Journal of Sex & Marital Therapy

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/usmt20

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To cite this article: Zeynep Dilşah Karaçam Yılmaz & Neslihan Keser Özcan (11 Oct 2024): The Turkish Version of the Sexual Interest and Desire Inventory-Female (SIDI-F): Examination of the Validity, Reliability and Factorial Structure, Journal of Sex & Marital Therapy, DOI: 10.1080/0092623X.2024.2409221

To link to this article: https://doi.org/10.1080/0092623X.2024.2409221

JOURNAL OF SEX & MARITAL THERAPY
https://doi.org/10.1080/0092623X.2024.2409221

Routledge
Taylor & Francis Group

RESEARCH ARTICLE

The Turkish Version of the Sexual Interest and Desire Inventory-Female (SIDI-F): Examination of the Validity, Reliability and Factorial Structure

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ABSTRACT

The aim of this study is to investigate the validity and reliability of the Turkish version of the Sexual Interest and Desire Inventory-Female (SIDI-F). This methodological study was conducted with 268 women who met the sampling criteria between January and February 2024. Validity analysis was performed using the content validity index, convergent and divergent validity, exploratory factor analysis, and confirmatory factor analysis. Pearson product-moment correlation and Cronbach Alpha reliability coefficients were used for reliability analysis. To evaluate invariance of the inventory over time, test-retest measurements were conducted three weeks apart and showed no difference in mean scores ($p > .05$). Corrected item-total score correlations ranged from 0.303 to 0.846 in the positive direction and were statistically highly significant. Adjusted goodness-of-fit index > 0.85 and comparative fit index > 0.90 confirmed the construct validity of the Turkish SIDI-F. The Cronbach Alpha was found to be .88, indicating high internal consistency. The Turkish version of SIDI-F can be used as a measurement tool to determine the level of sexual interest and arousal.

Introduction

Sexual Interest/Arousal Disorder (SIAD) is characterized by reduced/absent sexual interest or arousal, reduced/absent desire to respond to sexual stimuli, recurrent or persistent reduction/absence of sexual desire and the fantasies of engaging sexual activity for at least 6 months, which negatively affects the quality of life (Brotto et al., 2023; Kingsberg & Woodard, 2015; Malary et al., 2016).

SIAD affects approximately one-third of women worldwide (Brotto et al., 2023; Mitchell et al., 2013; Ramezani et al., 2015). Methodological and cultural differences should be taken into account regarding the prevalence of SIAD. It has been reported as 35% in Iran, 28.6% in the USA, 34% in Britain and 12% in Türkiye (Mitchell et al., 2013; Parish & Hahn, 2016; Ramezani et al., 2015; Tetik & Yalçınkaya Alkar, 2023). It has been determined that sexual interest and arousal disorders are around 45.9% of patients applying to psychiatric outpatient clinics in Türkiye (Günaydın et al., 2019).

Women's sexual desire and arousal levels are affected by many factors (Vowels et al., 2021). In one systematic review, factors affecting sexual desire and arousal were conceptualized as individual (e.g., attachment styles, expectations, cognitive focus), interpersonal (e.g., relationship

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duration, satisfaction, communication), and social (e.g., sexual attitudes, inequality) (Mark & Lasslo, 2018).

The literature recommends the use of valid and reliable quantitative tools to assess SIAD. In this context, many tools have been developed to measure sexual interest and arousal (Cartagena-Ramos et al., 2018; Velten et al., 2021). The Screener for Hypoactive Sexual Desire Disorder in Menopausal Women (SHSDD), a quantitative tool in the USA, only measures sexual desire in menopausal women (Leiblum et al., 2006). The 50-item Female Sexual Desire Questionnaire (FSDQ), developed in Australia, has not been adapted to other cultures (Goldhammer & McCabe, 2011). The 14-item Sexual Desire Inventory (SDI-2), developed in Canada, is one of the most widely used scales. The SDI-2 is available in Spanish (Vallejo-Medina et al., 2020), Portuguese (Peixoto et al., 2020) and Italian (Callea & Rossi, 2021). However, the scale is not specific to women (Spector et al., 1996). In the USA, the Sexual Interest and Desire Inventory-Female (SIDI-F) developed by Clayton et al. (2006) is widely used to measure female sexual interest and arousal disorders (Clayton et al., 2006). The SIDI-F has German (Velten et al., 2021), Chinese (Liu et al., 2021) and Persian (Malary et al., 2016) versions. This instrument contains 13 items and evaluates women's sexual interest and desire level in the last 4 weeks. Additionally, the mean SIDI-F total score of women diagnosed with SIAD was found to be significantly lower than that of women without sexual dysfunction. These results show that women with SIAD can be distinguished from other women with SIDI-F (Clayton et al., 2006, 2010). It is reported in the literature that SIDI-F is a quality measurement tool specific to determining low levels of sexual interest and desire (Brotto et al., 2023).

