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Development and initial validation of the Positive Sexuality Scale for female adults

This is the final peer-reviewed author's accepted manuscript (postprint) of the following publication:

*Published Version:*

Casu, G. (2019). Development and initial validation of the Positive Sexuality Scale for female adults. *JOURNAL OF CLINICAL NURSING*, 28(7-8), 1289-1299 [10.1111/jocn.14742].

*Availability:*

This version is available at: <https://hdl.handle.net/11585/670976> since: 2024-06-24

*Published:*

DOI: <http://doi.org/10.1111/jocn.14742>

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## POST-PRINT

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### Abstract

**Aim and objectives:** To develop and initially validate the Positive Sexuality Scale (PSS) to assess adult female positive sexuality.

**Background:** While traditional approaches focus on negative sexual experiences and sexual dysfunctions, within the positive psychology framework positive sexuality is a subjective experience of happiness and fulfillment with one's sexual expression, which contributes to well-being. No measure exists that specifically measures adult female positive sexuality and can be confidently used with women of any fertility/childlessness status.

**Design:** Two-stage cross-sectional study with a 4-week test-retest, which follows the STROBE guidelines.

**Methods:** Participants were 912 Italian women aged 18-45 (52.74% mothers, 23.79% voluntarily childless, and 23.46% primary infertile), who completed the 5-item PSS and a self-report of psychological well-being. A subsample ( $n = 61$ ) completed the 4-week test-retest.

**Results:** Factor analyses supported a one-factor model with measurement invariance across adulthood stage and fertility/childlessness status and good reliability. Younger and fertile women showed higher PSS scores, and moderate-to-high variability in infertile women's well-being was accounted for by PSS scores.

**Conclusion:** The PSS is a brief self-report with initial evidence of validity and reliability that could be used in sex research, practice, and education.

**Relevance to clinical practice:** The PSS could assist health professionals to identify a positive resource to which women can draw on to deal with sex-related issues. Implementing

the assessment of positive female sexuality in infertility protocols could help professionals to identify a potential resource within couples facing infertility and its treatment.

## KEYWORDS

childlessness, instrument development, measurement invariance, motherhood, positive sexuality, primary infertility, sexuality, validation, well-being, women

## IMPACT STATEMENT

### **What does this paper contribute to the wider global clinical community?**

- The PSS can be confidently used with emerging and young adult women who are mothers or voluntarily/involuntarily childless to assess their overall positive sexual expression from a person-centered, strengths-based perspective.
- The PSS might be used in future research on the associations between women's positive sexuality and other individual and social characteristics, with potential applications in sex and couples' therapy.
- The PSS might be used in sex research, practice and education with the aim of promoting a comprehensive approach to women's sexual and reproductive health and rights.

## **1 INTRODUCTION**

Traditional approaches to sexual health and functioning have predominantly adopted a problem-centered orientation, with a focus on negative sexual experiences (e.g., coercion or violence, unintended pregnancy, etc.) or on sexual dysfunctions (e.g., desire, arousal, orgasm, pain, and distress) (Anderson, 2013; Hargons, Mosley, & Stevens-Watkins, 2017). The positive psychology movement has proposed a different approach based on positive aspects of human life (Wood & Tarrier, 2010). This approach has given rise to a more person-centred view of sexuality, with a focus on positive aspects such as sexual satisfaction, sexual pleasure, and sexual well-being (Anderson, 2013). The World Health Organization (2006)

has also proposed a positive vision of sexuality by defining sexual health as a state of physical, psychological and social well-being related to sexuality requiring a positive and respectful approach to sexuality and sexual relationships. Within this sex-positive perspective, Williams and colleagues (Williams, Thomas, Prior, & Walters, 2015) proposed a basic structure for a positive sexuality framework that may help to guide research, practice, and education across multiple disciplines, such as health and medicine, psychology, counseling, and social work. In this view, positive sexuality is defined as how people are happy and fulfilled with their unique sexualities and sexual expression (Williams et al., 2015). This definition entails that people have the power to successfully negotiate sexual interactions, openly and honestly communicate about their sexual interests and preferences, and create sexual experiences that promote their happiness and well-being (Williams, Christensen, & Capous-Desyllas, 2016). Learning to achieve sexual pleasure and to experience sexual enjoyment is a crucial aspect of becoming sexually healthy adults (Tolman & McClelland, 2011). Being capable of controlling and enjoying sexual activity, and having physically and emotionally pleasurable and fulfilling sexual experiences have indeed beneficial implications for a number of outcomes, such as sexual, physical and mental health, overall well-being and quality of life (Anderson, 2013; Williams et al., 2015). Despite this knowledge, most sexuality research still focuses on problems associated with sexual behavior rather than on the potential benefits of sexuality (Arakawa, Flanders, Hatfield, & Heck, 2013; Hargons et al., 2017). Thus, there is a need to incorporate positive sexual indicators in sexuality research, by adopting a positive, strengths-based perspective (Arakawa et al., 2013; Williams et al., 2015). Furthermore, focusing on positive aspects of sex as a relevant component of human life across the life course and across cultures has been suggested as a way to minimize stigma and promote humanity (Hargons et al., 2017; Williams et al., 2016).

