumptions of normality, the MLR estimator was employed (Savalei & Rosseel, 2022), which has also been utilized in previous invariance analyses of this instrument (Rettenberger et al., 2019). The MLR estimation method, with a chi-square adjustment of the mean, was followed. Root mean squared error of approximation (RMSEA) values below .06, and comparative fit index (CFI) and Tucker-Lewis index (TLI) values above .90 evidence good fits. The CFI was considered to be the main invariance fit index to accept its levels: Configural, Weak, Strong and Strict (Milfont & Fischer, 2010; Putnick & Bornstein, 2016). A change in the CFI that equals or exceeds .01 is believed to adopt the less limited model and to reject the most restrictive one. For each dimension, the Test Information Function was calculated to provide the degree of measurement precision for each level of the latent trait. More information on the test is associated with lower measurement error of the latent trait (Hambleton et al., 2004). Next multiple linear regression models were performed by the Intro Method to explain the sexual functioning dimensions (i.e., desire, arousal, erection/lubrication, ability to reach orgasm, satisfaction with orgasm) from the SIS/SES-SF scores by including age as a covariate. Finally for each sexual functioning dimension, two groups that were equal in number of cases and age were organized: (1) without difficulties (i.e., scores equaling or below 4 on the dimension); (2) with difficulties (i.e., scores equaling or below 5 on the dimension). Both groups (i.e., without and with difficulties) were compared in SES, SIS1 and SIS2 by the Mann-Whitney U test. For missing values imputations, the missForest package was used (version 1.4; Stekhoven & Bühlmann, 2012) in the R® program (version 3.6.3) (R Core Team, 2020) with its RStudio® interface (version 1.2.5042) (RStudio Team, 2020). For the invariance analyses, the lavaan package (version 0.6-15; Rosseel, 2012) was applied, with the ltm package (version 1.2-0; Rizopoulos, 2006) for the Test Information Function, and psych package (version 2.1.9; Revelle, 2019) for McDonald's Omega coefficient. The other analyses were performed with SPSS v.20.

Results

Measurement Invariance Across Sex and Age

The results showed weak measurement invariance across sex [RMSEA = .054 (.050, .059); CFI = .925] and strict measurement invariance across the age range [RMSEA = .054 (.049, .058); CFI = .914]. The fit indices and invariance indicators for the three-dimensional model of SIS/SES-SF are shown in Table 2.

Reliability: Test Information Function

The Test Information Function of the three SIS/SES-SF subscales (Figure 1) gave values above 5 points for SES and SIS2, and a value of 3.4 for SIS1. The stablest measurements fluctuated from -2 to +1 for SES, from -1 to +2 for SIS1, and between -1 and +1 for SIS2. The values located above or below them suggest that the results may be more prone to errors.

Prediction of Sexual Functioning

In men, sexual desire was explained (R^2 = .09) by SES (β = -.20), SIS1 (β = .18) and SIS2 (β = .08); sexual arousal (R^2 = .14) by SES (β = -.29), SIS1 (β = .16) and SIS2 (β = .09); erection (R^2 = .27) by age (β = .24), SES (β = -.08) and SIS1 (β = .40); ability to reach orgasm (R^2 = .03) by SES (β = -.10) and SIS1 (β = .14); satisfaction with orgasm (R^2 = .04) by SIS1 (β = .20). These results are presented in Table 3.

In women, sexual desire (R^2 = .09) was explained by SES (β = -.30) and SIS1 (β = .23); sexual arousal (R^2 = .16) by SES (β = -.31)

and SIS1 (β = .24); lubrication (R^2 = .09) by SES (β = -.19) and SIS1 (β = .22); ability to reach orgasm (R^2 = .09) by age (β = -.13), SES (β = -.15) and SIS1 (β = .24); satisfaction with orgasm (R2 = .07) by age, (β = -.09), SES (β = -.14) and SIS1 (β = .21). These results are presented in Table 3.

## Comparison of People With and Without Difficulties in Sexual Functioning

Significant differences in the SES, SIS1 and SIS2 scores were observed between the groups of participants with and without difficulties on the sexual functioning dimensions, which were more consistent for women, for whom differences were found in all the comparisons (see Table 4).

Standard Scores

Finally, the norms of the Spanish Sexual Inhibition/Sexual Excitation Scales Short-Form were calculated. Considering the subjective perception of adulthood status proposed by Arnett (2000) and the distributions made on similar scales (Sierra et al., 2020), the norms were divided into three age groups (18-34, 35-49, and 50 years old or older). Table 5 and 6 present the standard scores differentiated by sex and age.

