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Is the sexual sensation seeking scale a reliable instrument? addressing multiple factor structures in a Colombian sample

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Is the Sexual Sensation Seeking Scale a Reliable Instrument? Addressing Multiple

Factor Structures in a Colombian Sample

Abstract

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The sexual sensation seeking scale (SSSS) is a widely used instrument to measure

individuals' tendency to seek an optimal level of sexual arousal and novel sexual experiences.

However, psychometric studies have suggested different factor structures for this instrument,

which may lead to a biased assessment of the subdimensions of sexual sensation seeking. The

present study (N = 812) aimed to identify the best factorial model of the SSSS by comparing

the model suggested by previous research. Results from Exploratory and Confirmatory Factor

Analyses showed that none of the models tested have sufficient goodness-of-fit to support the

internal validity of the instrument. Thus, this study highlights the limitations of the SSSS in

assessing sexual sensation seeking and proposes psychometric alternatives that should be

considered by researchers to achieve a reliable measure of sexual sensation seeking.

Keywords: Sexual sensation seeking; Factor structure; Validity; Colombian.

People vary in their tendency to maintain an optimal level of sexual arousal and having novel sexual experiences. Indeed, individuals high in sexual sensation-seeking (SSS) tend to need more exciting sexual experiences to reach the point of subjective sexual arousal that triggers a sense of sexual satisfaction (Kalichman et al., 1994, 1995). In this sense, individuals with high scores in SSS tend to be more curious and attentive to novel and challenging sexual experiences throughout their lifetime, more susceptible to sexual boredom, and more prone to use sex as a coping mechanism (Flanders et al., 2013; Moynihan et al., 2021). These individuals are also more open to engage in different sexual behaviors, experience more sexual motivation, and are more unrestricted in their sociosexuality, rendering them more likely to have casual sex without establishing significant affective bonds and to have more sex partners throughout their lifetime (Barrada et al., 2018; Gaither & Sellbom, 2003; Koomson & Teye-Kwadjo, 2021; Moynihan et al., 2021; Zheng & Zheng, 2014; Zuckerman, 2007).

To have an objective and reliable measure for assessing the SSS construct, Kalichman and colleagues (1994) developed the Sexual Sensation Seeking Scale (SSSS). Although this scale has been widely used, most studies have overlooked the importance of conducting psychometric analyses, and have instead relied on the original single-factor conceptualization (e.g., Burri, 2017). Only a handful of cross-cultural psychometric validations are reported in the literature. Consistent with the original operationalization, some studies (Brenk-Franz et al., 2021) found a single-factor structure in samples of Portuguese and German participants, whereas 2-factor structures were found in samples of Spanish (Ballester-Arnal et al., 2018; Gil-Llario et al., 2018; Santos-Iglesias et al., 2018) and Portuguese participants (Oliveira et al., 2017). And yet, there were inconsistencies in the item distribution across these research approaches (see Table 1).

For example, Ballester-Arnal and colleagues (2018) found that the item "I like wild "uninhibited" sexual encounters" saturated on the factor Physical Sensations Attraction (PSA), whereas Gil-Llario and colleagues (2018) found that same item to be part of the factor Seeking New Experiences (SNE). In contrast, the item "When it comes to sex, physical attraction is more important to me than how well I know the person" was found to saturate on the factor PSA across all studies. Moreover, the item "I have said things that were not exactly true to get a person to have sex with me" was included in the final structures in some studies (e.g., Gil-Lario et al., 2018) but excluded in others that had similar (Santos-Iglesias et al., 2018) or different samples (Pechorro et al., 2015). Adding to the argument of factorial inconsistency, Brenk-Franz and colleagues (2021) examined a single-factor aligned with Kalichman (2011)'s proposal despite acknowledging that different statistical criteria yielded distinct structures.