In light of the humanistic and inclusive approach of the positive sexuality framework, screening adult women for their level of positive sexuality would contribute to promote a

more comprehensive approach to sexual and reproductive health and rights, as female sexual expression has historically been overlooked and misunderstood (Kismodi, Corona, MatickaTyndale, Rubio-Aurioles, & Coleman, 2017). Although both partnered and single women can experience pleasurable and fulfilling sex lives, sexual experiences within a stable romantic partnership have been associated with more positive sexuality aspects, such as higher sexual esteem, pleasure, and satisfaction (Maas & Lefkowitz, 2015; Sánchez-Fuentes, Santos-Iglesias, & Sierra, 2014; Wood, McKay, Komarnicky, & Milhausen, 2016), and consistently linked to better health outcomes and subjective well-being (e.g., Braithwaite & Holt-Lunstad, 2017). Addressing positive sexuality in women would also allow to identify those with greater resources to deal with sex-related issues throughout adulthood, such as pregnancy, infertility, and contraception. It has indeed been suggested that a positive clinical approach to sexuality is liable to be more beneficial to women's sexual health and well-being than an emphasis on sexual dysfunction (Hutcherson et al., 2009).

## **2 BACKGROUND**

Changes in endocrinological, physical, cognitive, and socioemotional factors through a woman's developmental stages affect her sexual life in terms of motives, thoughts, fantasies, goals, behaviors, and relationships (e.g., Hayes, Bennett, Sidat, Gurrin, & Fairley, 2008). Regarding age-related changes in positive sexuality dimensions, women in the period from the late teens to the mid-to-late twenties show a high degree of sexual exploration (Arnett, 2000), which has been linked to a number of benefits, including sexual pleasure and a positive view of one's sexual self (Maas & Lefkowitz, 2015; Wood et al., 2016). Some research suggests that women reach their peak in sexual satisfaction and desire, and perceive themselves as more lustful, seductive, and sexually active in their early thirties (Barr, Bryan, & Kenrick, 2002; Schmitt, Shackleford, Duntley, & Tooke, 2002). Finally, other research indicates that women with declining fertility (aged 27-45 years) think more about sex, have more frequent and intense sexual fantasies, are more willing to and actually engage in sexual

intercourse more frequently than younger and older, adult women (Easton, Confer, Goetz, & Buss, 2010). A woman's fertility status also affects her sexuality (e.g., Direkvand-Moghadam, Delpisheh, & Direkvand-Moghadam, 2015). Many studies have compared fertile and infertile women in their levels of sexual satisfaction as a dimension of sexual functioning, observing that infertile women tend to have a less enjoyable sexual life than fertile women (e.g., Emec, Apay, & Ozorhan, 2017). Commonly reported causes for a loss of enjoyment of sex among infertile women include an inability to have sex due to fertility problems, or having sexuality be focused on fertility, with scheduled sexual intercourse and persistent thoughts about having a child during sexual intercourse (Newton, Sherrard, & Glavac, 1999). When comparing fertile and infertile women, researchers rarely make a distinction, among fertile women, between mothers and those who are voluntarily childless. The voluntarily childless is a relatively understudied population that is characterized by an active choice regarding the decision not to parent. Voluntarily/involuntarily childless women represent about 20% of women in some European countries, and voluntarily childless women represent an increasing, although still uncommon (2.8%), segment of the childless population (Miettinen, Rotkirch, Szalma, Donno, & Tanturri, 2015). A desire to maintain an active and satisfying sex life with the partner has been reported as a reason for the decision not to have children (Blackstone, 2014).

To the best of our knowledge, no study has addressed adult female positive sexuality as defined within the positive sexuality perspective, with a specific focus on positive feelings (happiness, amusement, enjoyment, pleasure, etc.) and the attribution of positive meaning and value (sense of fulfillment) to one's own sexual experience within the couple (Williams et al., 2015, 2016). This concept of positive sexuality does not strictly coincide with the cognitive-judgmental process involved in the construct of sexual satisfaction, which is currently the most studied positive indicator of sexuality in healthy subjects (e.g., Sánchez-Fuentes et al., 2014). To increase our understanding of how positive sexuality impact an individual's life,

there is a need of standardized measures that may be used across disciplines (Anderson, 2013). Researchers have developed a variety of self-reports that also include positive aspects of sexuality, such as sexual satisfaction, sexual quality of life, and sexual well-being (Anderson, 2013; Rosen et al., 2009; Symonds, Boolell, & Quirk, 2005). Most of these address sexual satisfaction, defined as a subjective evaluation of both the positive and negative aspects of one's sexual relationship (Lawrance & Byers, 1995). Traditional sexual satisfaction scales measure an individual's degree of dissatisfaction with the sexual component of his/her dyadic relationship (e.g., Hudson, Harrison, & Crosscup, 1981; Rust & Golombok, 1985), compare the rewards and costs of one's sexual relationship (Lawrance & Byers, 1995; Nomejko & Dolinska-Zygmunt, 2014), discriminate between sexually functional and dysfunctional individuals (e.g., Meston & Trapnell, 2005; Symonds et al., 2005), or distinguish sexual satisfaction from sexual dissatisfaction (Shaw & Rogge, 2016), while a brief measure has been recently developed to assess satisfaction with sex life as an overall positive cognitive judgment (Neto, 2012). Another recent sexual satisfaction scale focuses to a larger extent on positive aspects of sexuality, which are nonetheless limited to emotional connection and pleasurable erotic/sexual activities and sensations (Štulhofer, Buško, & Brouillard, 2011). Some of these tools developed for the general population or for women with sexual arousal disorders have been used in research on sexuality among infertile women. An example is the Female Sexual Function Index (Rosen et al., 2000), which has been largely used for comparing infertile and fertile women (e.g., Emec et al., 2017), but without being tested for invariance across fertility status groups. Nevertheless, only an evidence of measurement invariance across groups of interest allows meaningful comparisons of conceptualizations, mean values, and relationships between constructs (Steenkamp & Baumgartner, 1998).