Figure 1
Information Functions for SES, SIS1 and SIS2 Subscales
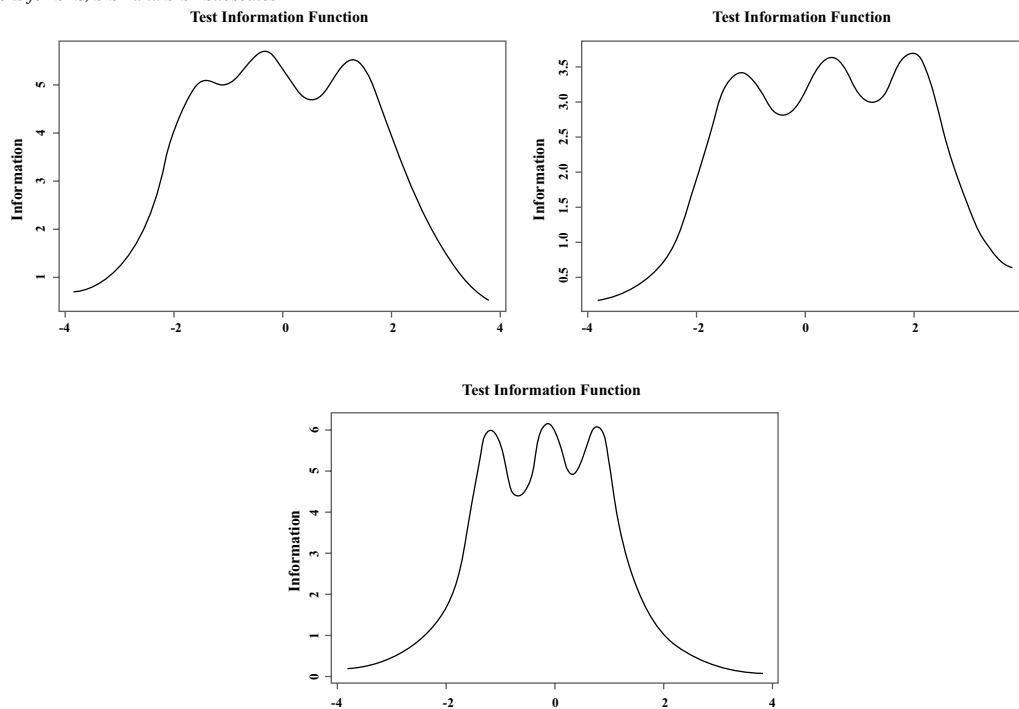
Table 2
Measurement Invariance Across Sex and Age

Model	χ^2	df	p	CFI	TLI	RMSEA	RMSEA 90% CI	ΔCFI
Sex (men, women)								
Configural	590.11	148	< .001	.928	.911	.056	.051, .060	
Weak	613.30	159	< .001	.925	.915	.054	.050, .059	-.003
Strong	786.88	170	< .001	.900	.893	.061	.057, .065	-.025
Strict	858.65	184	< .001	.889	.891	.062	.058, .066	.011
Age (18-34, 35-49, $\geq$ 50 years old)								
Configural	679.96	222	< .001	.929	.912	.056	.051, .061	
Weak	709.36	244	< .001	.927	.919	.054	.050, .059	.002
Strong	789.86	266	< .001	.919	.917	.055	.050, .059	.008
Strict	843.32	294	< .001	.914	.920	.054	.049, .058	.005

Note. CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; ΔCFI = Difference of CFI-values.