In most of the psychometric studies, the authors took precautions to decrease factorial indeterminacy (see Perez et al., 2000) and confirmatory biases (see Hair et al., 2014) by implementing exploratory and confirmatory factor analyses (Ballester-Arnal et al., 2018; Gil-Llario et al., 2018; Santos-Iglesias et al., 2018). These procedures allow researchers to explore different factor structures on a subsample of participants, and then compare the fit indexes of each model and identify the model with the higher goodness-of-fit in a different subsample (e.g., Domingues & Gonçalves, 2020; Rodrigues & Lopes, 2013). Furthermore, although researchers conducted psychometric analyses with similar procedures, the statistical procedures performed to estimate the factors differed across studies. For example, Ballester-Arnal and colleagues (2018) used Un-Weight Least Squares (ULS), Gil-Llario and colleagues (2018) estimated the parameters using Weight Least Square (WLS), whereas Oliveira and colleagues (2017) used Maximum Likelihood (ML) in their study. By employing different

estimators, researchers are unable to discard the possibility that the estimation technique could cause differences in factor structures.

Current Study

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Given the inconsistent factor structures of the SSSS reported in the literature and the lack of validation studies in South American countries, we conducted a psychometric study in Colombia examining the validity and reliability of the SSSS. We compared our factor structure(s) with other structures previously reported by using the same estimator. This allowed us to determine which structure had the best fit indexes within acceptable thresholds and, consequently, which was the most fitted to our data (if any).

Method

Participants

A total of 1033 participants took the web survey but only 812 met the inclusion criteria and answered the attention-check item correctly. Participants were, on average, 23 years old ($M_{\rm age} = 22.9$, SD = 7.24) and most were heterosexual (87.4%), women (63.9%), and undergraduate students (74.6%). Nearly half the sample indicated to be in a romantic relationship (52.4%) and not being religious (46.4%).

Measures

Demographic Variables

The survey inquired participants' demographic information. The questions probed into the sex (e.g., male, female, and other), sexual orientation (e.g., heterosexual, homosexual, bisexual, and other), marital status (e.g., single, dating, common-law marriage, and married), age (open-ended question), educational level (e.g., high school, college, bachelor, graduate studies, and no studies), and area of residence (e.g., Atlántico, Bolivar, Cundinamarca, etc.).

Sexual Sensation Seeking Scale (SSSS)

The original SSSS (Kalichman et al., 1994) includes 11 items to assess people's tendency to maintain an optimal level of sexual drive and to seek novel sexual experiences (e.g., "I am interested in trying out new sexual experiences"). Responses are given in a 4-point-response scale (1 = Strongly disagree to 4 = Strongly agree). Since its original proposal, some authors have recommended the exclusion of the item "I have said things that were not exactly true to get a person to have sex with me", because it refers to problematic sexual behaviors that involve sexual coerciveness and not sexual sensation-seeking (e.g., Kalichman, 2011; Pechorro et al., 2015). Hence, we used the 10-item version of the SSSS in our study. Some studies have shown a reliable global score, $.74 < \alpha < .91$ (Brenk-Franz et al., .2021; Pechorro et al., 2015), whereas other studies have shown reliable 2-factor structures, .2021; Pechorro et al., 2015), whereas other studies have shown reliable 2-factor structures, .2021; Pechorro et al., 2015), whereas other studies have shown reliable 2-factor structures, .2021; Pechorro et al., 2015), whereas other studies have shown reliable 2-factor structures, .2021; Pechorro et al., 2015), whereas other studies have shown reliable 2-factor structures, .2021; Pechorro et al., 2015), whereas other studies have shown reliable 2-factor structures, .2021; Pechorro et al., 2015), whereas other studies have shown reliable 2-factor structures, .2021; Pechorro et al., 2015), whereas other studies have shown reliable 2-factor structures, .2021; Pechorro et al., 2015), whereas other studies have shown reliable 2-factor structures, .2021; Pechorro et al., 2015), whereas other studies have shown reliable 2-factor structures, .2021; Pechorro et al., 2015), whereas other studies have shown reliable 2-factor structures, .2021; Pechorro et al., 2015), whereas other studies have shown reliable 2-factor structures, .2021; Pechorro et al., 2015, whereas other structures, .2021; Pechorro et

Procedure

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The data for this study were collected between April 2019 and May 2020 using an online survey distributed on social media in Colombia. To participate, individuals had to be over the age of 18 and to have previously engaged in sexual activity. The first section of the survey explained the general goals of the study and included an informed consent form. After providing their consent, participants were asked to provide demographic information (e.g., gender, relationship status), and then presented with the SSSS. We also included one attention-check item ("Please check the option *Completely agree*").

