



International Journal of Clinical and Health Psychology

www.elsevier.es/ijchp



ORIGINAL ARTICLE

Development of the Spanish short version of Negative Attitudes Toward Masturbation Inventory[☆]



Oscar Cervilla^a, Pablo Vallejo-Medina^b, Carmen Gómez-Berrocal^a, Juan Carlos Sierra^{a,*}

^a Mind, Brain, and Behavior Research Center, Universidad de Granada, Granada, Spain

^b SexLabKL, Fundación Universitaria Konrad Lorenz, Bogotá, Colombia

Received 9 October 2020; accepted 7 December 2020

KEYWORDS

Attitude toward
masturbation;
Negative Attitudes
Toward Masturbation
Inventory;
Reliability;
Validity evidence;
Instrumental study

Abstract *Background/Objective:* Masturbation has historically been a sexual behaviour associated with negative connotations, as a consequence of traditional orthodox positions, despite its positive impact on health. The instruments developed to measure the attitude towards masturbation are scarce, and none of them have been validated in the Spanish adult population. This study aims to propose a short version of the Negative Attitudes Toward Masturbation Inventory (NATMI) and examine their psychometric properties (reliability and evidence of validity) in the Spanish adult population. *Method:* A total of 4,116 heterosexual adults aged 18-83 years ($M = 40.58$; $SD = 12.24$; 54.64% women) participated in the study. In addition to the NATMI, they answered other scales to assess sexual attitudes, sexual desire, propensity to become sexually excited/inhibited and sexual functioning. *Results:* Analysis of the construct validity of the NATMI resulted in a reduced version of ten items grouped into a single factor explaining 66% of the variance (ordinal alpha = .95). The evidence of validity is clear, as subjects with negative and positive attitude towards masturbation differed in religiousness, frequency of masturbation, erotophilia, positive attitude towards sexual fantasies, sexual inhibition and sexual functioning. *Conclusions:* The Spanish short version of NATMI provides reliable and valid measures in the Spanish adult population.

© 2021 Asociación Española de Psicología Conductual. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

[☆] This article is part of the Doctoral Thesis of the first author (Psychological Doctoral Programme B13 56 1; RD 99/2011).

* Corresponding author: Facultad de Psicología, Universidad de Granada, 18011 Campus Universitario de Cartuja s/n. Granada, España. E-mail address: jcsierra@ugr.es (J.C. Sierra).

<https://doi.org/10.1016/j.ijchp.2021.100222>

1697-2600/© 2021 Asociación Española de Psicología Conductual. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

PALABRAS CLAVE

Actitud hacia la masturbación;
Negative Attitudes
Toward Masturbation
Inventory;
Fiabilidad;
Evidencias de
validez;
Estudio instrumental

Desarrollo de una versión española breve del Negative Attitudes Toward Masturbation Inventory

Resumen *Antecedentes/objetivo:* La masturbación ha sido una conducta sexual asociada históricamente a connotaciones negativas, como consecuencia de posturas tradicionales ortodoxas, a pesar de su impacto positivo en la salud. Son escasos los instrumentos desarrollados para medir la actitud hacia la masturbación, no existiendo ninguno validado en población adulta española. El objetivo de este estudio es proponer una versión breve del *Negative Attitudes Toward Masturbation Inventory* (NATMI) y examinar sus propiedades psicométricas (fiabilidad y evidencias de validez) en población adulta española. *Método:* Participaron 4.116 adultos heterosexuales de 18-83 años ($M=40,58$; $DT=12,24$; 54,64% mujeres), que respondieron además del NATMI a otras escalas para evaluar actitudes sexuales, deseo sexual, propensión a excitarse/inhibirse sexualmente y funcionamiento sexual. *Resultados:* El análisis de la validez de constructo dio lugar a una versión reducida de diez ítems agrupados en un único factor que explica el 66% de la varianza (α ordinal = 0,95). Se aportan evidencias de validez, ya que los sujetos con actitud negativa y positiva hacia la masturbación se diferencian en religiosidad, frecuencia de masturbación, erotofilia, actitud positiva hacia las fantasías sexuales, inhibición sexual y funcionamiento sexual. *Conclusiones:* La versión española breve del NATMI proporciona medidas fiables y válidas en población adulta española.

© 2021 Asociación Española de Psicología Conductual. Publicado por Elsevier España, S.L.U. Este es un artículo Open Access bajo la licencia CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Masturbation as sexual behaviour has traditionally had negative connotations owing to the influence of religion, especially Jewish-Christian, and to certain areas of 19th-century Medicine. These orthodox positions meant that many people experienced masturbation with feelings of guilt and negative affectivity (Abramson & Mosher, 1975; Carvalheira & Leal, 2013; Das, 2007; Ortega et al., 2005). The importance of religion, the frequency of attending religious ceremonies, sexual activity and sexual knowledge are significant predictors of attitude towards masturbation (Sümer, 2015). Nowadays, masturbation is considered a healthy lifelong conduct, even at older ages (Træen et al., 2019). It is practiced relatively often by men and to a greater extent than women (Gil-Llario et al., 2017; Haus & Thompson, 2020), although a high percentage of women state having sometimes masturbated (Burri & Carvalheira, 2019). Masturbation is a means by which to improve self-knowledge. It also contributes to positive intimate experiences and improves sexual health (Coleman, 2003). The World Association for Sexual Health (2019) defends the right to health and sexual pleasure, which include pleasurable sexual experiences with masturbation among them. Yet despite increasingly more favourable attitudes, a stigmatised vision of this sexual behaviour still prevails (Burri & Carvalheira, 2019; Haus & Thompson, 2020).

Studying attitude towards masturbation is a poorly investigated area (Hogarth & Ingham, 2009). Although some studies have associated attitude towards masturbation with negative feelings like guiltiness and/or shame, even among young people (Carvalheira & Leal, 2013; Castellini et al., 2016; Ortega et al., 2005; Sierra et al., 2011), many studies have simply related it to masturbation frequency and have not dealt with its relation to other dimensions of sexuality. Attitude towards masturbation had been related to

erotophilia and positive attitudes towards sexual fantasies (Sierra et al., 2013). People with negative attitude towards masturbation and sexual fantasies tend to use objects and fantasies during masturbation less and experience fewer orgasms (Driemeyer et al., 2017). Taking a positive attitude towards masturbation favours orgasmic capacity (Abramson et al., 1981) and is associated with higher masturbation frequency (Zimmer & Imhoff, 2020). Intervention on negative attitudes towards masturbation has even been included in sexual education programmes to improve different sexual health aspects (Lameiras Fernández et al., 2004; Ruiz et al., 2019).