Thus, no measure exists that specifically measures positive female sexuality and can be confidently used with adult women of any fertility/childlessness status. Taking into

account the above considerations on content, target population, and need for measurement invariance, a self-report to assess the level of positive sexual expression of adult women of any fertility/childlessness status, namely the Positive Sexuality Scale (PSS), was developed and psychometrically tested.

The length of the scale was an issue taken into account in developing the PSS. In clinical practice, a critical goal is to avoid increasing the respondent burden of multiple assessments and questionnaire incompleteness; therefore, there is an increasing demand for short scales (Ziegler, Kemper, & Krueger, 2014). Although single-item measures have been also proposed to assess sexual well-being as part of subjective well-being (e.g., Mark, Herbenick, Fortenberry, Sanders, & Reece, 2014), some authors (e.g., Diamantopoulos, Sarstedt, Fuchs, Wilczynski, & Kaiser, 2012) discouraged the use of single-item measures, as they do not allow for a thorough examination of instrument validity and reliability. An ideal solution would be a short scale that measures a specific complex psychological construct with fewer than ten items (Ziegler et al., 2014).

To collect evidence of psychometric soundness, the PSS internal structure and measurement invariance across adulthood stages and fertility/childlessness status was tested, which would allow meaningful comparisons of positive sexuality conceptualization and mean values between groups. The PSS internal consistency and test-retest reliability and its relationship with overall well-being among fertile women with or without children and infertile childless women were also examined.

### **3 METHODS**

#### **3.1 Design**

This study has a two-stage cross-sectional design with a 4-week test-retest. The STROBE guidelines for the reporting of observational studies were followed (see Supplementary File 1).

#### **3.2 Participants**



Participants in this study were fertile mothers, voluntarily childless, and involuntarily childless women. During the first stage of sampling, two independent samples, recruited at different time periods and settings, took part in the study. The first one was a convenience sample of women recruited at three family practice centers and three fertility clinics in Italy between January and December 2014 as part of a larger study. The second sample was enrolled at three family practice centers and two fertility clinics between January and December 2015 as to get three equally sized subgroups in relation to fertility/childlessness status.

Inclusion criteria for both samples were: (1) age between 18 and 45 years; (2) being in a stable relationship with a male partner for at least 12 months and living with him; (3) no history of psychiatric disorders; and (4) Italian speaking. The second criterion was built on the Italian law for the access to fertility treatment and was extended to the fertile participants in this study to allow for comparisons across fertility/childlessness status groups. With the aim of avoiding overlapping characteristics in relation to fertility/childlessness status, we used additional inclusion criteria. We enrolled in the first group only mothers who had conceived naturally (excluding mothers who had conceived through assisted reproduction technology and foster mothers); in the second group only childless women who reported an active choice and permanence regarding the decision not to have children (Blackstone, 2014; Miettinen et al., 2015); in the third group only involuntarily childless women diagnosed with primary infertility (i.e., who have never conceived, despite 12 months of attempting conception) who were seeking their first assisted reproduction technology treatment.

Among the 1,172 women contacted during the first recruitment period, 519 (44.28%) met all inclusion criteria. A total of 443 agreed to participate (85.36% response rate). Among the 1,304 women contacted in the second recruitment period, 508 (38.96%) met all inclusion criteria and 469 consented to participate in the study (92.32% response rate). A total of 115

women declined participation, with the most common reason being “not interested in the research”.

For the second stage of sampling, 100 randomly selected women from the second sample were asked to fill out the PSS again after 4 weeks and 61% agreed and completed the retest.

### **3.3 Instrument development**

For developing the PSS items, consultation with members of the target population in the form of focus groups was used as to enhance content validity (Vogt, King, & King, 2004). Four focus groups were conducted with three convenience samples of 4 adult women aged 18-45 years, for a total of 12 participants. The first three focus groups were simultaneously conducted, and involved, respectively, (1) fertile women who were mothers; (2) voluntarily childless fertile women; (3) primary infertile women. In each of these focus groups, women were asked to reflect on the concept of positive sexuality defined as a sense of happiness and fulfillment with one’s own unique sexuality and sexual expression that contributes to well-being and quality of life (Williams et al., 2015), and to try to describe its features based on their personal experiences with their partners. Aspects that emerged in all three focus groups and were thus considered as the most expressive and representative of positive female sexuality within a dyadic relationship were: having sex with the partner is a (1) beautiful, (2) amusing, (3) exciting experience that (4) gives sexual pleasure and (5) brings a sense of fulfillment in the couple relationship. A fourth focus group with all 12 participants was then conducted to refine the final content and response format of the items to include in a new positive female sexuality scale. Content and face validity were then evaluated and approved by three independent sex therapists.

The PSS that resulted from this process was composed of 5 items rated on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). The respondent is asked to think about her actual stable relationship and to rate how much each of the five aspects of sexual life

reported in the questionnaire is representative of her sexual experience with her partner. Although derived entirely from the experience reported by and discussed among women participating in the focus groups in this study, a few PSS items express concepts that are inevitably similar to those expressed in existing measures of sexual satisfaction, sexual well-being and quality of sexual life (Hudson et al., 1981; Nomejko & Dolinska-Zygmunt, 2014; Rosen et al., 2009; Shaw & Rogge, 2016).

### **3.4 Measures**

The questionnaire administered in the first time period included socio-demographic information (i.e., age and educational attainment), and the PSS. The questionnaire administered in the second time period included also the Psychological Well-Being Scales (PWBS-S; Ryff & Keyes, 1995).