There is no scale adapted to Turkish culture that measures the level of sexual interest and arousal specific to women. In this context, this study aimed to adapt a valid and reliable instrument to the Turkish society in order to evaluate the level of female sexual interest and arousal.

Methods

Translation and cross-cultural adaptation

Translation and cross-cultural adaptation were performed following the international guidelines for self-report measures published by the American Association of Orthopedic Surgeons Outcomes Committee (Beaton et al., 2000).

The adaptation of Sexual Interest and Desire Inventory-Female (SIDI-F) to Turkish culture was carried out in six stages. (1) Forward translation and back-translation to examine the psycholinguistic properties of the inventory, (2) Synthesis of translations, (3) Back-translation, (4) Expert committee, (5) Final version and testing, (6) Submission of Documentation to the Developers for Appraisal of the Adaptation Proces.

The inventory was translated from English to Turkish by two different bilingual people (clinical psychologist and English lecturer). One of the translators did not have any information about inventory and sexual function. Next the researchers synthesized the translated texts. The synthesized text was checked for spelling errors and inconsistencies by a Turkish teacher. The inventory was then back-translated from Turkish to English. Accordingly, the inventory was translated back to its original form by two bilingual people (psychologists and preofessional translator) who had not seen the original form of the inventory before. In the fourth stage, expert opinions were received for SIDI-F Turkish version linguistic, conceptual and cultural equivalence (Gynecology and obstetrics nursing faculty member (2), midwifery faculty member (4), sexual therapist, clinical psychologist (1), gynecologist (1), fifth In the first stage, preliminary testing of the inventory was carried out with 20 women with sexual interest and arousal disorders to evaluate the comprehensibility of the SIDI-F Turkish version sentences. The last stage, all the reports and forms were submitted for appraisal of the adaptation process to Anita Clayton.

Preliminary testing

SIDI-F Turkish version was administered to 20 women via Google Forms online survey form. Under each item in the inventory, an evaluation and suggestion regarding the clarity and suitability of the item were requested. Necessary arrangements were made in line with the suggestions. Women included in preliminary testing were not included in the sample of the study.

Participant reported Outcomes questionnaires

SIDI-F is an inventory consisting of 13 items, 5-point Likert type and 11 subgroups that evaluates women's sexual interest, desire and level in the last 4 weeks (Clayton et al., 2006). Subgroups: Relationship, Acceptance, Initiation, Desire—Frequency, Intimacy, Desire—Satisfaction, Desire—Distress, Positive Thoughts, Eroticism, Arousal—Frequency, Ease of Arousal, Persistence of Arousal and Orgasm. Scores from the inventory range from 0 to 51, with a low score indicating a decrease in sexual interest and desire. Considering the cutoff score of SIDI-F as 33, it was determined that 94.7% of women with hypoactive sexual desire disorder were correctly identified (Clayton et al., 2010). The Cronbach Alpha coefficient of the inventory is .90 (Clayton et al., 2006).

Participants

The study was conducted between January and February 2024. Women between the ages of 18 and 47, whose biological sex was female and who had a sexual partner for at least 4 weeks, were included in the study. Women who were receiving treatment for any sexual dysfunction, who were pregnant or menopausal, who had a major psychiatric diagnosis such as depression or schizophrenia, and who gave up participating in the study at any stage of the study were excluded from the study.

Study participants were reached by announcing the study via social media platforms. Sociodemographic information form and SIDI-F Turkish version were applied via Google Form to 268 women who responded positively to the announcement and met the inclusion criteria. SIDI-F retest was applied to 28 women among the participants three weeks later for test-retest reliability.

Statistical analysis

Statistical analysis of the data was carried out using IBM SPSS 28.0 package program (SPSS Inc., Chicago, IL) and SPSS Amos (Analysis of Moment Structures) 16.0 program. The suitability of the data for normal distribution was evaluated by Shapiro-Wilk normality test and skewness and kurtosis values. Since the data showed normal distribution, parametric tests were used in statistical evaluations. T test and one-way analysis of variance were applied to compare quantitative data. Pearson correlation analysis was used to examine the relationship in inventory scores. "Reliability Analysis" was performed to test the reliability of the inventory, and "Confirmatory Factor Analysis (CFA)" was performed to test construct validity. The invariance of the inventory over time was examined by test-retest. AVE and CR values were calculated for convergent and divergent validity. In all analyses, a significance level of $p < 0.05$ was considered statistically significant.