Very few instruments have been developed to assess attitude towards masturbation. One of the existing few is the Negative Attitudes Toward Masturbation Inventory (NATMI; Abramson & Mosher, 1975; Mosher, 2011). This instrument was developed to measure negative attitude towards masturbation and, although it was devised as a unidimensional measure, it actually groups three different theoretical dimensions: positive attitudes towards masturbation; false beliefs about the harmful nature of masturbation; and personally experienced negative affects associated with masturbation. Abramson and Mosher (1975) reported a corrected split-half reliability of .75, whereas Mosher and Vonderheide (1985) indicated Cronbach's alpha to be .94.

NATMI has been adapted to Hispanic adolescent populations. Sierra et al. (2010) worked with a sample of Salvadoran adolescents and isolated the three factors that the authors of the scale had conceptually contemplated: Personally experienced negative affects associated with masturbation ($\alpha = .85$); Negative attitudes towards positive aspects of masturbation ($\alpha = .76$); False beliefs about the harmful nature of masturbation ($\alpha = .61$). Regarding validity evidence, an inverse association was observed between

negative attitude towards masturbation and erotophilia. Later [Sierra et al. \(2013\)](#) used a confirmatory factor analysis with a large sample of Peruvian adolescents and proposed a shorter 21-item version grouped into two factors: Negative attitudes towards positive aspects of masturbation ($\alpha = .62$) and Personally experienced negative affects associated with masturbation ($\alpha = .75$). The measures of this NATMI version offered suitable validity evidence by significantly correlating negatively with erotophilia and positive attitude towards sexual fantasies. It also distinguished those adolescents who had never masturbated from those who had.

As instruments that evaluate attitude towards masturbation are lacking in a Spanish adult population, and in order to confer continuity to the psychometric studies of NATMI conducted in Hispanic adolescents, we considered adapting and validating this scale in Spanish adults following recommended guidelines ([Hernández et al., 2020](#); [Muñiz & Fonseca-Pedrero, 2019](#)). Bearing in mind that NATMI could include items that are no longer up-to-date owing to the time since it was originally published and, given both the clinical and research fields, having a brief version with good psychometric properties is recommendable ([Vallejo-Medina et al., 2014](#)). So we proposed devising a shorter version of this instrument. To do so, the construct validity of the original NATMI version was examined, the internal consistency reliability coefficient was obtained and evidence of the discriminant validity of its measures was provided.

Method

Participants

Our study included 4,116 heterosexual Spanish adults from the general population (1,867 men, 2,249 women) aged between 18 and 83 years ($M = 40.58$; $SD = 12.24$). [Table 1](#) offers the participants' socio-demographic characteristics. Of all the participants, 57.30% had university studies, and women's level of education was higher than that of men. Most (72.40%) had a partner at the time the evaluation was made, with a slightly higher percentage for men, and 92.80% of the people in a relationship practiced sex, while 67.10% with no partner reported having at least one sexual relationship in the past 6 months. Practically all the participants had masturbated on some occasion (94.30%), but men more frequently than women. The age of their first masturbation experience was younger for men ($M = 13.05$ years) than women ($M = 16.52$ years). Finally regarding their religiosity, 69.40% of the participants never prayed.

Instruments

Background Questionnaire. This instrument was used to collect information about sex, age, education level, nationality, partner relationship, current sexual activity, sexual orientation, age of their first sexual experience, masturbation experience, age of their first masturbation experience, and religiosity.

The Negative Attitudes Toward Masturbation Inventory (NATMI; [Mosher, 2011](#)). This inventory is a 30-item, 5-point Likert-type scale anchored by 1 (*not at all true for me*) and 5 (*extremely true for me*). Higher scores indicate a more

negative attitude towards masturbation. Its psychometric properties are described in the Introduction.

The Spanish version of the Sexual Opinion Survey-6 (SOS-6; [Vallejo-Medina et al., 2014](#)). It measures erotophilia with six items on a 7-point Likert-type scale ranging from 1 (*I strongly disagree*) to 7 (*I strongly agree*). The higher the score, the higher the degree of erotophilia. Its internal consistency reliability is adequate ($\alpha = .74$) and it evidences convergent validity by correlating its scores with sexual satisfaction, sexual desire, sexual functioning, sexual assertiveness and positive attitudes towards sexual fantasies ([Vallejo-Medina et al., 2014](#)). In the present study, the ordinal alpha coefficient was .82.

The Spanish version of the Hurlbert Index of Sexual Fantasy (HISF; [Sierra, Arcos-Romero et al., 2020](#)). It consists of ten items to evaluate the positive attitude towards sexual fantasies on a Likert scale from 0 (*never*) to 4 (*all of the time*). Higher scores indicate more positive attitude towards sexual fantasies. Its internal consistency reliability is .94 and it presents suitable evidence of validity by being related to similar measures. In this study, the ordinal alpha coefficient was .91.

The Solitary Sexual Desire Subscale of the Spanish version of the Sexual Desire Inventory (SDI; [Moyano et al., 2017](#)). Its four items evaluates interest in solitary sexual activity. It presents different scale kinds with Likert-type responses depending on the item (e.g., from 0 = *no desire* to 8 = *strong desire*). High scores indicate higher levels of desire for solitary sexual activities. Its internal consistency reliability is .90 for men and .93 for women. There is evidence of suitable convergent validity. Cronbach's alpha in the present study was .84.

The Spanish version of the Sexual Inhibition/Sexual Excitation Scales-Short Form (SIS/SES-SF; [Moyano & Sierra, 2014](#)). It is composed of 14 items that assess sexual excitation (SES), sexual inhibition due to the threat of performance failure (SIS1) and sexual inhibition due to the threat of consequences (SIS2). Responses are provided on a Likert scale ranking from 1 (*strongly disagree*) to 4 (*strongly agree*). Higher scores indicate greater excitation and inhibition proneness. The internal consistency reliability of its subscales is over .60 and its authors provide evidence of the validity of its measures. In this study, the ordinal alpha values were .83 for SES, .72 for SIS1 and .71 for SIS2.

The Spanish version of the Arizona Sexual Experience Scale (ASEX; [McGahuey et al., 2000](#); [Sánchez-Fuentes et al., 2019](#)). It is made up of six items that evaluate sexual functioning in the last 7 days in terms of desire, excitation, orgasm, erection (in men), vaginal lubrication (in women), facility of having an orgasm and orgasm satisfaction. It employs a Likert-type scale from 1 (*good functioning*) to 6 (*bad functioning*). High scores reflect worse sexual functioning. The scale shows suitable psychometric properties: Cronbach's alpha of .81 and .79 in men and women, respectively, and suitable evidence of validity. In the present study, the ordinal alpha was .81 for men and .86 for women.

Procedure

Following the International Tests Commission's guidelines (see [Hernández et al., 2020](#); [Muñiz & Fonseca-Pedrero,](#)

Table 1 Sociodemographic characteristics of the participants.

