Measurement properties of sexual function assessment questionnaires in women with endometriosis: A systematic review following COSMIN guidelines

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SYSTEMATIC REVIEW

Measurement properties of sexual function assessment questionnaires in women with endometriosis: A systematic review following COSMIN guidelines

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Abstract

Introduction: Sexual function of patients with endometriosis should be assessed by patient-reported outcome measures (PROMs) that present high reliability and validity. The objective was to study the PROMs used to assess sexual function for patients with endometriosis to improve their selection for research and clinical practice.

Material and methods: We performed a systematic literature review from January 2000 to September 2023. All studies including women with confirmed endometriosis and assessing sexual quality of life or sexual function or sexual distress were retrieved. Different properties of PROMs used for sexual dysfunction were assessed according to the COnsensus-based Standards for the selection of health Measurement Instruments (COSMIN) recommendations. Properties evaluated were: structural validity, internal consistency, cross-cultural validity, reliability, measurement error, criterion validity, construct validity, and responsiveness. This literature review was registered on Prospero as 2018 CRD42018102278.

Results: Seventy-four articles with evaluation of sexual function were included. Of the 25 PROMs assessing sexual function, the Female Sexual Function Index (FSFI) was the most frequently used (34/74 [45.9%] items), followed by the Female Sexual Distress Scale (9/74 [12.2%] items) and the Sexual Activity Questionnaire (SAQ) (8/74 [10.8%] items). The most commonly used measurement properties were "hypothesis testing" and "responsiveness". The PROMs with a high level of evidence for these two measurement properties were the FSFI, the SAQ, the Short Sexual Functioning Scale, the Sexual Satisfaction Scale for Women, Sexual Quality of Life-Female, the Brief Profile of Female Sexual Function, and the Sexual Health Outcomes in Women Questionnaire. The FSFI questionnaire appeared to be more relevant for evaluating medical treatment, and the SAQ for evaluating surgical

Abbreviations: COSMIN, COnsensus-based Standards for the selection of health Measurement Instruments; ES, effect size; FSDS, Female Sexual Distress Scale; FSFI, Female Sexual Function Index; PROMSs, patient-reported outcome measures; SAQ, Sexual Activity Questionnaire; SHOW-Q, Sexual Health Outcomes in Women Questionnaire; SIDI, Subjective Impact of Dyspareunia Inventory; SQOL-F, Sexual Quality of Life-Female; SSS-W, Sexual Satisfaction Scale for Women.

treatment. Only one instrument was specific to endometriosis (the Subjective Impact of Dyspareunia Inventory [SIDI]).

Conclusions: In this systematic literature review of sexual function assessment questionnaires in endometriosis, the FSFI and the SAQ questionnaires emerged as having the best measurement properties according to the COSMIN criteria. The FSFI questionnaire appears to be suited for evaluating medical treatment, and the SAQ for surgical treatment. The SIDI is the only specific questionnaire, but its responsiveness remains to be defined.

KEYWORDS
endometriosis, sexual function, sexual quality of life, sexual questionnaire

1 | INTRODUCTION

Endometriosis is a chronic benign gynecological pathology characterized by the presence of endometrial cells outside the uterus that impacts the reproductive and general health of women during the course of their life.[1] Endometriosis can cause dyspareunia that may affect sexual function.[2–4] However, pain during intercourse is not the only determinant of sexual health in women: sexuality is a complex and multifactorial phenomenon involving emotional and physiological processes. Endometriosis lesions and their treatment may negatively affect different domains of sexual function.[5–7] Due to the subjective and intimate nature of sexual function, the most appropriate instruments for assessing sexual dysfunction are patient-reported outcome measures (PROMs), which assess several areas of sexuality with high reliability and validity.[8] PROMs are standardized and validated questionnaires used as support in daily clinical practice to ascertain perception of patients' health status, perceived symptoms, level of impairment, disability, and health-related quality of life.[9]

Evidence has shown that the systematic use of PROMs in daily clinical practice contributes to better communication and decision-making between clinicians and patients.[10–12] The use of PROMs to assess sexual function in endometriosis provides an opportunity for clinicians to discuss women's expectations of a given treatment and potentially identify incompatibilities. For this reason, it is important to define the most appropriate PROMs for sexual function in endometriosis patients.