Data Analysis

We employed a two-step validation to analyze the psychometric properties of the SSSS. Specifically, we randomly divided our sample into two equally-sized groups. On the first subsample, we computed an exploratory factor analysis (EFA) with Weighted Least

Square (WLS) and Promax rotation. We chose WLS due to the limitations of estimating ordinal variables from estimators developed for quantitative data such as the Maximum Likelihood (ML) method (Gazeloglu & Greenacre, 2020). For the same reason, we relied on the polychoric correlation matrix. Descriptive statistics for each item and Kaiser-Meyer-Olkin statistic (KMO) analysis are detailed. We then determined the number of factors based on three criteria – Minimum Average Partial (MAP), Horn's parallel analysis, and eigenvalues. We then considered the saturation values of each item and retained only items with $\lambda \geq .30$ on just one of the factors. If needed, items were systematically excluded to obtain a factor structure in which items had at least moderate loadings, and factors included at least three items. For the interested reader, fit indexes with ML estimation are also reported.

On the second subsample, we computed confirmatory factor analyses (CFA) considering the factor structures identified through the EFA and the factor structures reported in previous research (Ballester-Arnal et al., 2018; Gil-Llario et al., 2018; Kalichman, 2011; Kalichman & Rompa, 1995; Oliveira et al., 2017; Pechorro et al., 2015; Santos-Iglesias et al., 2018). For each model, we computed χ^2 , Comparative Fit Index (CFI), Tucker Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). Models were compared in absolute and incremental fit indices. Based on the recommendations of Hu and Bentler (1999), models with adequate fit require CFA and TLI values higher than .95, and RMSEA lower than .06. By using different analyses in two independent subsamples, we decreased the chance of biased results (see Aguinis et al., 2017). For all the analyses, we used the 'psych' (Revelle, 2021) and 'lavaan' (Rosseel, 2012) packages of R (R Core Team, 2021).

Results

Exploratory Factor Analysis

The polychoric correlation matrix showed that the SSSS items were factorizable (see Table 2). Hence, we proceeded with the EFA. Different factor structures were identified

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according to different criteria (see Figure 1). Specifically, the MAP criterion suggested a single-factor structure (Model 1), the Horn's parallel analysis criterion suggested two factors (Model 2), and the eigenvalues criterion suggested a three-factor structure (Model 3).

-- Figure 1 --

-- Table 2 --

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In Model 1, the item "I enjoy the sensation of intercourse without a condom" (Item 3) showed a low loading (λ = .27) and was excluded from the structure. All other items presented adequate loading values ($\lambda \ge .30$). In Model 2, the items "The physical sensations are the most important thing about having sex" (Item 2) and "When it comes to sex, physical attraction is more important to me than how well I know the person" (Item 5) showed low loadings, ($\lambda \le .26$), whereas the item "I enjoy the sensation of intercourse without a condom" (Item 3) had loadings above 1 (λ = 1.08). Also, the second factor in Model 2 had only one item and was deemed inappropriate. Similarly, the third factor in Model 3 included only one item that was also deemed inappropriate (see table 3). By eliminating items with saturation problems from Model 2 and Model 3 to obtain a more suitable model, results were not satisfactory, therefore, from the models identified in the EFA, only Model 1 was tested in the CFA.

-- Table 3 --

Confirmatory Factor Analysis

In total, we tested six models – our model (Model 1) and five other models identified in past studies (Models 4-8). Results are summarized in Table 3. Model 6 (reported by Gil-Llario et al., 2018) had the worst fit indexes and Model 8 had the most adequate fit indexes. Even though fit indexes for Model 8 were better than those obtained for our model (Model 1), none of the models showed acceptable goodness-of-fit indexes to support internal validity. –-Table 4--

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In the present study, we aimed to validate the SSSS in the Colombian context and determine the most adequate factor structure using EFA and CFA. In total, we evaluated six models based on one identified in our EFA and the other ones were proposed in previous studies. Our results showed that the 2-factor structure proposed by Ballester-Arnal and colleagues (2018) had the best fit indexes for our sample. However, the fit indicators were far from ideal and not sufficient to support the validity of the scale. Based on our data, we argue that the SSSS does not reliably assess SSS or its (different) factors. This opens a gap in the literature by highlighting the need to revise the current SSSS (e.g., rephrase items, generate new items) and determine the best distribution of items across different factors, or alternatively develop a new measure to assess SSS (e.g., through a content analysis of its meaning).