The PWBS-S is a 18-item questionnaire assessing six dimensions of psychological well-being: autonomy, environmental mastery, positive relations with others, personal growth, purpose in life, and self-acceptance. Items are rated on a 6-point scale from 1 (strongly disagree) to 6 (strongly agree). All items were summed up to obtain an overall psychological well-being score, with higher scores indicating higher psychological well-being. Cronbach's  $\alpha$  was .72 in the present study.

### **3.5 Ethical considerations**

The investigation conforms to the principles outlined in the Declaration of Helsinki and was approved by the Ethics Committee of the Bologna Local Health Authority (reference number 13039) prior to data collection. All women agreed to voluntarily take part in the study, signed informed consent and responded autonomously to the study questionnaire. Consent forms were stored separately from the questionnaires to ensure confidentiality.

### **3.6 Statistical analysis**

To assess the PSS internal structure, exploratory (EFA) and confirmatory (CFA) factor analyses were conducted on two independent samples, using Pearson's correlation matrices. A large amount of empirical literature demonstrates that Likert items with at least five numerical response categories can be treated as interval-level variables and confidently used in parametric analytical procedures (e.g., Harpe, 2015; Norman, 2010). EFA was performed on the first sample ( $n = 443$ ) using principal axis factoring. To determine the number of factors to retain, optimal implementation of parallel analysis based on minimum rank factor analysis (Timmerman & Lorenzo-Seva, 2011) was used, generating 500 random correlation matrices through permutation of the observed data. Only the observed-data factors that explained a percentage of common variance larger than that explained by corresponding random factors were retained. CFA was then performed on the second sample ( $n = 469$ ) to test the factor model that resulted from EFA. Model parameters were estimated using the robust maximum likelihood method, which is a good estimation choice for Likert items with seven categories (Rhemtulla, Brosseau-Liard, & Savalei, 2012). The closeness of the hypothesized model to the empirical data was evaluated through the following goodness-of-fit indexes:  $\chi^2$ , Satorra-Bentler scaled  $\chi^2$  statistic (S-B  $\chi^2$ ); root mean square error of approximation (RMSEA, cutoff  $< .08$ ); standardized root mean square residual (SRMR, cutoff  $< .08$ ) and comparative fit index and non-normative fit index (CFI and NNFI, respectively, cutoff  $\geq .95$ ). The second sample ( $n = 469$ ) was used to perform also two multigroup CFAs (MG-CFAs) to test for measurement invariance between emerging (aged 18-29 years) and young (aged 30-45 years) adult women as based on the classification by Arnett (2012), and between fertile mothers, voluntarily childless, and primary infertile women, respectively. Increasingly restrictive models representing configural, metric, scalar, and strict factorial invariance were tested with parameters constrained to be equivalent across groups as follows: factor structure (configural), factor loadings (metric), factor loadings and intercepts (scalar), and factor loadings, intercepts, and error variances (strict) (Steenkamp &

Baumgartner, 1998). Differences in fit between nested models were evaluated using an S-B  $\chi^2$  difference test ( $\Delta$ S-B  $\chi^2$ ), and the CFI difference test ( $\Delta$ CFI), with a  $\Delta$ CFI  $\leq$  .01 as indicative of nonsignificant decrease in fit across models (Cheung & Rensvold, 2002). In case of significant reduction in fit between nested models, partial invariance models were tested after removing invariance constraints based on modification indexes. Partial invariance, which is sufficient for conducting meaningful cross-group comparisons, is achieved when at least two indicators per latent construct have invariant parameters (Steenkamp & Baumgartner, 1998).

To collect evidence of criterion-related validity, differences in PSS scores across adulthood stages and fertility/childlessness status were tested in the total sample ( $N = 912$ ) by performing analysis of variance (ANOVA) followed by Bonferroni post-hoc comparisons. Separate linear regression analyses were performed in each fertility/childlessness status group of the second sample ( $n = 469$ ) to test the association between PSS and PWBS-S scores, controlling for age.

Internal consistency was assessed with Cronbach's  $\alpha$  (cutoff  $\geq$  .70) and corrected item-total correlations (cutoff  $\geq$  .30) in each sample and group based on adulthood stage and fertility/childlessness status. Test-retest reliability over a 4-week period was assessed in a subsample of 61 women from the second sample by calculating the intra-class correlation coefficient (ICC; cutoff  $\geq$  .70) with a two-way random effects (absolute agreement) model.

Sample size was established a priori. For the first sample, a minimum sample size of 100 women was established based on the recommended 20:1 cases-to-item ratio for EFA (Costello & Osborne, 2005), given 5 PSS items. For the second sample, the established minimum total sample size was 450 to allow running MG-CFAs, which required a minimum sample size of 150 women in each group as to have an acceptable 10:1 cases-to-parameter ratio (Kline, 2011), given 15 estimated parameters in the PSS confirmatory factor model. For

the retest, a sample size larger than 50 was established for test-retest reliability assessment based on Doros's and Lew's (2010) method.

The PSS was returned fully completed with no missing data by 100% of participants ( $N = 912$ ), while 4.9% of the second sample ( $n = 23$ ) had 6% to 18% of missing data in the PWBS-S, with one to three PWBS-S missing items. These missing values were replaced using the individual mean imputation method (Shrive, Stuart, Quan, & Ghali, 2006).

Evaluation of estimates was based on both statistical significance (significance level set at  $p < .05$ ) and effect-size measures, with Cramer's  $V$  of .10 considered small, .30 medium, and .50 large, Cohen's  $d$  of 0.20 considered small, 0.50 medium and 0.80 large, and  $R^2$  and  $\eta^2$  of .01 considered small, .09 medium, and .25 large. Data were analyzed using FACTOR version 10.8.04 for parallel analysis, LISREL 8.80 for CFAs, and IBM SPSS 20 for all other analyses.