	Total N = 4,116	Men n = 1,867	Women n = 2,249	t / χ^2
Age M (SD)	40.58 (12.24)	40.19 (11.66)	41.06 (12.90)	2.26*
Education level n (%)				22.61***
No studies	10 (0.30)	7 (0.40)	3 (0.10)	
Primary Education	284 (7.20)	136 (7.30)	148 (6.60)	
Secondary Education	1,390 (35.20)	693 (37.10)	697 (31)	
University Degree	2,263 (57.30)	959 (51.40)	1,304 (58)	
Partner relationship n (%)				-3.25**
Yes	2,982 (72.40)	1,399 (74.90)	1,583 (70.40)	
No	1,134 (27.60)	468 (25.10)	666 (29.60)	
If you have a partner, do you have sexual activity within that relationship? n (%)				-1.03
Yes	2,766 (92.80)	1,305 (93.30)	1,461 (92.30)	
No	216 (7.20)	94 (6.70)	122 (7.70)	
If you do not have a partner, have you had sex in the last six months? n (%)				4.62***
Yes	664 (67.10)	243 (59)	421 (72.80)	
No	326 (32.90)	169 (41)	157 (27.20)	
Age of first sexual experience M (SD)	17.79 (3.47)	18.02 (3.74)	17.60 (3.22)	3.78***
Have you ever masturbated? n (%)				-4.84***
Yes	3,883 (94.30)	1,797 (96.30)	2,086 (92.80)	
No	233 (5.70)	70 (3.70)	163 (7.20)	
Age of first masturbation experience M (SD)	14.90 (5.31)	13.05 (2.32)	16.52 (6.54)	-21.14***
Current masturbation frequency n (%)				469.77***
Never	163 (4.20)	63 (3.40)	100 (4.40)	
Less than once a month	389 (10)	93 (5)	296 (13.20)	
Once a month	115 (3)	31 (1.70)	84 (3.70)	
A few times a month	829 (21.30)	240 (12.90)	589 (26.20)	
Once a week	275 (7.10)	108 (5.80)	167 (7.40)	
A few times a week	1,492 (38.40)	782 (41.90)	710 (31.60)	
Once a day	431 (11.10)	330 (17.70)	101 (4.50)	
More than once a day	189 (4.90)	150 (8)	39 (1.70)	
Praying frequency n (%)				21.20**
Never	2,736 (69.40)	1,247 (66.80)	1,489 (66.20)	
Less than once a month	408 (10.30)	183 (9.80)	225 (10)	
Once a month	44 (1.10)	21 (1.10)	23 (1)	
A few times a month	226 (5.50)	88 (4.70)	138 (6.10)	
Once a week	26 (0.60)	9 (0.50)	17 (0.80)	
A few times a week	209 (5.30)	84 (4.50)	125 (5.60)	
Once a day	188 (4.80)	107 (5.70)	81 (3.60)	
More than once a day	106 (2.70)	58 (3.10)	48 (2.10)	

*p < .05, ** p < .01, *** p < .001.

2019), the NATMI items were translated from English to Spanish by two researchers specialised in sexuality with a high level of English. A consensus on the translations was reached with a bilingual psychologist, who is also an expert in sexuality. The obtained version was judged by four experts in Psychometry and Sexuality, who scored to what extent,

from 1 (*not at all*) to 4 (*considerably*), all 30 items matched the four criteria (representativeness, comprehension, clarity and ambiguity), and suggested improvements if they deemed them necessary. An analysis with Aiken's V with a 95% confidence interval was carried out. The results showed that a suitable consensus had been reached with good con-

struct representativeness as the lower Aiken's V limit was found in all the items over .50. For comprehension, items 3, 10, 17, 20 and 27 had values below .50 and items 10 and 20 were evaluated as not very clear. Finally, items 1, 3, 5 and 10 were found to be ambiguously worded. After revising the seven different items following the experts' recommendations, the pilot version of the scale was applied to a group of 50 Spanish adults from the different sex-paired ages to see if they understood each item or not. Only item 20 obtained a consensus below 90% by those surveyed. Thus it was revised to improve its comprehension and the definitive version of the instrument was obtained.

The battery of instruments was applied online. This is the usual method in studies that evaluate sexual behaviours (Arcos-Romero & Sierra, 2019; Calvillo et al., 2020; Sánchez-Mendoza et al., 2020; Tavares et al., 2019) and its use is also recommended to study masturbation (Burri & Carvalheira, 2019; Carvalheira & Leal, 2013). Former research has indicated no differences between the responses obtained by this method and the traditional paper-and-pencil kind (Álvarez-Muelas et al., 2021; Carreno et al., 2020; Sierra et al., 2018). The online battery was distributed using virtual platforms (Facebook®, Twitter®, WhatsApp® groups, and e-mail), using LimeSurvey® software. The IP address of the responses was controlled; to avoid automated responses, participants were asked to confirm their access to the survey by responding to a security question consisting of a simple randomized arithmetic operation. Anonymity was guaranteed to all participants, as well as the confidentiality of their data, and their participation was voluntary. Before responding, participants were asked to read and accept an informed consent form, which described the purpose of the study and provided information on data confidentiality and privacy. The study was approved by the University of Granada Human Research Ethics Committee.

Data analysis

Our sample was divided into two random subsamples: Subsample 1 ($n=2,060$) was used to carry out the Exploratory Factor Analysis (EFA), while Subsample 2 ($n=2,059$) was employed for the Confirmatory Factor Analysis (CFA). All the other analyses were performed with the whole sample. To process any missing data, an algorithm for non-parametric distributions was applied to create a random forest model for each variable by means of the other variables from the database. The estimated error range for the imputation was 26%. With subsample 1, the factorial reduction of the inventory was explored by considering 23 methods to obtain the number of factors. Next according to this estimation, an EFA was performed on the polychoric matrix for which maximum likelihood was employed as the estimation method. Once the EFA results were known, the CFA was performed in the polychoric matrix in Subsample 2. The Weighted Least Squares Means and Variance Adjusted (WLSMV) estimation method was used, which is suitable for non-parametric samples comprising ordinal or categorical data (Lara Hormigo, 2014). The following fit indices were contemplated for the CFA: (a) root mean square error of approximation (RMSEA); (b) comparative fit index (CFI); (c) Tucker-Lewis Index (TLI). The RMSEA values were lower than

.06 (Browne & Cudeck, 1993), and the CFI and TLI values exceeded .95 (Kline, 2011), which are indicators of a good model fit. Then internal consistency was examined by the ordinal alpha. Finally to examine discriminant validity, two age-paired groups were formed: (1) 136 cases ($M_{\text{age}} = 38.24$; $SD = 13.78$) with two standard deviations over the mean score (i.e., score that equals or exceeds 15: a more negative attitude towards masturbation); (2) 102 cases ($M_{\text{age}} = 38.83$; $SD = 11.94$) with scores on the opposite pole (score of 10: a possibly more positive attitude towards masturbation). The differences between both groups were examined in terms of religious frequency and masturbation, erotophilia, attitude towards sexual fantasies, solitary sexual desire and sexual functioning (sexual desire, excitation, erection/vaginal lubrication and orgasm). To examine the differences, the data fit was compared according to the null hypothesis and the alternative hypothesis by applying Fisher's ANOVA Bayesian analysis. An $r^{JZ5} = 0.71$ was employed. A positive outcome contributes a higher likelihood to favour the null hypothesis, while a negative outcome favours the alternative hypothesis. An outcome is considered more robust the further away it is from zero by assuming the following intervals (Jeffreys, 1961): 1-3 anecdotal, 3-10 substantial, 10-20 strong, 20-30 strong, 30-100 very strong, 100-150 decisive, >150 decisive.