The COSMIN (COnsensus-based Standards for the selection of health Measurement Instruments) initiative provides tools to improve the selection of PROMs for research and clinical practice by assessing the risk of bias and the level of evidence for each specific measurement property.[13]

We conducted a systematic literature review of the existing PROMs used to measure sexual function of patients with endometriosis. The objective was to identify the different PROMs used to assess sexual function in women with endometriosis and to evaluate their psychometric properties using the checklist developed by the COSMIN initiative.[13]

Key message

The FSFI and the SAQ questionnaires present the best measurement properties according to the COSMIN criteria to assess sexual function in women with endometriosis and the SIDI is the only one specific to endometriosis.

2 | MATERIAL AND METHODS

This systematic review was conducted according to the PRISMA (Preferred Reporting Items for Guidelines on Systematic Reporting and Meta-analysis) guidelines.

2.1 | Registration

This literature review was registered on Prospero as 2018 CRD42018102278. We followed COSMIN recommendations for the methodology of the systematic review and for the presentation of PROM assessment qualities.

2.2 | Search strategy and article selection

We conducted a Medline search (via PubMed) covering the last 23 years (January 2000 to September 2023). We did not use a search filter. The search strategy was based on two search equations, one dedicated to studies indexed with MeSH terms (Medical Subject Headings), and the other using exclusively free text (such as endometrioma, sexual disorder, sexual distress, quality of sexual life). The MeSH terms used were: quality of life, sexual behavior, sexual dysfunction, dyspareunia, questionnaires, endometriosis, and humans. The search equations were: ((((((((((("quality of life"[MeSH Terms]) OR sexual behavior[MeSH Terms]) OR "sexual dysfunction"[MeSH Terms]) OR dyspareunia[MeSH Terms]) OR questionnaires[MeSH Terms]) AND ("2000/01/01"[PDat]: "3000/12/31"[PDat]))) AND

((Clinical Study[ptyp] OR Clinical Trial[ptyp] OR Clinical Trial, Phase I[ptyp] OR Clinical Trial, Phase II[ptyp] OR Clinical Trial, Phase III[ptyp] OR Clinical Trial, Phase IV[ptyp] OR Comparative Study[ptyp] OR Observational Study[ptyp] OR Randomized Controlled Trial[ptyp] OR Review[ptyp] OR systematic[sb] OR Meta-Analysis[ptyp] OR Journal Article[ptyp] OR Controlled Clinical Trial[ptyp]) AND ("2000/01/01"[PDat]: "3000/12/31"[PDat]) AND Humans[Mesh] AND (English[lang] OR French[lang]))))) AND (endometriosis[MeSH Terms] AND ("2000/01/01"[PDat]: "3000/12/31"[PDat]))).

An additional manual search was performed using the reference lists of the included articles.

2.3 | Article eligibility criteria

Eligible studies were clinical trials or observational studies published in English and/or French, including women over 18 years of age with confirmed endometriosis (diagnosis of endometriosis by histology, surgery or a diagnosis of endometriosis based on expert ultrasound or pelvic magnetic resonance imaging) and assessing sexual quality of life or sexual function or sexual distress by means of a specific PROM or a PROM including sexual function as one of its dimensions.

Studies were excluded based on the following criteria: fewer than 10 patients, case reports, studies without PROMs of sexual function per se or without a calculated sexual subscore, qualitative studies without exploitable scores, and studies measuring only dyspareunia, but no other dimension related to sexual function.

2.4 | Selection of studies

Two reviewers—the first (AO) and second (FB) authors of the manuscript—independently examined the titles and abstracts of the articles identified in the literature to determine whether the eligibility criteria were met. The final selection of articles was made only after a full-text review had confirmed that the inclusion criteria were met. The reference lists of full-text articles were systematically reviewed to identify additional studies for inclusion. Any disagreement between the two reviewers (AO and FB) about the inclusion of an article was resolved by consensus. A third reviewer—the last author of the manuscript (AF)—was also involved if the two main reviewers failed to reach consensus.

2.5 | Data collection

A standardized extraction form was established by using the COSMIN guidelines.[14,15]

The COSMIN checklist[13] is a dedicated tool that combines the assessment of the methodological quality of articles on measurement properties with the quality of the PROM itself.[14] In each article using a PROM measuring sexual dysfunction, several properties of each PROM can be assessed simultaneously (structural validity, internal consistency, cross-cultural validity, reliability, measurement error, criterion validity, construct validity, and responsiveness). It is important to note that one article can use several measurement properties per PROM and that a "study" corresponds to one measurement property (there can, therefore, be several measurement property studies for an article). The final objective of the COSMIN checklist is to assess the risk of bias and the level of evidence for each specific measurement property. We achieved this objective in four steps.