## 4 RESULTS

### 4.1 Participants' characteristics

A total of 912 respondents participated in the study (Table 1). Mothers were 52.74% of the whole sample, 23.79% were voluntarily childless women, and 23.46% had primary infertility. Infertile women were older than both mothers and voluntarily childless, with medium-to-large effect sizes ( $ds$  0.59 and 0.83, respectively), and mothers were slightly older than voluntarily childless women ( $d = 0.20$ ). There was a higher proportion of emerging adults among childless women, and a higher proportion of young adults among infertile women. Most women had a higher secondary education or above, with no between-group differences. The two samples did not differ in mean age ( $F(1,910) = 0.01, p = .96, d = 0.01, \eta^2 = .00$ ), adulthood stage ( $\chi^2(1) = 0.38, p = .54, V = .02$ ), or educational level ( $\chi^2(2) = 0.30, p = .86, V = .02$ ).

In the subsample who completed the retest ( $n = 61$ ), 24 (39.34%) participants were mothers, 19 (31.15%) voluntarily childless, and 18 (29.51%) infertile women with age and educational levels similar to those of the two samples.

#### **4.2 Structural validity**

The EFA run on the first sample ( $n = 443$ ) yielded a single-factor explaining 62.28% of the variance, with factor loadings ranging from .62 to .87 (Table 2). Results of parallel analysis also suggested that one was the most appropriate number of factors, as the common variance explained by the first observed-data factor (69%) exceeded that explained by the first random factor (65%), while the common variance of the second observed-data factor (12%) was smaller than that of the second random factor (29%). The one-factor model from EFA was tested on the second sample ( $n = 469$ ) using CFA. Results indicated an excellent fit to the data, with all indexes close to the expected value (Table 2). Standardized factor loadings ranged from .51 to .80 ( $p < .001$ ) (Figure 1).

#### **4.3 Measurement invariance**

Using data from the second sample ( $n = 469$ ), two MG-CFAs across adulthood stages and fertility/childlessness status were run (Table 3). In the MG-CFA across adulthood stage, although the  $\Delta$  S-B  $\chi^2$  test for scalar invariance was statistically significant ( $p = .039$ ), fit indexes remained acceptable across all nested models, and all CFI values did not decrease by more than .004, indicating no meaningful reduction in model fit across nested models. Thus, invariance of factor structure (configural), factor loadings (metric), item intercepts (scalar), and error variances (strict) across adulthood stages was supported for all PSS items.

In the MG-CFA across fertility/childlessness status, configural, metric, and scalar invariance was achieved for all PSS items. Although the  $\Delta$  S-B  $\chi^2$  test for scalar invariance was statistically significant ( $p = .031$ ), the RMSEA value remained acceptable and the  $\Delta$ CFI was lower than .01, indicating no meaningful decrease in model fit. Although strict invariance

was not supported (with a significant  $\Delta$ S-B  $\chi^2$ ,  $p < .001$ , and a  $\Delta$ CFI  $> .01$ ), partial strict invariance was achieved, with two indicators (items #1 and 5) having equal error variances across groups (Steenkamp & Baumgartner, 1998).

#### 4.4 Criterion-related validity

In the total sample ( $N = 912$ ), the interaction between adulthood stage and fertility/childlessness status was nonsignificant ( $F(2,906) = 2.89$ ,  $p = .06$ ), while both adulthood stage and fertility/childlessness status had significant main effects on PSS scores (Table 4). Emerging adult women reported slightly higher PSS scores than young adult women ( $d = 0.32$ ). Infertile women reported slightly lower PSS scores than both mothers ( $d = 0.21$ ) and voluntarily childless women ( $d = 0.34$ ).

The variability in global PWBS-S scores accounted for by PSS scores was examined separately in each fertility/childlessness status group of the second sample ( $n = 469$ ), controlling for age. PSS scores accounted for a moderate-to-high variability in PWBS-S scores in infertile women ( $\beta = .47$ ,  $t = 4.25$ ,  $p < .001$ ,  $R^2_{\text{adj}} = .20$ ,  $F(2,152) = 9.88$ ,  $p < .001$ ), and for a small variability in PWBS-S scores in both mothers ( $\beta = .19$ ,  $t = 2.38$ ,  $p = .02$ ,  $R^2_{\text{adj}} = .03$ ,  $F(2,157) = 3.54$ ,  $p = .03$ ) and voluntarily childless women ( $\beta = .27$ ,  $t = 3.37$ ,  $p < .001$ ,  $R^2_{\text{adj}} = .07$ ,  $F(2,154) = 6.72$ ,  $p = .002$ ). The effect of age on PWBS-S scores was nonsignificant in all groups.

#### 4.5 Reliability

Internal consistency estimates were adequate. Cronbach's  $\alpha$ s were .86 and .83, and corrected item-total correlations were in the .58-.80 and .48-.73 range in the first ( $n = 443$ ) and second ( $n = 469$ ) samples, respectively. For emerging ( $n = 191$ ) and young ( $n = 721$ ) adults, Cronbach's  $\alpha$ s were .88 and .86, and corrected item-total correlations were in the .52-.81 and .53-.75 range, respectively. For mothers ( $n = 481$ ), voluntarily childless ( $n = 217$ ), and



infertile ( $n = 214$ ) women, Cronbach's  $\alpha$ s were .87, .90, and .81, and corrected item-total correlations were in the .55-.77, .59-.83, and .41-.74 range, respectively.

Test-retest reliability estimate over a 4-week period ( $n = 61$ ) was acceptable, with an ICC of .75 and 95% CI [.58, .85].