In inventory adaptation, it is recommended that the sample be at least five to ten times the size of the number of inventory items (Boateng et al., 2018; Çapık et al., 2018). Additionally, sample calculations were made using One Sample t-Test with G*Power (3.1.9.6.). With $d = 0.244$, $\alpha = 0.05$ and $1-\beta = 0.95$, the sample size was calculated as 268 women (Cohen, 1988; Faul et al., 2007).

Test-retest reliability and agreement

Test and Retest reliability shows the power of a measurement tool to provide stable results and show invariance at different times (Lamm et al., 2020; Mohajan, 2017). Correlation is examined between measurements performed at different times. Since the test scores have continuous variable and equally spaced inventory characteristics, "Pearson Product Moment Correlation Equation" was used to calculate this correlation. The correlation coefficient (r) should be at least .50 (r = .81–1.0, excellent; r = .61–.80, very good; r = .41 –.60, good; r = .21–.40, moderate and r = .00–.20, poor) (Gökdemir & Yılmaz, 2023; Polit, 2014). SIDI-F Turkish version Test-retest measurements made with 28 participants at three weeks intervals were evaluated with Pearson Product Moment Correlation and t-test.

Validity

Validity indicates the suitability of the measurement tool for its intended use and its representativeness of the construct being measured (Hawkins et al., 2018). In this study, Construct Validity, Convergent and Divergent or Discriminant Construct Validity were used to measure validity. For content validity, the Content Validity Index was calculated after the minimum and maximum scores of each item were determined by eight experts. For construct validity, Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were performed to determine the factor structure of the inventory. In Convergent and Divergent Validity, the relationships between the factors of the inventory resulting from EFA were determined.

Reliability

Reliability refers to the consistency and stability of results obtained from the inventory, demonstrating minimal variability across administrations (Çapık et al., 2018). In this study, Item-Total Correlation Reliability, Internal Consistency Reliability and Test-retest reliability were used to measure validity. For item-total correlation reliability, it is recommended that correlations should not be negative and ideally should exceed .25 or .30, with correlations above .70 considered excellent (Çapık et al., 2018; Tavakol & Dennick, 2011). The internal consistency reliability of the SIDI-F Turkish version was evaluated using the Cronbach's Alpha technique, which is suitable for Likert-type scales. A higher Cronbach's Alpha coefficient indicates greater consistency among the items in the inventory, suggesting that items measuring the same trait are consistent with each other (Gökdemir & Yılmaz, 2023).

Ethical consideration

Ethical approval to conduct the study was obtained from the XX Ethics Committee (No: 158; date:12.18.2023). Informed consent was obtained from each participant and documented using the informed consent form, and the tenets of the Declaration of Helsinki were adhered to.

Results

Translation and cross-cultural adaptation

Following the initial translation process, certain differ were identified between the two translations. These differences included variations such as "sex" and "cinsel aktivite," "sexually suggestive material" and "cinsel içerikli materyal," and "stimulation" and "uyarım." These variations were deliberated upon by researchers, translators, and a native Turkish Literature Teacher to reach a consensus on the final synthesized version. Subsequently, the synthesized version was refined.

After conducting the backward translation, the ultimate version of the inventory was submitted to eight experts for thorough review. The inventory items that reached a consensus as a result of the evaluations made by the experts were evaluated through a pilot application in a group of 20 participants who were not included in the research sample. Necessary corrections were made, and the final version of the inventory was provided.

Reliability

Item-total correlation reliability

The item-total score correlations of the 13 items in the Turkish version of the SIDI-F were examined to evaluate the reliability of the inventory. The correlation reliability coefficients of the sub-dimensions of the Turkish version of the SIDI-F were determined as follows: r = .729–.869 for the Desire/Arousal Sub-Dimension, r = .796–.850 for the Relationship with Partner Sub-Dimension, and r = .825–.83 for the Positive Thoughts Sub-Dimension. These correlation reliability coefficients were positive and statistically highly significant. The analysis revealed that the correlation reliability coefficients ranged from r = .303 to .846, all of which were positive and highly statistically significant.