To carry out the analyses, the R® environment was used (version 3.6.3; R Core Team, 2020) with its RStudio® interface (version 1.2.5042; RStudio Team, 2020). To impute any missing values, the missForest package was employed (version 1.4; Stekhoven & Bühlmann, 2011). To explore the factorial structure, the Parameters package was resorted to (version 0.8.0; Lüdtke et al., 2020). The EFA and the ordinal alpha calculation were performed with the Psych package (version 1.9.12.31; Revelle, 2019). For the CFA, the lavaan package was utilised (Rosseel, 2012). Finally, the tidyBF package (version 0.4.0; Patil, 2018) was used for the Bayesian analyses.

Results

Construct validity: EFA and CFA

First of all, in Subsample 1 the factorial structure underlying the original 30-item version was examined. We observed that most methods (four: acceleration factor, VSS complexity 1, TLI, RMSEA) supported the unifactorial structure. In fact the second proposal supported by the three methods suggested a 29-factor structure, which would indicate very little cohesion with items. This would be consistent with the fact that the variance explained by the unidimensional version was low: 41%. What all this evidences is the need to reduce the number of items in order to seek a more consistent structure.

In order to improve the explained variance in NATMI, all the items whose communality (h^2) was above .50 were selected by means of the EFA. With this criterion, ten items were selected with which a short version was proposed (items 10, 30, 23, 12, 4, 18, 6, 20, 7, and 27). The factorial structure of this short version was explored by the above-described parameters where, once again, a single factor was proposed (backed by nine methods: 39.13%). Given the

Table 2 Item analysis of the NATMI.

Item	Factor loadings	h^2
10. After masturbating, a person feels degraded	.91	.83
30. After I masturbate, I am disgusted with myself for losing control of my body	.87	.75
23. When I masturbate, I am disgusted with myself	.86	.74
12. I feel guilty about masturbating	.82	.68
4. Masturbation is a sin against yourself	.82	.67
18. Playing with your own genitals is disgusting	.81	.65
6. Masturbation is an adult is juvenile and immature	.80	.64
20. Any masturbation is too much	.73	.54
7. Masturbation can lead to homosexuality	.73	.54
27. Masturbation is a normal sexual outlet	.73	.54

Note. The items maintain the numbering of the original 30-item version.

greater consensus reached with the unifactorial 10-items version, the EFA for one factor was applied, which explained 66% of total variance (see Table 2).

Next a CFA was performed in Subsample 2 to test the fit of the 10-item version of the unifactorial model. This single-factor structure showed an acceptable fit: RMSEA = .071; 90%CI RMSEA = .065-.078; CFI = .930; TLI = .910; $\chi^2(35) = 400.06$, $p < .01$. Figure 1 illustrates the flow chart of the unifactorial model where the standardised loadings fell within the .68 (item 27) and .90 (item 23) range.

Reliability

Having confirmed the structure of one factor, its internal consistency was analysed by the ordinal alpha for the total inventory score. The 10-item version gave an excellent internal consistency reliability coefficient (ordinal alpha = .95). As we can see in Table 3, eliminating any of these 10 items did not improve this alpha. It is worth stressing the high kurtosis for most items as most responses were for response 1 option (*not at all true for me*) of the instrument's Likert-type scale, which would be expected in a non-clinical Spanish general population.

Validity evidence

Finally given the high kurtosis, the NATMI scores were compared between those people with a negative attitude and those with a positive attitude towards masturbation. As Figure 2 shows, both groups proved significantly different for

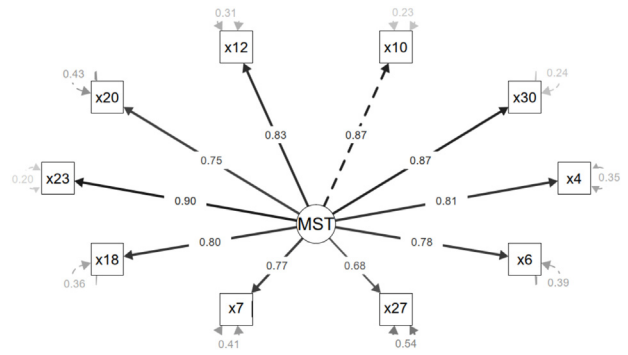


Figure 1 Standardised estimates of the 10-item unifactorial model.

Note. The items maintain the numbering of the original 30-item version.

masturbation frequency, religiousness, erotophilia, positive attitude towards sexual fantasies, sexual inhibition due to the threat of performance failure and solitary sexual desire, and effect sizes ranged between moderate and large. Significant differences were also found between both groups for sexual functioning, with generally moderate effect sizes (see Figure 3). All these differences were corroborated with Bayesian probability.

Discussion

The main objective of the present study was to adapt and validate NATMI (Mosher, 2011) in a Spanish adult population to propose a short version. The final proposal is a short unifactorial scale with ten items taken from the original 30-item version. This version showed suitable construct validity, excellent internal consistency reliability and evidence of discriminant validity. Collectively, these results reveal that NATMI is a suitable instrument to measure negative attitude towards masturbation of a Spanish adult population.

Adaptation and validation were performed following the International Tests Commission's guidelines (see Hernández et al., 2020; Muñoz & Fonseca-Pedrero, 2019). Firstly, the subjective evaluation of the items by four experts in Psychometry and Human Sexuality demonstrated its good representativeness, comprehension, clarity and low level of ambiguity. Only seven items (1, 3, 5, 10, 17, 20 and 27, three of which form part of the final short version) had to be revised in accordance with the experts' indications. These results were supported by a quantitative analysis, which ensured that the lower Aiken V's limit of all the items was between .50% and .95% (Vallejo-Medina et al., 2016).