## **5 DISCUSSION**

The objective of the present study was to develop and psychometrically test a very brief self-report that provides a rapid assessment of overall positive sexuality in adult women with a stable intimate relationship. The 5-item PSS was developed based on the themes that emerged in the initial focus groups formed by adult women of any fertility/childless status. EFA and CFA supported a one-factor model for the PSS, suggesting that a woman's positive sexuality is a single dimension expressing the perception of one's sexual life with the partner as a beautiful, amusing and exciting experience that provides sexual pleasure and adds considerable meaning to the couple's relationship. Results from the MG-CFAs indicated that the dimensionality and meaning of positive sexuality were the same among emerging and young adult women, as well as among mothers who conceived naturally, voluntarily childless and primary infertile women. Internal consistency and test-retest estimates were adequate, providing evidence of acceptable reliability.

Differences in PSS scores between groups provided initial evidence of criterion-related validity for the PSS, as they were in line with the literature indicating that infertile women commonly experience a loss of enjoyment of sex compared to fertile women (e.g., Emec et al. 2017). Mothers and voluntarily childless women showed similar PSS scores, in part reconciling the contrasting results of studies investigating differences in sexual satisfaction and sexual function problems between mothers and nulliparous women (e.g., Botros et al., 2006; Witting et al., 2008). Concerning differences between adulthood stage groups, emerging adult women (aged 18-29 years) reported slightly higher PSS scores than young adult women (aged 30-45 years). This finding is partially in contrast with previous research

suggesting either that women reach their sexual peak in their early thirties (Barr et al., 2002; Schmitt et al., 2002), or that women with about a decline in their fertility experience (from their mid-late twenties) may begin to experience an increase in their sexual desire and behaviors (Easton et al., 2010). However, it is coherent with scholars' characterization of emerging adulthood as a period when identity explorations and the absence of enduring role commitments make sexual experimentation normative and potentially healthy (Arnett, 2000; Maas & Lefkowitz, 2015; Wood et al., 2016). Furthermore, it is in line with previous evidence that age is associated with a decrease in positive and pleasurable sexual experiences in the general population (Shahhosseini et al., 2014), and with part of the literature indicating age as a risk factor for worse sexual functioning among infertile women (e.g., Bakhtiari, Basirat, & Nasiri-Amiri, 2016). It must be nonetheless acknowledged that between-groups differences in PSS scores were small in effect size.

Further evidence of criterion-related validity was offered by the positive association between PSS and psychological well-being scores, in line with the conceptual inclusion of positive sexuality in the domain of positive psychology and with the results of studies attesting that aspects of positive sexuality are linked to mental health and global well-being (Anderson 2013; Sánchez-Fuentes et al., 2014; Shahhosseini et al., 2014). The fact that this association was stronger among infertile women is in line with previous evidence that, on the opposite, the perceived burden of infertility in the sexual domain is strongly linked to a lower quality of life in infertile women (Donarelli et al., 2016).

Altogether, the findings from this study provide initial evidence of acceptable validity and reliability for the PSS. This new short measure is unique in that it explicitly assesses positive sexuality as a sense of enjoyment and fulfillment with their sexual expression in adult women of any fertility/childlessness status. In addition, this is the first study to compare voluntarily and involuntarily childless women in their positive sexuality levels. Different from previous instruments designed to assess other aspects of positive sexuality, the PSS was

tested for measurement invariance across groups of women. Thus, it provides a rapid assessment of overall positive sexuality that can be confidently performed with both emerging and young adult women who are mothers or voluntarily/involuntarily childless, and might be useful for future research to study the associations of positive sexuality with other individual and social characteristics such as contraception and childbearing decisions, quality of life, health status, couple intimacy and communication, and relationship satisfaction.

## **6 LIMITATIONS**

This study has some limitations. First, to collect evidence of content validity before the main data collection, the PSS was not pilot tested on members of the target population different from those who participated in the focus groups. However, consultation in the form of focus groups was conducted with members of the target population, for purposes of both construct identification and specification, and item review and refinement, which is a major strength of the PSS according to recommendations for content validation (Vogt et al., 2004). Second, participants were not randomly selected, and women who were single, in homosexual relationships, with mental disorders, or aged less than 18 or over 45 years were excluded. Therefore, future validation studies of the PSS in these populations are recommended. In addition, based on the humanistic and inclusive approach of the positive sexuality framework, the concept of positive sexuality applies to any individual regardless of race, ethnicity, class, gender, sexual orientation, and age (Williams et al., 2016). Thus, the PSS is potentially applicable to women of any sexual orientation. In this regard, it must be remarked that women in homosexual relationships were excluded from the present study to allow for comparisons across fertility/childlessness status groups, as only stable heterosexual couples are admitted to fertility treatment according to the Italian law. Third, we focused on positive sexuality from a woman's point of view. However, whether men conceptualize positive sexuality in the same way as women is especially worthy of being addressed (Hargons et al., 2017), and future psychometric studies using the focus group methodology (Vogt et al., 2004)

might address the development and validation of a complementary PSS for men. Fourth, no evidence of criterion-related validity could be obtained from a negative correlation perspective as no self-report of negative sexual experiences or sexual dissatisfaction has yet been validated in Italy. Therefore, it is recommended that future Italian validation studies address this issue, as to collect further evidence of the PSS validity. Fifth, the PSS was psychometrically tested in a single country; therefore, cross-cultural validation studies are needed to elucidate to what extent the identified aspects of positive female sexuality represent a common pattern across countries/cultures. Finally, because data were collected cross-sectionally, the direction of causality cannot be inferred between positive sexuality and psychological well-being. Longitudinal studies are therefore encouraged to collect evidence of the PSS validity in predicting quality of life and to elucidate its sensitivity to interventions or treatment responsiveness to further support its use in clinical research and practice evaluation.