Table 3

Multiple Regression Models for Sexual Functioning in Men and Women

Predictors	Men								Women							
	B	*SE*	β	*95% CI*	*t*	*p*	*R²*	VIF	*B*	*SE*	β	*95% CI*	*t*	*p*	*R²*	VIF
Sexual desire							.09								.09	
Age	0.00	0.00	-.01	-0.01, 0.00	-0.26	.794			0.01	0.00	.05	0.00, 0.01	1.80	.072		1.01
SES	-0.06	0.01	-.20	-0.08, -0.04	-6.42	< .001		1.05	-0.11	0.01	-.30	-0.12, -0.09	-11.08	< .001		1.10
SIS1	0.08	0.01	.18	0.05, 0.10	5.47	< .001		1.18	0.12	0.01	.23	0.09, 0.15	8.34	< .001		1.14
SIS2	0.03	0.01	.08	0.00, 0.05	2.25	.025		1.18	0.02	0.01	.04	-0.01, 0.05	1.49	.136		1.23
Sexual arousal							.14								.16	
Age	0.00	0.00	.04	0.00, 0.01	1.17	.242		1.05	0.00	0.00	.03	0.00, 0.01	0.96	.340		1.01
SES	-0.08	0.01	-.29	-0.10, -0.06	-9.38	< .001		1.05	-0.10	0.01	-.31	-0.12, -0.09	-11.26	< .001		1.10
SIS1	0.06	0.01	.16	0.04, 0.09	4.86	< .001		1.18	0.12	0.01	.24	0.09, 0.15	8.52	< .001		1.14
SIS2	0.03	0.01	.09	0.01, 0.05	2.76	.006		1.18	0.00	0.01	.01	-0.02, 0.03	0.25	.801		1.23
Erection (men) lubrication (women)							.27								.09	
Age	0.02	0.00	.24	0.01, 0.02	8.29	< .001		1.06	0.02	0.00	.01	0.00, 0.01	0.34	.738		1.01
SES	-0.03	0.01	-.08	-0.04, -0.01	-2.89	.004		1.04	-0.06	0.01	-.19	-0.08, -0.04	-6.55	.004		1.10
SIS1	0.18	0.01	.40	0.15, 0.21	13.43	< .001		1.18	0.11	0.01	.22	0.08, 0.14	7.73	< .001		1.14
SIS2	0.01	0.01	.02	-0.14, 0.03	0.77	.443		1.18	0.01	0.01	.02	-0.02, 0.03	0.52	.605		1.23
Orgasm ability							.03								.09	
Age	0.00	0.00	.02	0.00, 0.01	0.53	.594		1.05	-0.01	0.00	-.13	-0.02, -0.01	-4.81	< .001		1.01
SES	-0.03	0.01	-.10	-0.05, -0.01	-3.06	.002		1.05	-0.06	0.01	-.15	-0.08, -0.04	-5.37	.002		1.10
SIS1	0.06	0.02	.14	0.03, 0.09	3.96	< .001		1.18	0.13	0.02	.24	0.10, 0.16	8.31	< .001		1.14
SIS2	-0.00	0.01	.00	-0.03, 0.02	-0.10	.922		1.18	0.00	0.01	.01	-0.03, 0.03	0.22	.825		1.23
Orgasm satisfaction							.04								.07	
Age	0.00	0.01	-.04	-0.01, 0.00	-1.15	.251		1.05	-0.01	0.00	-.09	-0.02, 0.00	-3.31	.001		1.01
SES	-0.02	0.01	-.05	-0.03, 0.00	-1.58	.114		1.05	-0.05	0.01	-.14	-0.07, -0.03	-4.83	< .001		1.10
SIS1	0.08	0.01	.20	0.05, 0.11	5.72	< .001		1.18	0.11	0.02	.21	0.08, 0.14	7.40	< .001		1.14
SIS2	0.00	0.01	-.01	-0.03, 0.02	-0.17	.867		1.18	0.01	0.01	.02	-0.02, 0.03	0.49	.627		1.23

Notes. B: non-standardized beta; *SE:* standard error; β: standardized beta; 95% IC: 95% confidence interval. VIF: Variance inflation factor. SES: Sexual excitation; SIS1: Sexual inhibition due to threat of performance failure; SIS2: Sexual inhibition due to the threat of performance consequences of sexual activity.