First, we assessed the methodological quality of each single "study" by using the COSMIN risk of bias checklist (as "very good," "adequate," "doubtful," "inadequate quality").[16] Second, we evaluated the content validity of each PROM. If there was high quality evidence that the content validity of a PROM was insufficient, the PROM was not further considered. Third, we evaluated the measurement property of each PROM in each "study" by referring to the COSMIN table *Updated criteria for good measurement property* (sufficient [+], insufficient [−], inconsistent [±], or indeterminate [?]).[17] Fourth, the overall quality of evidence of a PROM was summarized according to the result of the first two steps to assign overall recommendation level (grade) according to the COSMIN table *Grade approach for grading the quality of evidence*[17] (high, moderate, low, or very low).

The entire methodology of this evaluation is described in Appendix S1. The extraction form was pre-tested by two authors (AO and FB), and disagreements were discussed with a third evaluator (AF). Once all the contentious issues were resolved, two reviewers (AO and FB) independently extracted the following data from the selected articles (using the full text and supporting information): general data (geographical origin, study subject), methods (type of intervention evaluated, study design, type of questionnaire used, measurement properties evaluated, duration of follow up, number of patients), and main results.

Differences between treatments were expressed by *effect size* (ES) according to Cohen's method, which standardizes differences for comparison. An ES of around 0.2 was considered a small effect, around 0.5 moderate, and 0.8 or higher large.[18,19] The calculation of the ES was made with the Effect Size Calculator in Excel using *n* and mean difference.

3 | RESULTS

Figure 1 reports the flow chart of the study selection process. A total of 1787 articles were identified using the search equation and a further two were found in the references of the selected articles. Analysis of the titles and abstracts led to the selection of 839 articles, among which 765 were excluded after reading the full text. Of these, 264 (34.5%) were excluded because they were limited to assessment of dyspareunia alone. We finally included 74 articles in the study (Figure 1).

Table 1 summarizes the characteristics of the included studies. Among the 74 articles included, 25 different PROMs