Internal consistency reliability

The internal consistency reliability of the Turkish version of the SIDI-F was assessed using Cronbach's Alpha coefficient. The Alpha coefficient for the Turkish version of the SIDI-F is α = .88. When examining the Alpha coefficients of the Sub-Dimensions, it was found that α = .92 for the Desire/Arousal Sub-Dimension, α = .76 for the Relationship with Partner Sub-Dimension, and α = .71 for the Positive Thoughts Sub-Dimension.

Test-retest reliability

To calculate the time invariance of the SIDI-F Turkish version, 28 participants were re-tested three weeks later. It was determined that the total test-retest correlation of the SIDI-F Turkish version was r = .88, and its sub-dimensions varied between r =.85 and .75. This showed that the test-retest reliability of the inventory was excellent.

Validity

Content validity

Experts committee opinions for content validity were obtained after the linguistic validity of the inventory was completed. The experts were asked to rate each item between 1 and 3 points (1 point = inappropriate, 3 points = appropriate). According to this rating, the Content Validity Index (CVI) value of each item was calculated. Romero Jeldres et al. (2023) suggested that CVI values for eight experts should be at least .75 at a significance level of $p < .05$ (Lawshe, 1975; Romero Jeldres et al., 2023). After feedback from experts, the CVI of the substances was found to be 88%. As a result of the evaluation of the SIDI-F items, it was determined that 93.26% received 3 points. In this context, it was assumed that the Turkish version of the SIDI-F has good content validity.

Construct validity

Exploratory factor analysis (EFA)

In this study, the Kaiser-Meyer-Olkin (KMO) test was used to determine the suitability of the data for factor analysis, and the Bartlett test was used to determine whether the relationships between the variables were significant. The KMO coefficient was 0.880, and the chi-square value

of Bartlett's test was 1098.672, with $df = 70$ and $p = .000$. These results indicate that the data were suitable and sufficient for factor analysis. Principal Components, Maximum Likelihood and Varimax Rotation Method were used in factor analysis.

As a result of EFA, factors with eigenvalues above 1 were considered significant and sub-dimensions were created with Scree Plot.

When the Scree Plot examined, it is determined that it shows a three factors. EFA is an important and necessary step in ensuring construct validity. As a result of EFA, the 13-item SIDI-F was found to have three factors with eigenvalues above 1.00, explaining 71.557% of the total variance.

Confirmatory factor analysis (CFA)

After EFA, CFA was performed on the data set containing a new sample group. Model fit testing was conducted with CFA. In EFA, factor loadings should not be less than 0.20. As a result of CFA, it was found that the loadings of all items obtained from the three sub-dimensions of the Turkish version of SIDI-F were sufficient (Above 0.20, the values between the arrows are loadings corresponding to the factor loading.)

According to CFA, it was determined that the Structural Equation Model Result of the inventory was significant at the $p = .000$ level and that 13 items and three sub-dimensions were related to the inventory structure. Goodness-of-fit index (GFI), Adjusted goodness-of fit index (AGFI) and Comparative fit index (CFI) indexes are accepted to be above 0.90, and Root Mean Square Error of Approximation (RMSEA) value is below 0.08. corresponds to acceptable fit. As a result of three-factors CFA, fit indices were determined as follows: chi-square (χ^2) = 301.973 ($p = .000$), degrees of freedom (df) = 6 (χ^2/df 301.973/6 = 4.872), RMSEA = 0.07, CFI = 0.93, GFI =0.91, and AGFI = 0.85. CFA analysis of the 13-item and three-factor SIDI-F showed that the goodness of fit indices were at an acceptable level.

Convergent and divergent validity

For convergent and divergent validity, Composite Reliability (CR) and Average Variance Extracted (AVE) values were calculated for each dimension. CR value was calculated as 0.70 and above, and AVE values were calculated as 0.50 and above, thus ensuring convergent validity. Correlations between variables were calculated for divergent validity. It was determined that the square roots of AVE values were greater than these correlation values.

Discussion

In this study, the suitability of the SIDI-F, which was developed to measure women's sexual interest and arousal levels, for the Turkish culture was evaluated and it was determined that the Turkish version of the SIDI-F had good psychometric properties. In this regard, the reliability and validity of the SIDI-F Turkish version has been demonstrated.

There are many scales in the literature that have been developed to measure sexual interest and arousal. However, there is no single universally accepted scale, as each scale has its advantages and limitations (Battle et al., 2022).