Table 4

Comparisons Without and With Difficulties in Sexual Functioning

Variables M (SD)	Men					Women				
	Functional	Dysfunctional	*U*	*p*	*d*	Functional	Dysfunctional	*U*	*p*	Cohen's *d*
Sexual desire	*n* = 22	*n* = 22				*n* = 115	*n* = 115			
SES	18.18 (3.02)	14.86 (3.60)	134.50	.011	0.99	15.88 (3.52)	13.03 (2.96)	3,606	< .001	0.88
SIS1	7.95 (2.54)	8.82 (2.13)	185	.176	-	8.08 (2.15)	10.36 (2.37)	3,135	< .001	1.00
SIS2	11.23 (2.88)	11.50 (3.39)	221	.620	-	11.44 (2.49)	13.10 (2.53)	4,008.50	< .001	0.66
Sexual arousal	*n* = 26	*n* = 26				*n* = 112	*n* = 112			
SES	17.92 (2.90)	13.77 (3.66)	131.50	< .001	0.21	16.59 (3.42)	13.13 (3.12)	2,925.50	< .001	0.42
SIS1	7.96 (2.44)	8.92 (2.92)	271	.216	-	8.16 (2.26)	10.28 (2.52)	3,368.50	< .001	0.08
SIS2	10.15 (2.74)	11.73 (3.01)	229.50	.046	0.36	11.17 (2.65)	12.73 (2.61)	4,160	< .001	0.38
Erection (men) lubrication (women)	*n* = 14	*n* = 14				*n* = 56	*n* = 56			
SES	16.07 (3.71)	14.57 (3.32)	73	.265	-	15.16 (3.25)	13.39 (3.26)	1,087.50	.005	0.54
SIS1	8.07 (2.87)	10.57 (2.38)	52.50	.035	0.95	8.73 (2.10)	10.34 (2.77)	988.50	.001	0.66
SIS2	12.07 (3.25)	11.57 (3.72)	91.50	.769	-	11.02 (2.55)	12.75 (2.48)	972	< .001	0.69
Orgasm ability	*n* = 24	*n* = 24				*n* = 105	*n* = 105			
SES	16.67 (2.93)	16.08 (3.63)	272.50	.748	-	15.54 (3.16)	14.09 (3.42)	4,307,50	.006	0.44
SIS1	7.88 (2.46)	9.16 (1.83)	191	.043	0.59	8.06 (2.11)	9.99 (2.71)	3,106,50	< .001	0.79
SIS2	10.46 (2.50)	11.33 (3.33)	235.50	.276	-	11.49 (2.55)	12.39 (2.61)	4,368.50	.009	0.35
Orgasm satisfaction	*n* = 26	*n* = 26				*n* = 75	*n* = 75			
SES	16.73 (3.26)	15.88 (3.22)	302	.508	-	15.52 (2.73)	13.41 (3.31)	1,824	< .001	0.70
SIS1	8.03 (2.55)	8.85 (2.01)	245	.085	-	8.47 (1.84)	10.07 (2.67)	1,747	< .001	0.70
SIS2	10.23 (2.97)	10.73 (3.08)	309	.593	-	11.40 (2.47)	12.76 (2.30)	1,947	.001	0.60

Notes. SES: Sexual excitation; SIS1: Sexual inhibition due to threat of performance failure; SIS2: Sexual inhibition due to the threat of performance consequences of sexual activity.

Table 5
Standard Scores of the SIS/SES-SF in Men of Different Age Groups

	Men											
	18 – 34 years				35 – 49 years				≥ 50 years			
	SES	SIS1	SIS2		SES	SIS1	SIS2		SES	SIS1	SIS2	
Ordinal α	.84	.73	.74		.83	.71	.66		.85	.70	.72	
McDonald's Omega	.83	.75	.75		.85	.67	.68		.86	.68	.73	
M	16.07	7.65	10.68		16.67	7.86	10.52		16.60	8.72	11.27	
SD	3.24	2.29	2.65		3.13	2.03	2.44		3.18	2.10	2.58	
Min	6	4	4		8	4	4		6	4	4	
Max	24	16	16		24	15	16		24	14	16	
Percentile												Percentile
99	23	15	12	24	12.44	12	23.07	13	12	23	15	99
95	21	12	11	22	11	11	22	12	12	21	12	95
90	20	10	10	21	10	10	21	12	11	20	10	90
85	19	10	10	20	10	9	20	11	10	19	10	85
80	19	9	9	19	10	9	19	11	10	19	9	80
75	18	9	9	19	9	9	19	10	9	18	9	75
70	18	8.1	9	18	9	8	18	10	9	18	8.1	70
65	17	8	8	18	8.4	8	18	10	9	17	8	65
60	17	8	8	18	8	8	17	9	9	17	8	60
55	17	8	8	17	8	7	17	9	8	17	8	55
50	16	8	7	17	8	7	17	9	8	16	8	50
45	16	7	7	16	8	7	16	8	8	16	7	45
40	15	7	7	16	8	6	16	8	7	15	7	40
35	15	7	6	15	7	6	16	8	7	15	7	35
30	14	6	6	15	7	6	15	8	7	14	6	30
25	14	6	6	15	6	6	15	7	6	14	6	25
20	13	6	6	14	6	5	14	7	6	13	6	20
15	13	5	5	13	6	5	13	7	5	13	5	15
10	12	5	4	13	5	4	13	6	5	12	5	10
5	10	4	3	12	4	3	11	5	4	10	4	5
1	8	4	3	9	4	3	8	4	3	8	4	1

Note. SES: Sexual excitation; SIS1: Sexual inhibition due to threat of performance failure; SIS2: Sexual inhibition due to the threat of performance consequences of sexual activity.