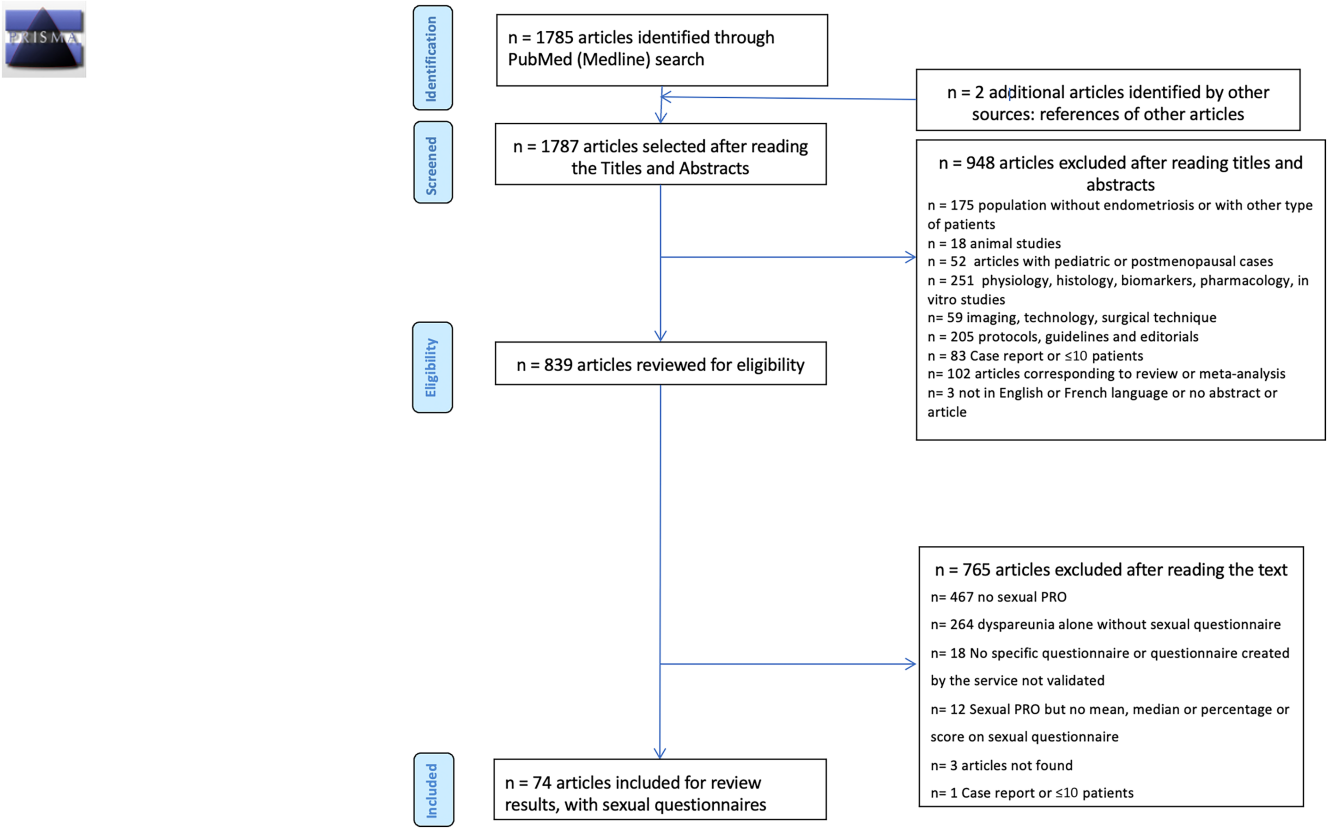

FIGURE 1 Chart flow of the studies selected.

evaluating sexual function were identified (Table 1). The Female Sexual Function Index (FSFI) was the most frequently used PROM (34/74 [45.9%] items), followed by the Female Sexual Distress Scale (FSDS) (9/74 [12.2%] items) and the Sexual Activity Questionnaire (SAQ) (8/74 [10.8%] items). However, the FSDS was systematically associated with the use of another PROM evaluating sexual function.

The risks of bias of the measurement property studies classified by the PROMs are presented in Figure 2. Among all the questionnaires, the SAQ, the FSDS, and the FSFI were those with the highest number of studies classified as "good" and "very good."

The assessment of content validity of each PROM is presented in Table S1. The two PROMs with inadequate content validity were excluded from further evaluation.

Table 2 summarizes the measurement properties and risk of bias of each questionnaire according to the COSMIN criteria properties. The most commonly used measurement properties in the articles were "hypothesis testing" and "responsiveness." Seven questionnaires had high levels of evidence for these two measurement properties: the FSFI, the SAQ, the Short Sexual Functioning Scale (SSFS), the Sexual Satisfaction Scale for women (SSS-W), Sexual Quality of Life-Female (SQOL-F), the Brief Profile of Female Sexual Function (B-PFSF), and the Sexual Health Outcomes in Women Questionnaire (SHOW-Q). These questionnaires also presented no risk of bias when used for these types of measurement ("hypothesis testing" and "responsiveness"). Only one questionnaire, the SAQ, represented almost all measurement properties in the context of endometriosis. The Subjective Impact of Dyspareunia Inventory (SIDI) appears in only one article and is the only specific questionnaire. However, the responsiveness of the SIDI is not available.

The FSFI had a high level of evidence for discriminating between known groups of patients suffering from various forms of endometriosis and "control" groups without endometriosis (e.g. endometriosis of the rectovaginal septum versus control group [without endometriosis]: ES = −0.3, $p = 0.029$) (Table 2). The FSFI also appears to be effective for evaluating medical treatments for the two measurement properties mentioned above. However, in the context of surgical treatments, the "responsiveness" of the FSFI was insufficient (no significant change was noted with FSFI).

On the other hand, the SAQ was more relevant for evaluating surgical treatments (good responsiveness) for the total score (ES = 0.3), pleasure (ES = 0.9 to ES = 1.2), and discomfort (ES = −0.79 to ES = −1.06) subdomains. The SSFS and the SHOW-Q both provide a good evaluation of surgical treatment but not in all domains. However, the SSFS has insufficiently rated measurement properties when referring to the criteria for good measurement properties.

The FSDS questionnaire is often used in association with the FSFI. Similar to the FSFI, the FSDS appears to be effective in the evaluation of medical treatments but only for the "responsiveness" measurement property (ES = −2.25 to ES = −5.4, $p = 0.01$, for the comparison of continuous versus sequential administration of

TABLE 1 Characteristics of the studies included in the systematic review. All studies including women with confirmed endometriosis assessing sexual quality of life or sexual function or sexual distress were retrieved.