SIDI-F has been psychometrically tested in many languages, including Persian and English, and its validity and reliability have been demonstrated (Clayton et al., 2010; Malary et al., 2016; Velten et al., 2021). SIDI-F Turkish version consists of 13 items with 3 sub-dimensions.

Exploratory Factor Analysis (EFA) revealed a three-factor structure explaining 71.557% of the variance explained by the factors. Factor 1 includes items 4, 5, 6, 7, 7, 10, 11, 12 and 13, Factor 2 includes items 1, 2 and 3 and Factor 3 includes items 8 and 9. Due to the absence of factor analysis on versions of SIDI-F in other languages, a comparative analysis could not be conducted (Clayton et al., 2006; 2010; Malary et al., 2016; Velten et al., 2021).

A Cronbach Alpha coefficient between .80 and 1.00 indicates a high level of reliability (Boateng et al., 2018). The total Cronbach Alpha coefficient for three sub-dimensions of SIDI-F Turkish version is .88 and it is similar to the coefficients in other versions of the inventory. Clayton et al. (2006) reported Cronbach Alpha coefficient of .90, Malary et al. (2016) reported Cronbach Alpha coefficient of .89, and Velten et al. (2021) reported Cronbach Alpha coefficient of .90.

The invariance of a inventory over time is very important. It is recommended to perform test-retest measurements in order to measure the invariance of inventories over time (Polit, 2014). When this study is examined, it is shown that the test-retest correlation (r) value is .88 and its sub-dimensions vary between .75 and .85. This shows that the invariance of the inventory against time is excellent. Malary et al. (2016) reported that it ranged from r = .77 to r = .99, and Velten et al. (2021) reported r = .74 (Malary et al., 2016; Velten et al., 2021).

In Item-Total Score Correlation Reliability, the higher correlation coefficient, the stronger relationship of the item with quality to be measured. It is generally recommended that the item-total score correlation coefficient should be greater than .25 or .30. (Çapık et al., 2018). When the item-total score correlation in the initial version of the SIDI-F was examined, it was reported to range between .10 and .83 (Clayton el al., 2006). In a later study conducted for its revision, it was demonstrated that the correlation coefficient ranged between .15 and .75 (Sills et al., 2005). In this study, the correlation coefficients ranged from .30 to .84 and were higher than in the Sills et al. (2005) and Clayton et al. (2006) studies. This shows that the reliability of the Turkish version of the inventory is higher. In addition, when the SIDI-F Turkish version was divided into sub-dimensions, the item-sub-dimension total score correlation coefficient ranged from .72 to .86. This shows that SIDI-F Turkish version is very reliable and can be used for its intended purpose.

Convergent validity states that the statements related to the variables are related to each other and to the factor they form. Divergent validity means that statements about variables should be less related to factors other than the factor to which they belong, than the factor to which they belong. For convergent validity, all CR values for the inventory are expected to be greater than the AVE values, and the AVE value is expected to be greater than 0.5 (Alarcón et al., 2015; Yaşlıoğlu, 2017). In this study, when the AVE and CR scores calculated for each factor in the inventory were examined, it was determined that the AVE scores ranged from .65 to .67 and the CR scores ranged from .80 to .82. According to these results, it was determined that CR was greater than the AVE score. As with Cronbach Alpha, the CR value is over .70, providing additional empirical evidence regarding the validity of the inventory (Raykov, 1998).

In order to ensure divergent validity, the conditions where MSV < AVE; ASV < MSV are met, and the square root of AVE must be greater than the correlation between factors (Alarcón et al., 2015). In terms of divergent validity in this study, it was determined that the MSV values in all sub-dimensions of the inventory were less than the AVE value, the ASV values in all sub-dimensions were less than the MSV values, and finally, the square root of the AVE in all sub-dimensions was greater than the correlation between factors. When the convergent and divergent validity between the sub-dimensions was examined, it was shown that all sub-factors were related to each other.

This situation demostrates that sexual interest and desire should be evaluated holistically, not only with sexual intercourse with or without a partner or with positive thoughts.

As a result of all analyses, it was concluded that SIDI-F-TR is a valid and reliable inventory applicable in Turkish culture.

Acknowledgments

This manuscript is part of the doctoral dissertation of the corresponding author.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Ethical approval

Before starting the study, permission was obtained from the Marmara University Faculty of Health Sciences, Noninvasive Clinical Studies Ethics Committee (12.18.2023/158).

Funding

The author(s) reported there is no funding associated with the work featured in this article.

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