Discussion

The DCM enables the sexual response to be explained from the sexual excitation and inhibition dimensions (Bancroft et al., 2009; Bancroft & Janssen, 2000; Velten et al., 2017), which is why it is useful for understanding sexual dysfunctions (Bancroft, Carnes et al., 2005; Bancroft, Herbenick et al., 2005; Bancroft & Janssen, 2000; Janssen et al., 2002; Moyano & Sierra, 2014; Sanders et al., 2008; Sierra et al., 2019). The existence of a relatively independent inhibitory and excitatory system together provides double control over the sexual response and associated behaviors (Bancroft & Janssen, 2000; Janssen & Bancroft, 2007). Low sexual excitation levels and high sexual inhibition levels are expected to be associated with a greater probability of developing sexual dysfunction.

Among the different instruments developed to assess the DCM dimensions (see Graham et al., 2006; Janssen et al., 2020; Milhausen et al., 2010), the SIS/SES-SF scales stand out for their brevity (Carpenter et al., 2011). To provide psychometric endorsement for the Spanish version of the SIS/SES-SF by Moyano and Sierra (2014), this research was carried out, in which the reliability of the scores was examined from the perspectives of the Item Response Theory (IRT); the invariance of its mea-surement by sex and age; the relation of its SES, SIS1 and SIS2 subscales with sexual functioning (i.e., arousal erection for men/lubrication for women; sexual desire, sexual ability to reach orgasm, and satisfaction with orgasm).

Table 6
Standard Scores of the SIS/SES-SF in Women of Different Age Groups

	Women										
	18 – 34 years				**35 – 49 years**				**≥ 50 years**		
	SES	**SIS1**	**SIS2**		**SES**	**SIS1**	**SIS2**		**SES**	**SIS1**	**SIS2**
Ordinal α	.78	.74	.67		.85	.66	.69		.83	.71	.76
McDonald's Omega	.81	.72	.66		.86	.67	.69		.85	.71	.74
M	15.27	8.79	11.89		15.34	8.77	11.60		14.86	9.28	12.18
SD	2.99	2.27	2.44		3.51	2.18	2.54		3.37	2.25	2.61
Min	8	4	5		7	4	4		6	4	4
Max	24	16	16		24	16	16		24	16	16
Percentile									14	Percentile	
99	22	14	12	23	15	12	22	15	12	22	12.85	99
95	20	12.85	12	21.45	12	12	20.95	13	12	20	12	95
90	19	12	11	20	12	11	19	12	12	19	11	90
85	18	11	11	19	11	11	18	12	11	18	11	85
80	18	11	10	18	10	10	18	11	11	18	10	80
75	17	10	10	18	10	10	17	11	10	17	10	75
70	17	10	10	17	10	9	17	10	10	17	10	70
65	16	10	9	17	9	9	16	10	10	16	9	65
60	16	9	9	16	9	9	16	10	9	16	9	60
55	16	9	9	16	9	8	15	9.55	9	16	9	55
50	15	9	9	15	9	8	15	9	9	15	8	50
45	15	8	8	15	8	8	14	9	9	15	8	45
40	14.2	8	8	14	8	7	14	9	8	14.2	8	40
35	14	8	8	14	8	7	14	8	8	14	7	35
30	14	7	7	14	8	7	13	8	7	14	7	30
25	13	7	7	13	7	6	13	8	7	13	7	25
20	13	7	6	12	7	6	12	8	7	13	7	20
15	12	7	6	12	7	6	11	7	6	12	6	15
10	11.3	6	5	11	6	5	10	7	5	11.3	5	10
5	10	5	4	10	5	4	9	6	4	10	4	5
1	9	4	3	8	4	3	8.21	4	3	9	14	1

Note. SES: Sexual excitation; SIS1: Sexual inhibition due to threat of performance failure; SIS2: Sexual inhibition due to the threat of performance consequences of sexual activity.