References	Type of study	Objective of the study	Reason for consultation[a]	Duration of follow up (months)	Age Mean ± SD or median (min max)	Diagnosis[b]	Type of lesion	Type of treatment	*N*	Name of the sexual questionnaires	Name of the measurement properties according to Cosmin
Oppenheimer et al. 2019, Human Reprod[20]	Prospective	Questionnaire validation	Mixed	12	33 ± 6.5	Mixed	All types	Both[c]	261	SAQ	Structure validity Construct validity Internal consistency Responsiveness and MCID
Cozzolino et al. 2009, Fertil Steril[21]	Prospective	Impact of endometriosis	Mixed	Not applicable	36 ± 6.99	Histologic	Deep infiltrating endometriosis with digestive symptoms?	None	170	FSFI	Hypothesis
Vercellini et al. 2017, Gynecol Obstet Invest[22]	Self-controlled study	Treatment evaluation (Hormone)	Pain	12	Oral contraceptive → Norethisterone acetate 35.5 ± 4.7 Norethisterone acetate → Oral contraceptive 34.2 ± 5.3	Mixed	All types	Hormone	67	FSFI	Responsiveness
Fairbanks et al. 2017, Gynecol Endocrinol[23]	Cross-sectional study	Other (Impact of endometriosis)	Mixed	Not applicable	35.8 ± 5.4 (endometriosis group)	Mixed	All types	None	583	FSQ	Hypothesis
de Graaff et al. 2016, Hum Reprod[24]	Cross-sectional study	Other (Impact of endometriosis)	Mixed	Not applicable	34.3 (endometriosis group)	Mixed	All types	None	123	FSFI SSCS	Hypothesis
Caruso et al. 2016, J Endocrinol Invest[25]	Prospective	Treatment evaluation	Pain	6	26.8 ± 5.72	Auto declaration	All types	Hormone	96	FSFI FSDS	Hypothesis or Responsiveness
Riiskjær et al. 2016, BJOG[26]	Prospective	Treatment evaluation	Pain	12	33.8 ± 5.3	Histologic	Deep infiltrating endometriosis with digestive symptoms	Surgery	128	SVQ	Responsiveness
Fritzerv etal. 2015, Eur J Obstet Gynecol Reprod Biol[27]	Prospective	Treatment evaluation	Pain	10	30.8 ± 6	Histologic	All types	Surgery	96	FSFI FSDS	Responsiveness
Vercellini et al. 2015, Fertil Steril[28]	Before and after	Treatment evaluation	Pain	6	Northisterone acetate 33.8 ± 5.2; Dienogest 33.6 ± 5.2	Mixed	All types	Hormone	180	FSFI	Responsiveness Hypothesis
Di Donato et al. 2015, J Fam Plann Reprod Health Care[29]	Prospective	Treatment evaluation	Mixed	6	34 ± 5	Histologic	All types	Surgery	500	SHOW-Q	Responsiveness Hypothesis

(Continues)

TABLE 1 (Continued)