The first analyses of the construct validity of the 30-item version showed that the cohesion of the items was low. Perhaps the time that had elapsed since the original scale was devised could mean that many items are not as relevant for measuring today's attitude towards masturbation. For this reason, and to improve its consistency, those items whose communality was over .50 were selected. Ten items were selected. Selecting those items with better psychometric guarantees is the normal procedure to reinforce an instrument's measurement properties (Muñoz & Fonseca-Pedrero, 2019). Moreover, proposing a short version will improve its usefulness for both research and clinical prac-

Table 3 Reliability analysis.

Item	M	SD	Cronbach α if item deleted	r	Skew	Kurtosis
Item 10	1.06	0.34	.94	.88	7.50	68.05
Item 30	1.13	0.49	.94	.83	4.64	24.93
Item 4	1.08	0.41	.94	.80	6.76	51
Item 6	1.11	0.42	.94	.78	5.37	35.87
Item 27	1.18	0.51	.95	.69	4.22	23.50
Item 7	1.04	0.28	.94	.73	8.65	91.12
Item 18	1.08	0.37	.94	.78	6.43	51.13
Item 23	1.09	0.39	.94	.82	5.78	40.59
Item 20	1.19	0.57	.94	.72	3.80	16.73
Item 12	1.18	0.58	.94	.75	3.91	16.56

Note. The items maintain the numbering of the original 30-item version.

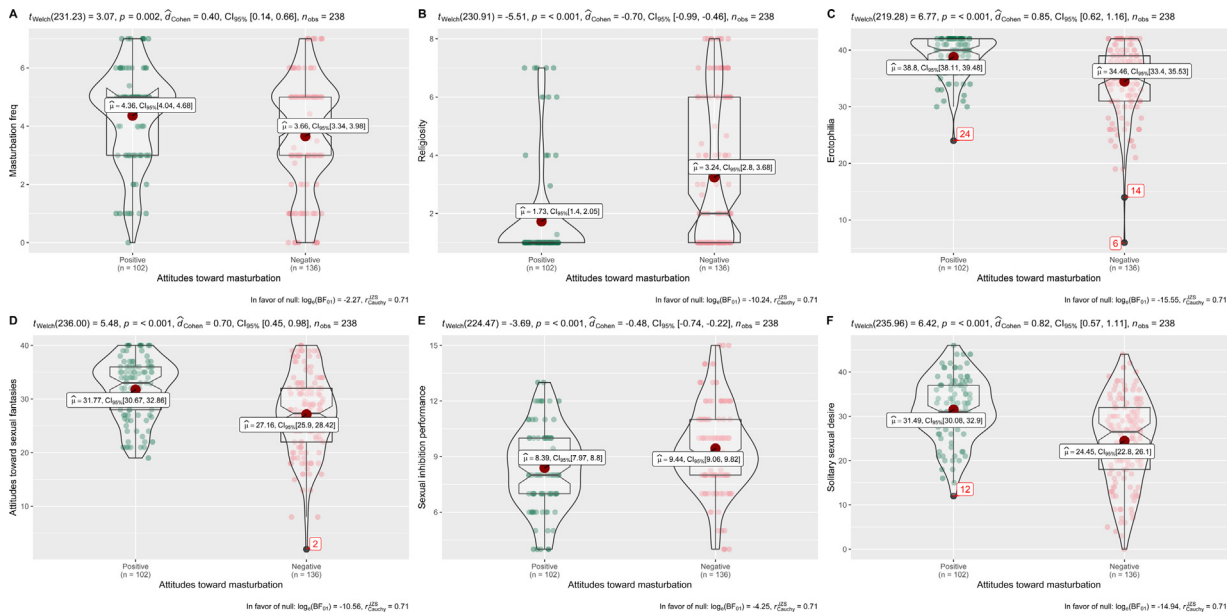


Figure 2 Comparisons between groups with positive and negative attitudes towards masturbation in frequency of masturbation, religiosity, erotophilia, positive attitude towards sexual fantasies, sexual inhibition due to fear of failure in sexual performance and solitary sexual desire.

Note. The red dot shows the population mean (μ) of that group together with the corresponding confidence interval. Below each figure are the results of the Bayesian analysis.

tice purposes (Vallejo-Medina et al., 2014). The 10-item NATMI version confirmed a unifactorial structure, including items from the three theoretical dimensions (positive attitudes: e.g., “Masturbation is a normal sexual outlet”; false beliefs: e.g., “Masturbation can lead to homosexuality”; negative affects: e.g., “I feel guilty about masturbating”), and considerably increased its explained variance (66%) in relation to former versions (Abramson & Mosher, 1975; Sierra et al., 2013).

Regarding reliability, the inventory revealed Cronbach’s alpha of .95, which improves the values obtained by former works (Mosher & Vonderheide, 1985; Sierra et al., 2010; Sierra et al., 2013). A tendency in responses was observed with high kurtosis in most items, which was expected if we bear in mind that the sample formed part of a non-clinical general population. It also reflected the typical polarisation of an occidental society where masturbation is viewed

more positively (Burri & Carvalheira, 2019; Træen et al., 2019). The evidence of discriminant validity in the short NATMI version was capable of distinguishing between people with negative attitude (scores equalling or exceeding 15) and positive attitude towards masturbation (the lowest possible score on the scale: 10) in the psychosexual variables, which we now go on to look at. As expected, we observed differences in masturbation frequency between both groups. A recent study has evidenced how beliefs and attitudes about the negative impact of masturbation are more prevalent in men who do not practice masturbation (Zimmer & Imhoff, 2020). Furthermore, differences were noted in praying frequency, which falls in line with former evidence pointing out that practicing one’s religion is a predictor of having a negative attitude towards masturbation (Sümer, 2015). For erotophilia, discrepancies also appeared between the two groups, which coincides with previous works (Sierra