Researchers, who decide to work on existing factor structures, could consider the structure and item distribution proposed by Ballester-Arnal and colleagues (2018) as a starting point. Building upon the characteristics of the PSA and SNE as factors underlying the experience of SSS, researchers could aim to propose new items, thus increasing the validity and reliability of the scale. Differentiating between both factors could be beneficial (and less time consuming) for future studies since it identifies how the tendency to seek new sexual partners and sexual pleasure may lead people to engage in risky sexual behaviors, such as people with high scores in PSA may be more likely to engage in riskier sexual activities to increase their physical sensations and sexual pleasure (e.g., condomless sex, sex under the influence of drugs or alcohol), whereas individuals that have high scores in SNE may focus on engaging in new sexual experiences and taking more risks (e.g., having sex with strangers). As previous studies have found that people with high SSS tend to be more sociosexually unrestricted (Barrada et al., 2018; Koomson & Teye-Kwadjo, 2021; Zheng &

Zheng, 2014), it is possible that implementing a revised version of the SSSS may yield high correlates between physical experience seeking and constructs such as sociosexuality. On the other hand, research shows that individuals with high sexual disgust tend to avoid risky situations (e.g., dating a stranger), which departs from the possible decisions of a sexual sensation seeker (Sevi & Shook, 2021). These individuals tend to avoid taboo sexual situations, oral sex, and BDSM (Crosby et al., 2020), so it is possible that, when measuring the novel experience-seeking domain in these, a strong correlate with sexual disgust could be found.

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If researchers work on creating a new SSS measure, they should take a person-centered approach and ask individuals to indicate what they take as seeking new sensations and experiences in sexuality. This would provide key information as to which attributes would be central or more peripheral to the construct of SSS (for similar approaches, see Rodrigues & Lopes, 2014). We suggest that researchers would need to initially probe the conceptions a sample has about SSS, then evaluate the relevance of these aspects found in a second sample. Thus, they could determine both central and peripheral aspects of the SSS construct.

Our findings relied on non-probabilistic sampling and therefore the generalizability of the results is limited. As our sample consisted mainly of heterosexual young adults, future research should seek to revise or propose a new SSS scale and examine its psychometric properties with diverse samples to foster generalizability across cultural contexts.

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Table 1: Item distribution of SSSS by study

| | Factor structure | | | | | |
|---------|---|----------|-----|----------|----------|----------|
| | · · | 1 | 2 | 3 | 4a,b,c | 5 |
| Item 1 | I like wild "uninhibited" sexual encounters | PSA | SNE | SNE | PSA | PSA |
| Item 2 | The physical sensations are the most important thing about having sex | PSA | PSA | Excluded | PSA | PSA |
| Item 3 | I enjoy the sensation of intercourse without a condom | PSA | PSA | Excluded | PSA | PSA |
| Item 4 | My sexual partners probably think I am a "risk taker" | Excluded | PSA | PSA | PSA | PSA |
| Item 5 | When it comes to sex, physical attraction is more important to me than how well I know the person | PSA | PSA | PSA | PSA | PSA |
| Item 6 | I enjoy the company of "sensual" people | PSA | SNE | PSA | PSA | PSA |
| Item 7 | I enjoy watching "X-rated" videos | PSA | PSA | PSA | PSA | SNE |
| Item 8 | I have said things that were not exactly true to get a person to have sex with me | PSA | PSA | PSA | Excluded | Excluded |
| Item 9 | I am interested in trying out new sexual experiences | SNE | SNE | SNE | PSA | SNE |
| Item 10 | I feel like exploring my sexuality | SNE | SNE | SNE | PSA | SNE |
| Item 11 | I like to have new and exciting sexual experiences and sensations | SNE | SNE | SNE | PSA | SNE |

^{1:} Ballester-Arnal et al., (2018); 2: Gil-Llario et al., (2018); 3: Oliveira et al., (2017); Modelo 4^a: Kalichman (2011); 4^b: Pechorro et al., (2015); 4^c: Brenk-Franz et al., (2021); 5: Santos-Iglesias et al., (2018); PSA: Physical sensations attraction; SNE: Seeking new experiences.