References	Type of study	Objective of the study	Reason for consultation[a]	Duration of follow up (months)	Age Mean ± SD or median (min max)	Diagnosis[b]	Type of lesion	Type of treatment	*N*	Name of the sexual questionnaires	Name of the measurement properties according to Cosmin
Caruso et al. 2015, Minerva Gynecol[30]	Prospective	Treatment evaluation	Pain	9	26 ± 6	Imaging	All types	Other	56	FSFI FSDS	Responsiveness
Caruso et al. 2015, J Endocrinol Invest[31]	Prospective	Treatment evaluation	Pain	6	29.4 ± 9.2	Imaging	All types	Hormone	92	FSFI FSDS	Responsiveness Hypothesis
Morotti et al. 2014, Eur J Obstet Gynecol Reprod Biol[32]	Prospective	Treatment evaluation	Pain	6	33.4 ± 3.8	Imaging	Deep infiltrating endometriosis	Hormone	25	FSFI	Responsiveness
Di Donato et al. 2014, Eur J Obstet Gynecol Reprod Biol[33]	Case–control	Other (Impact of endometriosis)	Mixed	Not applicable	34 ± 5 (endometriosis group)	Histologic	All	Other	364	SHOW-Q	Hypothesis
Evangelista et al. 2014, J Sex Med[34]	Prospective	Other (Impact of endometriosis)	Mixed	Not applicable	35.4 ± 5.2 (endometriosis group)	Mixed	All	None	95	FSFI	Hypothesis Reliability
van den Broeck et al. 2013, Hum reprod[35]	Prospective	Treatment evaluation	Mixed	18	NA	Histologic	Deep infiltrating endometriosis with digestive symptoms	Surgery	203	SSFS	Responsiveness Hypothesis
Montanari et al. 2013, J Sex Med[4]	Prospective	Other (Impact of endometriosis)	Mixed	Not applicable	34.4 ± 5.4	Histologic	All types	Other	182	SHOW-Q	Hypothesis
Vercellini et al. 2012, Hum reprod[36]	Prospective	Treatment evaluation	Pain	12	Surgery 35.0 ± 4.7; NETA 34.3 ± 5.0	Histologic	All types	Both[c]	154	FSFI	Responsiveness
Dubuisson et al. 2012, Gynecol Obstet Fertil[37]	Prospective	Treatment evaluation	Pain	23	35.0 (24–41)	Histologic	All types	Surgery	15	BISF-W	Responsiveness Hypothesis
Vercellini et al. 2012, Fertil Steril[38]	Case–control	Other (Impact of endometriosis)	Mixed	Not applicable	32.1 ± 4.0	Histologic	All types	None	292	SSRS	Hypothesis
Kossi et al. 2011, Colorectal Dis[39]	Prospective	Treatment evaluation	Pain	12	33.5	Histologic	Deep infiltrating endometriosis with digestive symptoms	Surgery	34	MFSQ	Responsiveness
Setala et al. 2012, AOGS[40]	Prospective	Treatment evaluation	Pain	13	29.0	Histologic	All types	Surgery	27	MFSQ	Responsiveness
Mabrouk et al. 2012, J Sex Med[41]	Prospective	Treatment evaluation	Mixed	6	35.4 ± 5.5	Histologic	Deep infiltrating endometriosis	Both[c]	106	SHOW-Q	Responsiveness Hypothesis

TABLE 1 (Continued)

References	Type of study	Objective of the study	Reason for consultation[a]	Duration of follow up (months)	Age Mean ± SD or median (min max)	Diagnosis[b]	Type of lesion	Type of treatment	N	Name of the sexual questionnaires	Name of the measurement properties according to Cosmin
Meuleman et al. 2011, Hum Reprod[42]	Retrospective	Treatment evaluation	Mixed	27	30.0 (18–42)	Histologic	Deep infiltrating endometriosis with digestive symptoms	Surgery	45	SAQ	Responsiveness
Guzick et al. 2011, Fertil Steril[43]	Randomized study	Treatment evaluation	Pain	12	29.16 ± 6.47	Histologic or surgery	All types	Hormone	47	ISS	Responsiveness Hypothesis
Tripoli et al. 2011, J Sex Med[44]	Cross-sectional study	Other (impact of chronic pelvic pain)	Pain	Not applicable	NA	Histologic or surgery	All types	None	134	GRISS	Hypothesis
Meuleman et al. 2009, Reprod Biomed Online[45]	Retrospective	Treatment evaluation	Mixed	29 (median)	32.0 (24–42)	Histologic	Deep infiltrating endometriosis with digestive symptoms	Surgery	56	SAQ	Responsiveness
Ferrero et al. 2007, Hum Reprod[46]	Prospective	Treatment evaluation	Pain	12	34.7 ± 4.3	Histologic	All types	Surgery (no hormones after surgery)	68	Based on DSFI GSSI	Responsiveness Hypothesis
Ferrero et al. 2007, Fertil Steril[47]	Prospective	Treatment evaluation	Pain	12	34.6 ± 3.4	Histologic	All types	Surgery (and agonist)	98	Based on DSFI	Responsiveness
Ferrero et al. 2005, Fertil Steril[3]	Prospective	Other (Impact of endometriosis)	Mixed	Not applicable	34.2 ± 5.1	Histologic	Deep infiltrating endometriosis	None	136	Based on DSFI GSSI	Hypothesis
Abbott et al. 2004 Fertil Steril[48]	Randomized study	Treatment evaluation	Pain	12	NA	Histologic	All types	Surgery	39	SAQ	Responsiveness Hypothesis
Abbott et al. 2003, Hum Reprod[49]	Prospective	Treatment evaluation	Pain	60	31.0	Histologic	All types	Surgery	135	SAQ	Responsiveness
Vercellini et al. 2003, Fertil Steril[50]	Randomized study	Treatment evaluation	Pain	12	NA	Histologic	All types	Surgery	180	SSRS	Responsiveness Hypothesis
Soysal et al. 2003, Hum Reprod[51]	Prospective	Treatment evaluation	Pain	12	33.4 ± 1.9	Histologic	All types	Surgery	15	SSRS	Responsiveness
Vercellini et al. 2002, Fertil Steril[52]	Randomized study	Treatment evaluation	Pain	6	NA	Histologic	All types	Hormone	90	SSRS	Responsiveness Hypothesis
Garry et al. 2000, BJOG[53]	Prospective	Treatment evaluation	Mixed	4	NA	Histologic	All types	Surgery	57	SAQ	Responsiveness
Alberico et al. 2018, EJOG[54]	Retrospective	Other (benefits of pregnancy on endometriosis symptoms)	Pain	24 after pregnancy	36.0 ± 0	Mixed	All types	Other (Pregnancy)	131	FSFI	Responsiveness
Sansone et al. 2018, Arch Gynecol Obstet[55]	Prospective	Treatment evaluation	Pain	12	31.1 ± 6.3	Imaging	All types	Hormone	25	FSFI	Responsiveness