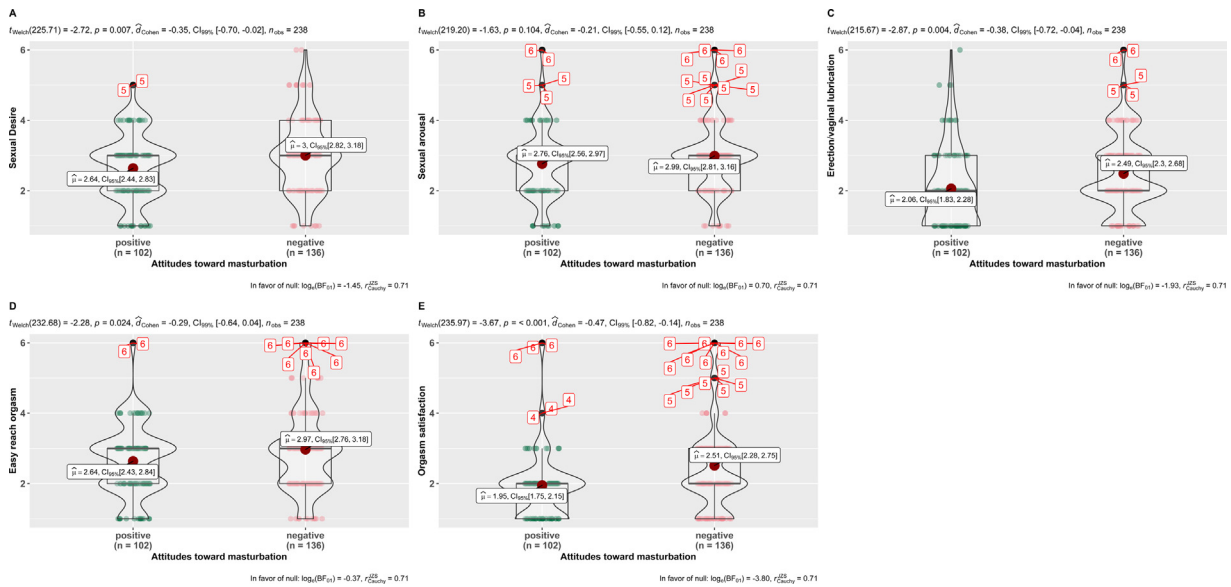


Figure 3 Comparisons between groups with positive and negative attitudes towards masturbation in the dimensions of sexual functioning: desire, arousal, erection/vaginal lubrication, ease of reaching orgasm and orgasm satisfaction. *Note.* The red dot shows the population mean (μ) of that group together with the corresponding confidence interval. Below each figure are the results of the Bayesian analysis.

et al., 2010, 2013). For attitude towards sexual fantasies, the encountered differences fell in line with former studies insofar as this attitude and resorting to sexual fantasies more are related to showing a more positive attitude towards masturbation (Driemeyer et al., 2017; Sierra et al., 2013). Validating this instrument by taking into account how their measures are related to other attitudes like erotophilia and attitude towards sexual fantasies provides evidence about their potential usefulness given the relevance of these variables in sexual health (Arcos-Romero et al., 2020; Sierra, Arcos-Romero et al., 2020; Vallejo-Medina et al., 2014). Finally, sexual inhibition due to the threat of performance failure was higher in the group with a negative attitude towards masturbation. If we bear in mind that this attitude is related to less masturbation frequency (Zimmer & Imhoff, 2020), it could be accompanied by less self-exploration, less personal experience with self-stimulation and less sexual self-knowledge, which could justify higher sexual inhibition levels due to the threat of performance failure. This hypothesis is congruent with employing masturbation as a therapeutic approach with certain sexual dysfunctions (Graham, 2014; Perelman, 2014).

Differences were also found in sexual functioning depending on the attitude towards masturbation being positive or negative. That is, those people who take a negative attitude towards this conduct reported generally less sexual desire and less solitary sexual desire. The relation between sexual desire and sexual attitudes has been well-documented in previous works (Arcos-Romero & Sierra, 2020; Sánchez-Fuentes et al., 2019; Santos-Iglesias et al., 2013; Sierra, Arcos-Romero et al., 2020). Moreover, sexual attitudes could be one of the best predictors of wishing to masturbate and frequency in doing so (Kelly et al., 1990). Therefore, promoting a healthier attitude towards masturbation may be important in the therapeutic field in the

sexual desire context (Zamboni & Crawford, 2003). For sexual excitation, differences have been detected in informed measures of erection/vaginal lubrication, as pointed out by Abramson (1981). The same can be stated of the facility to reach an orgasm and orgasm satisfaction, with discrepancies appearing between both groups according to their attitude. Accordingly, Kelly et al. (1990) found more prevalence for negative attitude towards masturbation in anorgasmic women than in functional peers, whereas Bentler and Peeler (1979) observed the orgasmic response in the masturbation context, as well as sexual relationships, being related to attitude towards masturbation, although these effects were mediated by sexual experience. These results suggest the role of attitude towards masturbation in the orgasmic experience and its relevance in sexual health (Sierra, Ortiz et al., 2020), although these relations must be explored in more depth by future works.

This study is not without its limitations because, despite employing a large varied sample, it is not possible to generalise the results to the whole Spanish population because the participants were selected by incidental sampling and were all heterosexual. Moreover, the majority of those surveyed showed a positive attitude towards masturbation, which must be taken into account when contemplating the results. Although a negative attitude towards masturbation persists in a small proportion of the Spanish population, the importance of studying it in ages where this behaviour is practiced more frequently is highlighted, such as adolescence, or in groups formed by people for whom this practice has been traditionally stigmatised, such as women. Its relation to other evaluated psychosexual variables in the present work suggests the relevance of dealing with this attitude by means of sexual education programmes to promote healthy sexuality. With clinical samples, future research could incorporate this instrument and look closely at the role played

by attitude towards masturbation in sexual health. However, we conclude that the measures obtained with the short Spanish NATMI version (Appendix A) are reliable and valid, and the fact that it is brief makes it a useful tool for both research and clinical practice.

Funding

This study has been funded by the Ministerio de Ciencia, Innovación y Universidades through the Research Project RTI2018-093317-B-I00 and the Bursary FPU18/03102 for University Professor Training as part of the first author's thesis (Psychological Doctoral Programme B13 56 1; RD 99/2011).

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi: <https://doi.org/10.1016/j.ijchp.2021.100222>.