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Table 2: Inter-item polychoric correlations and descriptive statistics

| | Item 1 | Item 2 | Item 3 | Item 4 | Item 5 | Item 6 | Item 7 | Item 8 | Item 9 | Item 10 | Item 11 |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|
| Item 1 | - | | | | | | | | | | |
| Item 2 | .18 | - | | | | | | | | | |
| Item 3 | .20 | 0 | - | | | | | | | | |
| Item 4 | .47 | .11 | .21 | - | | | | | | | |
| Item 5 | .30 | .32 | .17 | .26 | - | | | | | | |
| Item 6 | .40 | .17 | .15 | .21 | .36 | - | | | | | |
| Item 7 | .25 | .13 | .02 | .14 | .16 | .37 | - | | | | |
| Item 8 | .24 | .16 | .05 | .19 | .41 | .40 | .29 | - | | | |
| Item 9 | .42 | .15 | .20 | .38 | .18 | .45 | .27 | .12 | - | | |
| Item 10 | .31 | .11 | .16 | .25 | .15 | .31 | .26 | .06 | .74 | - | |
| Item 11 | .46 | .19 | .25 | .34 | .17 | .44 | .29 | .05 | .83 | .79 | - |
| M | 2.67 | 2.54 | 2.92 | 2.19 | 2.0 | 2.71 | 2.52 | 1.61 | 3.08 | 3.15 | 3.32 |
| SD | .98 | .86 | 1.07 | .95 | .91 | .92 | 1.02 | .94 | .97 | .96 | .81 |
| Skewness | 37 | 12 | 76 | .13 | .57 | 39 | 17 | 1.17 | 88 | 94 | -1.22 |
| Kurtosis | 88 | 80 | 54 | -1.02 | 64 | 73 | -1.08 | .15 | 18 | 15 | 1.08 |

 $\overline{\text{KMO}} = .76.$

Table 3. Factor loadings in EFA.

| | Model 1 | Mod | lel 2 | Model 3 | | |
|---------|---------|-----|-------|---------|-----|-----|
| | F1 | F1 | F2 | F1 | F2 | F3 |
| Item 1 | .63 | .53 | .17 | .43 | .12 | .18 |
| Item 2 | .30 | .21 | .14 | 19 | .96 | 17 |
| Item 3 | .27 | 35 | 1.11 | 17 | 13 | .99 |
| Item 4 | .54 | .37 | .27 | .27 | .17 | .26 |
| Item 5 | .37 | .26 | .19 | .03 | .47 | .05 |
| Item 6 | .60 | .64 | .01 | .51 | .17 | 05 |
| Item 7 | .48 | .57 | 11 | .48 | .08 | 09 |
| Item 9 | .73 | .82 | 16 | .97 | 22 | 08 |
| Item 10 | .65 | .71 | 11 | .83 | 20 | 03 |

Table 4: Fit measures

| | χ^2 | DF | CFI | TLI | RMSEA |
|----------|--------------------|---------|-----------|-----------|--------------|
| Model 1 | 138.95 (248.62)*** | 27 (27) | .62 (.76) | .50 (.68) | .10 (.14)*** |
| Model 4 | 128.17 (153.70)*** | 26 (26) | .63 (.86) | .49 (.81) | .10 (.11)*** |
| Model 5 | 119.80 (13.82)*** | 34 (34) | .72 (.90) | .63 (.86) | .08 (.08)*** |
| Model 6a | 193.38 (291.01)*** | 43 (43) | .55 (.75) | .43 (.68) | .09 (.12)*** |
| Model 7 | 161.23 (263.78)*** | 35 (35) | .59 (.76) | .47 (.69) | .09 (.13)*** |
| Model 8b | 114.14 (119.84)*** | 34 (34) | .73 (.91) | .65 (.88) | .08 (.08)*** |

"p < .001; ML fits are in parentheses; Model 1: Model reported by Kalichman et al. (2011), without item 3; Model 4: Model found by Oliveira et al. (2017); Model 5: Model proposed by Santos-Iglesias et al. (2018); Model 6: Model proposed by Gil-Llario et al. (2018); Model 7: Model proposed by Kalichman (2011); Model 8: Model found by Ballester-Arnal et al. (2018); Model 2 and 3 were not tested; a = Worst model; b = Best model.

Figure 1. Number of factors according to each statistical criterion