(Continues)

TABLE 1 (Continued)

References	Type of study	Objective of the study	Reason for consultation[a]	Duration of follow up (months)	Age Mean ± SD or median (min max)	Diagnosis[b]	Type of lesion	Type of treatment	N	Name of the sexual questionnaires	Name of the measurement properties according to Cosmin
Ucella et al. 2018, Arch Gynecol Obstet[56]	Prospective	Treatment evaluation	Mixed	6	39.0 (27–51)	Histologic	All types	Surgery (nerve sparing ± hormonal treatment after surgery) (nerve sparing ± hormonal treatment post op)	34	FSFI	Responsiveness
Vercellini et al. 2018, Fertil Steril[57]	Prospective	Treatment evaluation	Pain	12	32.9 ± 5.7	Mixed	All types	Both[c]	157	FSFI	Responsiveness
Leonardo Pinto et al. 2018, J Sex & Marital Ther[58]	Prospective	Treatment evaluation	Pain	12	36.1 ± 6.2	Imaging	Deep infiltrating endometriosis	Hormone	30	FSFI	Responsiveness
Riley et al. 2018, JMIG[59]	Randomized study	Treatment evaluation	Pain	12	28.1 ± 6.1	Surgery	All types	Surgery (± Progestin intrauterine device)	73	PISQ-12	Responsiveness Hypothesis
Vercellini et al. 2017, Hum Reprod[60]	Retrospective	Treatment evaluation	Pain	Median hormonal treatment 40 [18–60] surgical treatment 45 [30–67]	33.8 ± 5.8	Mixed	Deep infiltrating endometriosis with digestive symptoms	Both[c]	87	FSFI	Responsiveness Hypothesis
Abokhrais et al. 2020, PLOS[61]	Randomized study	Treatment evaluation	Pain	2	35.4 ± 36.1	Surgery	All types	Other (Omega-3 polyunsaturated fatty acids [O-PUFA])	33	SAQ	Responsiveness
Anderson et al. 2018, AOGS[62]	Prospective	Treatment evaluation	Other (major bleeding)	9	44.8 (3.5)	Imaging	All types	Hormone	23	FSFI	Responsiveness
Lermann et al. 2019, Eur J Obstet Gynecol Reprod Biol[63]	Retrospective	Treatment evaluation	Mixed	69.6 ± 26.3	34.3 ± 6.0/37.7 ± 6.0	Surgery	Deep infiltrating endometriosis	Surgery	276	KFSP	Responsiveness Hypothesis
Pokrzywinski et al. 2020, J Women's Health,[64]	Randomized study post hoc analysis	Treatment evaluation	Pain	6	31.5 ± 6.2	N/A	Deep infiltrating endometriosis	Hormone	871 et 875	EHP30 SR	Responsiveness
Jia et al. 2013, Obstet Gynecol[65]	Cross-sectional study	Other (associated factors of Female sexual dysfunction)	Mixed	Not applicable	33.7 ± 5.1	Histologic	All types	None	111	FSFI	Hypothesis

TABLE 1 (Continued)