References

- Álvarez-Muelas, A., Gómez-Berrocá, C., & Sierra, J. C. (2021). Study of sexual satisfaction in different typologies of adherence to the sexual double standard. *Frontiers in Psychology*, 11, Article 609571 <https://doi.org/10.3389/fpsyg.2020.609571>
- Abramson, P. R., & Mosher, D. L. (1975). The development of a measure of negative attitudes toward masturbation. *Journal of Consulting and Clinical Psychology*, 43, 485–490. <https://doi.org/10.1037/h0076830>
- Abramson, P. R., Perry, L. B., Rothblatt, A., Seeley, T. T., & Seeley, D. M. (1981). Negative attitudes toward masturbation and pelvic vasocongestion: A thermographic analysis. *Journal of Research in Personality*, 15, 497–509. [https://doi.org/10.1016/0092-6566\(81\)90046-5](https://doi.org/10.1016/0092-6566(81)90046-5)
- Arcos-Romero, A. I., Calvillo, C., Granados, R., Álvarez-Muelas, A., & Sierra, J. C. (2020). The Spanish version of the Sexual Opinion Survey (SOS-6): Evidence of validity of a short version. *International Journal of Psychological Research*, 13, 40–49. <https://doi.org/10.21500/20112084.4506>
- Arcos-Romero, A. I., & Sierra, J. C. (2019). Factorial invariance, differential item functioning, and norms of the Orgasm Rating Scale. *International Journal of Clinical and Health Psychology*, 19, 57–66. <https://doi.org/10.1016/j.ijchp.2018.11.001>
- Arcos-Romero, A. I., & Sierra, J. C. (2020). Factors associated with subjective orgasm experience in heterosexual relationship. *Journal of Sex & Marital Therapy*, 46, 314–329. <https://doi.org/10.1080/0092623X.2019.1711273>
- Bentler, P. M., & Peeler, W. H. (1979). Models of female orgasm. *Archives of Sexual Behavior*, 8, 405–423. <https://doi.org/10.1007/BF01541197>
- Browne, M. W., & Cudeck, R. (1993). *Alternative ways of assessing model fit*. In K. A. Bollen, & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Sage.
- Burri, A., & Carvalheira, A. (2019). Masturbatory Behavior in a Population Sample of German Women. *The Journal of Sexual Medicine*, 16, 963–974. <https://doi.org/10.1016/j.jsxm.2019.04.015>
- Calvillo, C., Sánchez-Fuentes, M. M., Parrón-Carreño, T., & Sierra, J. C. (2020). Validation of the Interpersonal Exchange Model of Sexual Satisfaction Questionnaire in adults with a same-sex partner. *International Journal of Clinical and Health Psychology*, 20, 140–150. <https://doi.org/10.1016/j.ijchp.2019.07.005>
- Carreno, D. F., Eisenbeck, N., Cangas, A. J., García-Montes, J. M., Del Vas, L. G., & María, A. T. (2020). Spanish adaptation of the Personal Meaning Profile-Brief: Meaning in life, psychological well-being, and distress. *International Journal of Clinical and Health Psychology*, 20, 151–162. <https://doi.org/10.1016/j.ijchp.2020.02.003>
- Carvalheira, A., & Leal, I. (2013). Masturbation among women: Associated factors and sexual response in a Portuguese community sample. *Journal of Sex & Marital Therapy*, 39, 347–367. <https://doi.org/10.1080/0092623X.2011.628440>
- Castellini, G., Fanni, E., Corona, G., Maseroli, E., Ricca, V., & Maggi, M. (2016). Psychological, relational, and biological correlates of ego-dystonic masturbation in a clinical setting. *Sexual Medicine*, 4, 156–165. <https://doi.org/10.1016/j.esxm.2016.03.024>
- Coleman, E. (2003). Masturbation as a means of achieving sexual health. *Journal of Psychology & Human Sexuality*, 14, 5–16. https://doi.org/10.1300/J056v14n02_02
- Das, A. (2007). Masturbation in the United States. *Journal of Sex & Marital Therapy*, 33, 301–317. <https://doi.org/10.1080/00926230701385514>
- Driemeyer, W., Janssen, E., Wiltfang, J., & Elmerstig, E. (2017). Masturbation experiences of Swedish senior high school students: Gender differences and similarities. *The Journal of Sex Research*, 54, 631–641. <https://doi.org/10.1080/00224499.2016.1167814>
- Gil-Llario, M. D., Giménez, C., Ballester-Arnal, R., Cárdenas-López, G., & Durán-Baca, X. (2017). Gender, sexuality, and relationships in young Hispanic people. *Journal of Sex & Marital Therapy*, 43, 456–462. <https://doi.org/10.1080/0092623X.2016.1207732>
- Graham, C. A. (2014). *Orgasm disorders in women*. In Y. M. Binik, & K. S. K. Hall (Eds.), *Principles and practice of sex therapy* (5th ed., pp. 89–111). Guilford Press.
- Haus, K. R., & Thompson, A. E. (2020). An Examination of the Sexual Double Standard Pertaining to Masturbation and the Impact of Assumed Motives. *Sexuality & Culture*, 1–26. <https://doi.org/10.1007/s12119-019-09666-8>
- Hernández, A., Hidalgo, M. D., Hambleton, R. K., & Gómez-Benito, J. (2020). International Test Commission guidelines for test adaptation: A criterion checklist. *Psicothema*, 32, 390–398. <https://doi.org/10.7334/psicothema2019.306>
- Hogarth, H., & Ingham, R. (2009). Masturbation among young women and associations with sexual health: An exploratory study. *Journal of Sex Research*, 46, 1–10. <https://doi.org/10.1080/00224490902878993>
- Jeffreys, H. (1961). *Theory of probability* (3rd ed.). Oxford University Press.
- Kelly, M. P., Strassberg, D. S., & Kircher, J. R. (1990). Attitudinal and experiential correlates of anorgasmia. *Archives of Sexual Behavior*, 19, 165–177. <https://doi.org/10.1007/BF01542230>
- Kline, R. B. (2011). *Principles and practice of structural equation modeling*. Guilford Press.
- Lameiras Fernández, M., Rodríguez Castro, Y., Ojea Rúa, M., & Dopereiro Rodríguez, M. (2004). *Programa coeducativo de desarrollo psicoafectivo y sexual*. Pirámide.
- Lara Hormigo, A. (2014). *Introducción a las ecuaciones estructurales en AMOS y R.* Retrieved from [https://masteres.ugr.es/moea/pages/curso201314/tfm1314/tfm-septiembre1314/memoriamaesterantonio.lara.hormigo/!](https://masteres.ugr.es/moea/pages/curso201314/tfm1314/tfm-septiembre1314/memoriamaesterantonio.lara.hormigo/)
- Lüdecke, D., Ben-Shachar, M. S., & Makowski, D. (2020). *Describe and understand your model's parameters*. CRAN. Retrieved from <https://easystats.github.io/parameters>
- McGahuey, C. A., Gelenberg, A. J., Laukes, C. A., Moreno, F. A., Delgado, P. L., McKnight, K. M., & Manber, R. (2000). The Arizona Sexual Experience Scale (ASEX): Reliability and validity. *Journal of Sex & Marital Therapy*, 26, 25–40. <https://doi.org/10.1080/009262300278623>
- Mosher, D. L. (2011). *Negative Attitudes Toward Masturbation*. In T. D. Fisher, C. M. Davis, W. L. Yarber, & S. L. Davis (Eds.),