## **7 CONCLUSIONS**

The PSS is a brief self-report for assessing positive adult female sexuality, which showed evidence of adequate psychometric properties in this initial validation study. The PSS has advantages over other sexuality-related measures in that it is the first tool specifically developed to measure positive female sexuality, is very short and not time-consuming, easy to administer and interpret, and shows initial evidence of validity and reliability when used with women at different adulthood stages and of different fertility/childlessness status.

## **8 RELEVANCE TO CLINICAL PRACTICE**

Health professionals have the opportunity to promote women's positive sexuality, when addressing sexual issues with their patients and providing sexual health-related care (e.g., Burnes, Singh, & Whitterspoon, 2017), and the PSS could assist them in identifying women who do have adequate resources deriving from their fulfilling sexual life to deal with sex-related issues, such as pregnancy, infertility, and contraception. From a strength-based

perspective, the level of overall positive sexuality may indeed be viewed as a potential resource within the couple, to which, for example, women can draw on to face and overcome the burden of infertility and its treatment (e.g., Watkins & Baldo, 2004). Thus, implementing this assessment in infertility protocols could be useful.

Furthermore, the availability of such a brief tool would benefit researchers and professionals interested in understanding how a positive sexual experience within a committed relationship relates to other functional dimensions and to decisions about contraception and reproductive choices. Deepening the understanding of positive sexuality in fertile/infertile and mothers/childless women may serve future research on women's health and well-being, and might have applications in sex and couples' therapy.

In conclusion, the PSS might be used in sex research, practice, and education with the aim of promoting a more comprehensive approach to women's sexual and reproductive health and rights, and to increase sexual, physical, and mental health outcomes (Anderson, 2013; Kismodi et al., 2017).

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Table 1

## Participants' characteristics

	Total sample ( $N = 912$ )				Group difference
	Total	Mothers ( $n = 481$ )	Voluntarily childless ( $n = 217$ )	Infertile ( $n = 214$ )	
Age, $M \pm SD$ (range)	33.40 $\pm$ 5.50 (18-45)	32.94 $\pm$ 5.49 (18-45)	31.83 $\pm$ 5.55 (18-44)	36.02 $\pm$ 4.51 (23-45)	$F(2, 909) = 37.71^*$ $\eta^2 = .08$
Adulthood stage, $n$ (%)					
Emerging adulthood (18-29 yrs.)	191 (20.94)	105 (21.83)	68 (31.34)	18 (8.41)	$\chi^2(2) = 34.68^*$ $V = .20$
Young adulthood (30-45 yrs.)	721 (79.06)	376 (78.17)	149 (68.66)	196 (91.59)	
Level of education, $n$ (%)					
Lower secondary	121 (13.27)	58 (12.06)	38 (17.51)	25 (11.68)	$\chi^2(4) = 5.43$ $V = .06$
Higher secondary	455 (49.89)	248 (51.56)	105 (48.39)	103 (48.13)	
Tertiary	336 (36.84)	175 (36.38)	75 (34.56)	86 (40.19)	
Sample 1 ( $n = 443$ )					

	Total	Mothers ( <i>n</i> = 322)	Voluntarily childless ( <i>n</i> = 61)	Infertile ( <i>n</i> = 60)	Group difference
Age, M ± SD (range)	33.39 ± 5.63 (18-45)	33.09 ± 5.60 (18-45)	31.80 ± 5.95 (18-44)	36.62 ± 4.13 (25-44)	$F(2, 443) = 13.45^*$ $\eta^2 = .06$
Adulthood stage, <i>n</i> (%)					
Emerging adulthood (18-29 yrs.)	89 (20.09)	67 (20.81)	20 (32.79)	2 (3.33)	$\chi^2(2) = 16.72^*$ $V = .19$
Young adulthood (30-45 yrs.)	354 (79.91)	255 (79.19)	41 (67.21)	58 (96.67)	
Level of education, <i>n</i> (%)					
Lower secondary	57 (12.87)	37 (11.49)	13 (21.31)	7 (11.67)	$\chi^2(4) = 5.82$ $V = .08$
Higher secondary	225 (50.79)	171 (53.11)	25 (40.98)	29 (48.33)	
Tertiary	161 (36.34)	114 (35.40)	23 (37.70)	24 (40.00)	
Sample 2 ( <i>n</i> = 469)					

	Total	Mothers ( <i>n</i> = 159)	Voluntarily childless ( <i>n</i> = 156)	Infertile ( <i>n</i> = 154)	Group difference
Age, <i>M</i> ± <i>SD</i> (range)	33.41 ± 5.38 (18-45)	33.64 ± 5.25 (18-43)	31.84 ± 5.41 (18-44)	35.79 ± 4.64 (23-45)	$F(2, 466) = 25.92^*$ $\eta^2 = .10$
Adulthood stage, <i>n</i> (%)					$\chi^2(2) = 19.57^*$ $V = .20$
Emerging adulthood (18-29 yrs.)	102 (21.75)	38 (23.90)	48 (30.77)	16 (10.39)	
Young adulthood (30-45 yrs.)	367 (78.25)	121 (76.10)	108 (69.23)	138 (89.61)	
Level of education, <i>n</i> (%)					
Lower secondary	64 (13.65)	21 (13.21) 77 (48.43)	25 (15.03) 79 (50.64)	18 (11.69)	$\chi^2(4) = 2.29$ $V = .05$
Higher secondary	230 (49.04)			74 (48.05)	
Tertiary	175 (37.31)	61 (38.36)	52 (33.33)	62 (40.26)	

\*\*  $p < .001$ .