Regarding the reliability of the IRT, it has been established at which excitation and inhibition levels the SES, SIS1 and SIS2 subscales are more precise. To do so, the information functions of each subscale were calculated for the excitation and inhibition intervals located between the ± 4 theta units. When observing the shape of functions (see Figure 1), the subscales were more precise when evaluating the mean ranges of SES, SIS1 and SIS2; that is, very low or high scores present more errors. Similar behavior has been found with other sexuality scales, such as the Hurlbert Index of Sexual Fantasy, which evaluates positive attitude toward sexual fantasies (Sierra et al., 2020), with evidence for the reliability of its measurement by showing that the amplitude of the range of values with accurate scores is adequate.

For the analysis of invariance, the SIS/SES-SF measures were strictly equivalent by age group, which coincides with that reported by Velten et al. (2018) for the German version. This fact allows comparisons to be made between different age ranges with a minimal measurement bias (Dimitrov, 2010; Muñiz et al., 2013; Muñiz & Fonseca-Pedrero, 2019). Concerning invariance by sex, the Spanish version of the SIS/SES-SF reached only the weak level, which indicates that the three-factor structure and factor loadings can be accepted as equal for men and women. These results coincide with those reported by Rettenberger et al. (2019). Unlike invariance by age, invariance by sex has been examined in most SIS/SES-SF adaptations to different countries, and distinct results have been obtained about the equivalence of the measurement between men and women. In the Colombian (Saavedra-Roa & Vallejo-Medina, 2020) and German (Velten et al., 2018) samples, invariance was strict, but only invariance of configural measure was supported in the French-Canadian version (Nolet et al., 2021). This should make us cautious when comparing the scores obtained with the SIS/SES-SF between men and women to make sure that possible differences are not due to biases of the measurement itself. As for the validity evidence based on the relation of SIS/SES-SF

scores with sexual functioning, and in line with the formulated hypotheses, the results showed that the scores of its subscales are associated with the sexual response components.

The SES subscale scores (i.e., propensity to sexual excitation) were negatively associated with the scores for sexual desire, sexual arousal, erection, and ability to reach orgasm in men, and with those for sexual desire, sexual arousal, lubrication, ability to reach orgasm and satisfaction with orgasm in women. Note that, in the sexual functioning evaluation using the ASEX, a higher score means worse sexual functioning. That is, the higher the excitatory system level, the greater the sexual desire, sexual arousal, ability to reach orgasm and satisfaction with orgasm. In addition, SES showed the ability to discriminate between men with and without difficulties in sexual desire and arousal insofar as those who present problems in these functioning components reported less intensity of the excitatory system. With women, this distinction was much more evident: compared to the women without sexual difficulties, those with difficulties on all the sexual functioning dimensions obtained lower scores on SES. This positive association of SES with adequate sexual functioning is a result that coincides with previous works in the literature (Hodgson et al., 2016; Moyano & Sierra, 2014; Nolet et al., 2021; Saavedra-Roa & Vallejo-Medina, 2020; Velten et al., 2018).

SIS1 (i.e., sexual inhibition due to threat of performance failure), a dimension of the sexual inhibition system proposed by the DCM, was a significant predictor of having difficulties for all the sexual functioning components, and for both men and women. Thus, inhibition due to threat of performance failure was associated with more problems in the sexual response, a fact that was clearly observed in women when comparing those with sexual difficulties to those without them. With men, the negative effect of SIS1 on sexual functioning was evident on erection, as other studies have shown (Bancroft & Janssen, 2000; Bancroft et al., 2009; Quinta-Gomes et al., 2022; Saito et al., 2022). This finding reveals that performance anxiety (or the spectator role), which many dysfunctional men adopt during their sexual activity, negatively affects their erectile capacity (LoPiccolo, 1992; Rosen et al. al., 2014; Telch & Pujols, 2013). The results obtained with SIS1 generally fall in line with other studies that have examined its effects on the sexual response (Moyano & Sierra, 2014; Nolet et al., 2021; Quinta-Gomes et al., 2018; Saavedra-Roa & Vallejo-Medina, 2020; Sierra et al., 2019; Velten et al., 2018), and highlight the relevance of this inhibitory system for understanding and addressing sexual dysfunctions as a possible trait that involves specific negative cognitive schemata that intensify sexual performance anxiety and, ultimately, interfere with proper sexual functioning (Clarke et al., 2015; Nobre, 2017).