- Handbook of sexuality-related measures* (3rd ed., pp. 487–488). Routledge.
- Mosher, D. L., & Vonderheide, S. G. (1985). Contributions of sex guilt and masturbation guilt to women's contraceptive attitudes and use. *The Journal of Sex Research, 21*, 24–39.
- Moyano, N., & Sierra, J. C. (2014). Validation of the Sexual Inhibition/Sexual Excitation Scales-Short Form (SIS/SES-SF). *Terapia Psicológica, 32*, 87–100. <https://doi.org/10.4067/S0718-48082014000200002>
- Moyano, N., Vallejo-Medina, P., & Sierra, J. C. (2017). Sexual Desire Inventory: Two or three dimensions? *The Journal of Sex Research, 54*, 105–116. <https://doi.org/10.1080/00224499.2015.1109581>
- Muñiz, J., & Fonseca-Pedrero, E. (2019). Ten steps for test development. *Psicothema, 31*, 7–16. <https://doi.org/10.7334/psicothema2018.291>
- Ortega, V., Ojeda, P., Sutil, F., & Sierra, J. C. (2005). Sex guilt in adolescents: Studying some related factors. *Anales de Psicología, 21*, 268–275.
- Patil, I. (2018). *ggstatsplot: 'ggplot2' Based Plots with Statistical Details*. CRAN. <https://doi.org/10.5281/zenodo.2074621>
- Perelman, M. A. (2014). Delayed ejaculation. In Y. M. Binik, & K. S. K. Hall (Eds.), *Principles and practice of sex therapy* (5th ed., pp. 138–155). Guilford Press.
- R Core Team. (2020). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing.
- Revelle, W. (2019). *Psych: Procedures for Personality and Psychological Research*. Evanston, Illinois, USA: Northwestern University. R package version 1.9.12. Retrieved from <https://CRAN.R-project.org/package=psych>
- Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software, 48*, 1–36.
- RStudio Team. (2020). *RStudio: Integrated Development for R [Computer software]*. RStudio, PBC.
- Ruiz, A., Jiménez, O., Ojeda, M. A., Rando, M. A., & Martínez, F. L. (2019). Intervención grupal en educación sexual con estudiantes: actitudes hacia la sexualidad, masturbación y fantasías sexuales. *Escritos de Psicología, 12*, 30–37.
- Sánchez-Fuentes, M. M., Moyano, N., Granados, M. R., & Sierra, J. C. (2019). Validation of the Spanish version of the Arizona Sexual Experience Scale (ASEX) using self-reported and psychophysiological measures. *Revista Iberoamericana de Psicología y Salud, 10*, 1–14. <https://doi.org/10.23923/j.riips.2019.01.021>
- Sánchez-Mendoza, V., Soriano-Ayala, E., & Vallejo-Medina, P. (2020). Psychometric properties of the Condom Use Self-efficacy Scale among young Colombians. *International Journal of Environmental Research and Public Health, 17*, Article 3762. <https://doi.org/10.3390/ijerph17113762>.
- Santos-Iglesias, P., Calvillo, G., & Sierra, J. C. (2013). A further examination of Levine's model of sexual desire. *Psychology & Sexuality, 4*, 34–45. <https://doi.org/10.1080/19419899.2011.576697>
- Sierra, J. C., Arcos-Romero, A. I., & Calvillo, C. (2020). Validity evidence and norms of the Spanish version of the Hurlbert Index of Sexual Fantasy. *Psicothema, 32*, 429–436. <https://doi.org/10.7334/psicothema2020.14>
- Sierra, J. C., Moyano, N., Vallejo-Medina, P., & Gómez-Berrocal, C. (2018). An abridge Spanish version of Sexual Double Standard Scale: Factorial structure, reliability and validity evidence. *International Journal of Clinical and Health Psychology, 18*, 69–80. <https://doi.org/10.1016/j.ijchp.2017.05.003>
- Sierra, J. C., Ortiz, A., Calvillo, C., & Arcos-Romero, A. I. (2020). Experiencia subjetiva del orgasmo en el contexto de la masturbación en solitario. *Revista Internacional de Andrología, 12*, 47–54. <https://doi.org/10.1016/j.androl.2019.10.001>. Advance online publication
- Sierra, J. C., Perla, F., & Gutiérrez-Quintanilla, R. (2010). Attitudes Toward Masturbation in Adolescents: Psychometric Properties of Spanish Version of Attitudes Toward Masturbation Inventory. *Universitas Psychologica, 9*, 531–542.
- Sierra, J. C., Perla, F., & Santos-Iglesias, P. (2011). Sexual guilt in youngsters: The influence of attitudes and sexual experience. *Revista Latinoamericana de Psicología, 43*, 73–81.
- Sierra, J. C., Santos Iglesias, P., & Monge, F. S. (2013). Inventario de actitudes negativas hacia la masturbación: validez, fiabilidad y propuesta de una versión reducida para población adolescente. *Revista Argentina de Clínica Psicológica, 22*, 57–65.
- Stekhoven, D. J., & Bühlmann, P. (2011). MissForest—non-parametric missing value imputation for mixed-type data. *Bioinformatics, 28*, 112–118. <https://doi.org/10.1093/bioinformatics/btr597>
- Sümer, Z. H. (2015). Gender, religiosity, sexual activity, sexual knowledge, and attitudes toward controversial aspects of sexuality. *Journal of Religion and Health, 54*, 2033–2044. <https://doi.org/10.1007/s10943-014-9831-5>
- Tavares, I. M., Schlagintweit, H. E., Nobre, P., & Rosen, N. O. (2019). Sexual well-being and perceived stress in couples transitioning to parenthood: A dyadic analysis. *International Journal of Clinical and Health Psychology, 19*, 198–208. <https://doi.org/10.1016/j.ijchp.2019.07.004>
- Træen, B., Stulhofer, A., Janssen, E., Carvalheira, A. A., Hald, G. M., Lange, T., & Graham, C. (2019). Sexual activity and sexual satisfaction among older adults in four European countries. *Archives of Sexual Behavior, 48*, 815–829. <https://doi.org/10.1007/s10508-018-1256-x>
- Vallejo-Medina, P., Granados, M. R., & Sierra, J. C. (2014). Proposal and validation of a short version of the Sexual Opinion Survey in the Spanish population. *Revista Internacional de Andrología, 12*, 47–54. <https://doi.org/10.1016/j.androl.2013.04.004>
- Vallejo-Medina, P., Marchal-Bertrand, L., Gómez-Lugo, M., Espada, J. P., Sierra, J. C., Soler, F., & Morales, A. (2016). Adaptation and validation of the Brief Sexual Opinion Survey (SOS) in a Colombian sample and factorial equivalence with the Spanish version. *PloS one, 11*, Article e0162531 <https://doi.org/10.1371/journal.pone.0162531>
- World Association for Sexual Health. (2019). *Declaration of sexual pleasure*. Retrieved from <https://worldsexualhealth.net/resources/declaration-on-sexual-pleasure/>
- Zamboni, B. D., & Crawford, I. (2003). Using masturbation in sex therapy: Relationships between masturbation, sexual desire, and sexual fantasy. *Journal of Psychology & Human Sexuality, 14*, 123–141. https://doi.org/10.1300/J056v14n02_08
- Zimmer, F., & Imhoff, R. (2020). Abstinence from masturbation and hypersexuality. *Archives of Sexual Behavior, 49*, 1333–1343. <https://doi.org/10.1007/s10508-019-01623-8>