Table 2

Descriptive statistics of PSS items ( $N = 912$ ), EFA factor loadings ( $n = 443$ ), and CFA goodness-of-fit indexes ( $n = 469$ )

Item content		<i>M</i>	<i>SD</i>	Loading		
1.	Sex brings a sense of fulfillment in my couple relationship.	5.35	1.51	.62		
2.	Sex with my partner is a beautiful experience.	5.55	1.38	.87		
3.	Our intimate relationship is sexually stimulating.	5.62	1.27	.75		
4.	Sex brings fun and joy in my couple relationship.	5.49	1.36	.84		
5.	Sex with my partner is an exciting experience.	5.24	1.24	.85		
Fit indexes	$\chi^2(5)$	S-B $\chi^2(5)$	RMSEA [90% CI]	SRMR	CFI	NNFI
	15.60*	10.94	.05 [.00, .09]	.02	1.00	.99

*Note.* PSS items were rated on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree).

\*  $p < .01$ .



Figure 1

Measurement model of the PSS with standardized parameters

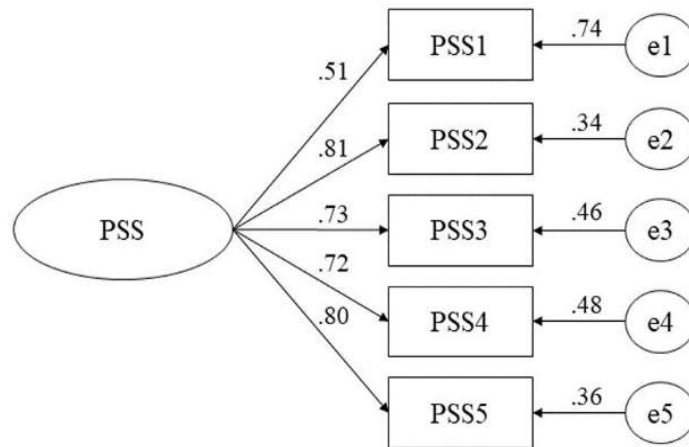


Table 3

Goodness-of-fit indexes for the MG-CFAs ( $n = 469$ )

Adulthood stage <sup>a</sup>								
Level of invariance	$df$	$\chi^2$	S-B $\chi^2$	$\Delta df$	$\Delta$ S-B $\chi^2$	RMSEA, 90% CI	CFI	$\Delta$ CFI
Configural	10	43.28***	22.22*	-	-	.07 [.03-.11]	.990	-
Metric	14	44.38***	25.97*	4	0.99	.06 [.02-.10]	.990	.000
Scalar	18	53.65***	34.99**	4	10.11*	.06 [.03-.09]	.986	.004
Strict	23	68.12***	37.42*	5	5.07	.05 [.02-.08]	.988	.002
Fertility/childlessness status <sup>b</sup>								
Level of invariance	$df$	$\chi^2$	S-B $\chi^2$	$\Delta df$	$\Delta$ S-B $\chi^2$	RMSEA, 90% CI	CFI	$\Delta$ CFI
Configural	15	29.45*	21.96	-	-	.05 [.00, .10]	.995	-
Metric	23	42.98**	32.59	8	10.60	.05 [.00, .09]	.993	.002
Scalar	27	50.60**	41.14*	4	10.61*	.06 [.01, .09]	.989	.004
Strict	37	158.771***	96.37***	10	38.98***	.10 [.08, .13]	.954	.035

<sup>a</sup> 102 emerging adults, 367 young adults. <sup>b</sup> 159 mothers, 156 voluntarily childless, 154 primary infertile.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

Table 4

## PSS scores by group

	<i>M</i>	<i>SD</i>	<i>F</i>
<b>Adulthood stage</b>			
			4.97*
Emerging adulthood ( <i>n</i> = 191)	28.30	5.23	$\eta^2 = .01$
Young adulthood ( <i>n</i> = 721)	26.98	5.45	
<b>Fertility/childlessness status</b>			
Mothers ( <i>n</i> = 481)	27.33	5.18	
Voluntarily childless ( <i>n</i> = 217)	28.12	5.66	4.59*
Primary infertile ( <i>n</i> = 214)	26.22	5.58	$\eta^2 = .01$
Total ( <i>N</i> = 912)	27.26	5.43	

*Note.* PSS total score range 5-35.

\**p* < .05.

## Supplementary File 1

## STROBE Statement—Checklist of items that should be included in reports of cross-sectional studies

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	1
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-7
Objectives	3	State specific objectives, including any prespecified hypotheses	7-8
Methods			
Study design	4	Present key elements of study design early in the paper	8
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	8
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	9
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	10-11
Bias	9	Describe any efforts to address potential sources of bias	9, 10
Study size	10	Explain how the study size was arrived at	13-14
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	11, 1213, 9
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	11-13
		(b) Describe any methods used to examine subgroups and interactions	13
		(c) Explain how missing data were addressed	14
		(d) If applicable, describe analytical methods taking account of sampling strategy	13
		(e) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	9
		(b) Give reasons for non-participation at each stage	9
		(c) Consider use of a flow diagram	--
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	14-15
		(b) Indicate number of participants with missing data for each variable of interest	14
Outcome data	15*	Report numbers of outcome events or summary measures	Tables 2 and 4
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	16, 17

		(b) Report category boundaries when continuous variables were categorized	n/a
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	16
Discussion			
Key results	18	Summarise key results with reference to study objectives	17-18
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	19-20
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	19
Generalisability	21	Discuss the generalisability (external validity) of the study results	19-20
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	n/a

\*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).