Finally, SIS2 (i.e., sexual inhibition due to threat of per-for-mance consequences) was less relevant as a predictor of sexual functioning problems and was a significant predictor of only sexual desire and arousal difficulties in men. However, it was able to differentiate between men with and without difficulties in sexual arousal, especially between functional and dysfunctional women in each sexual functioning component (i.e., desire, arousal, lubrication, ability to reach orgasm and satisfaction with orgasm). This lesser relevance of SIS2, compared to SIS1 in its association with sexual functioning, has already been revealed by previous studies (Nolet et al., 2021; Quinta-Gomes et al., 2018;

Rettenberger et al., 2019; Saavedra & Vallejo-Medina, 2020; Velten et al., 2018). This differential role between SIS1 and SIS2 in explaining sexual functioning could be due to the fact that SIS2 is more situational (and a lesser trait) than SIS1 (Bancroft et al., 2009). Therefore, this result could reflect that the weight of SIS1 in the sexual functioning of men and women is greater (Moyano & Sierra, 2014; Quinta Gomes et al., 2018).

Finally, following guidelines on the standards of evaluation instruments (Hernández et al., 2016; Muñiz & Fonseca-Pedrero, 2019), the fact that the Spanish version of the SIS/SES-SF is provided with scales by sex and across the different age groups (18-34, 35-49, ≥ 50 years) makes these scales a useful instrument in the clinical setting. These scales follow the recent trend of providing standardized scores to scales that may be of interest to Sexology professionals in Spain, as occurred with the Sexual Opinion Survey (Vallejo-Medina et al., 2014), the Hurlbert Index of Sexual Fantasy (Sierra et al., 2020), the Sexual Desire Inventory (Moyano et al., 2017), the Orgasm Rating Scale (Arcos-Romero & Sierra, 2019) or the Sexual Assertiveness Scale (Sierra et al., 2012).

In short, the contributions of present study are basically two: (1) examining the invariance of the measurement by sex and age, reaching the conclusion of discouraging comparisons of their scores between Spanish men and women; and (2) provide norms that allow interpreting the scores obtained with the Spanish population.

It is necessary to mention some limitations of this research. First, despite employing quota sampling, the obtained results cannot be generalized to the Spanish population because probabilistic sampling was not used. Second, the sample in the present study was composed only of heterosexual people and mostly of them had a high level of education. The evidence is showing that there are measures of sexuality that are not invariant by sexual orientation, such as some recently validated scales: Spanish versions of the Arizona Sexual Experience Scale (Sierra et al., 2023), Sexual Opinion Survey (SOS) o Negative Attitudes Toward Masturbation Inventory (Muñoz-García et al., 2023). Since previous studies have not analyzed the invariance of the SIS/SES-SF measures by sexual orientation, an inclusion criterion was established to consider the heterosexual population (on which previous evidence has been based). Future research should address their study with the LGTBIQA+ population. Therefore, future research with greater heterogeneity in terms of the participants' level of education is recommended. Finally, although the participants were divided according to their sexual functioning scores, the inclusion of clinical samples is recommended for future studies (i.e., people diagnosed with sexual dysfunction).

By way of conclusion, we point out that the Spanish version of the SIS/SES-SF (Moyano & Sierra, 2014) is an invariant measure by sex (weak level) and age (strict level), and its subscales can explain sexual functioning (i.e., sexual desire, sexual arousal, erection in men; lubrication in women; ability to reach orgasm and satisfaction with orgasm). Therefore, the SIS/SES-SF is able to adequately differentiate between people with and without difficulties in sexual functioning and is, therefore, a useful instrument with adequate psychometric guarantees to be employed in both the research context and sexual therapy. However, comparisons of scores between men and women should be cautiously considered.

Authors Contributions

Juan Carlos Sierra: Conceptualization, Methodology, Investigation, Formal Analysis, Writing - Original Draft, Writing – Reviewing and Editing, Supervision, Project Administration, Funding Acquisition. **Oscar Cervilla:** Investigation, Formal Analysis, Writing - Original Draft, Writing – Reviewing and Editing. **Ana Álvarez-Muelas:** Investigation, Formal Analysis, Writing - Original Draft, Writing – Reviewing and Editing. **María del Mar Sánchez-Fuentes:** Investigation, Formal Analysis, Writing - Original Draft, Writing – Reviewing and Editing

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Declaration of Interests

The authors declare that there is no conflict of interest.

Data Availability Statement

The data presented in this study is available at https://doi.org/10.6084/m9.figshare.24204045

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