References	Type of study	Objective of the study	Reason for consultation[a]	Duration of follow up (months)	Age Mean ± SD or median (min max)	Diagnosis[b]	Type of lesion	Type of treatment	*N*	Name of the sexual questionnaires	Name of the measurement properties according to Cosmin
D'Hooghe et al. 2018, Hum Reprod[66]	Randomized study	Treatment evaluation	Pain	3	Mean (Min Max) 33.7 (18–45)	Surgery	All types	Hormone	358	FSFI	Hypothesis Responsiveness
Kfoury et al. 2023, BMC Women's Health[67]	Case–control study	Other (emotional aspect in endometriosis women)	Mixed	Not applicable	29.46 ± 6.97	N/A	All types	Other and Surgery	317 (65 endometriosis)	SSS-W	Hypothesis Responsiveness
Privitera et al. 2023, Int J Environ Res Public Health[68]	Prospective	Other (sexual distress and avoidance of sex and impact on sex life of endometriosis)	Mixed	Not applicable	30.49 ± 7.25	Surgery	All types	Other	2060	FSDS-r	Hypothesis
Maiorana et al. 2023, Arch Gynecol Obstet[69]	Observational study	Treatment evaluation	Pain	18	32.61 ± 7.3	N/A	All types	Hormone	64	ISS	Hypothesis
Tajik et al. 2022, J Obstet Gynecol[70]	Prospective	Other (sensate focus technique and sexual position when endometriosis and hormonal treatment)	Pain	2	36.03 ± 4.5	Imaging	All types	Other (sex education)	80	FSFI	Hypothesis Responsiveness
Mirzai et al. 2022, Sci Reports[71]	Randomized study	Treatment evaluation	Pain	12	36.46 ± 8.1 (interventional group)	Imaging	Endometrioma	Medical (Silymarin)	70	FSFI	Responsiveness
Facchin et al. 2022, Hum Reprod[72]	Cross-sectional study	Questionnaire validation	Pain	NA	36.10 ± 6.9	Mixed	All types	Both[c]	638	SIDI	Structure validity Construct Validity Internal consistency Hypothesis
Rossi et al. 2022, Int J Environ Res Public Health[73]	Prospective	Other (relationship between cognitive and psycho-emotional factors and sexual functioning)	Pain	Not applicable	34.10 ± 9.2	Surgery	All types	Other	187 (87 endometriosis)	FSFI FSDS SDBQ SMQ QCSASC	Hypothesis
Matloobi et al. 2022, Int J Gynecol Obstet[74]	Prospective	Other (sex education program)	Pain	3	36.90 ± 5.7	Surgery	All types	Other	62	FSFI FSDS SQOL-F	Hypothesis Responsiveness

(Continues)

TABLE 1 (Continued)

References	Type of study	Objective of the study	Reason for consultation[a]	Duration of follow up (months)	Age Mean ± SD or median (min max)	Diagnosis[b]	Type of lesion	Type of treatment	N	Name of the sexual questionnaires	Name of the measurement properties according to Cosmin
Halici et al. 2023, Arch Gynecol Obstet[75]	Prospective	Treatment evaluation	Pain	3	36.82 ± 7.8	Surgery	All types	Surgery	56	FSFI	Responsiveness
Zhang et al. 2022, BMC Women's Health[76]	Retrospective	Treatment evaluation	Mixed	24	30.22 ± 3.6	Surgery	All types	Surgery	55	FSFI	Responsiveness
Dior et al. 2022, J Sex Med[77]	Prospective	Treatment evaluation	Pain	12	NA	Surgery	All types	Surgery	149	FSFI	Responsiveness
Alcade et al. 2022, J Sex Med[78]	Prospective	Treatment evaluation	Pain	12	NA	Imaging	All types	Hormone	112	SQOL-F B-PFSF	Hypothesis Responsiveness
Maria Lanieri et al. 2022, Gynecology[79]	Retrospective	Treatment evaluation	Pain	3	38 (32.5–43)	Surgery	All types	Surgery	100	FSFI	Responsiveness
Yalcin Bahat et al. 2022, J Obstet Gynecol[80]	Retrospective	Treatment evaluation	Pain	6	27.46 ± 3.90	Imaging	All types	Hormonal	79	FSFI	Responsiveness
Minko et al. 2022, Int J Environ Res Public Health[81]	Prospective	Endometriosis versus control	Pain	Na	33.1 ± 6.0	Clinical	All types	Other	860	FSFI	Hypothesis
Scheepers et al. 2021, J Psychosom Obstet Gynecol[82]	Retrospective	Segmental resection vs. shaving	Pain	6	Mean 37.8 (23.2–49.9)	Surgery	DIE bowel	Surgery	74	EHP30 section for sexual relationship	Responsiveness
Alcade et al. 2021, Women and Health[83]	Prospective	AD vs. DIE vs. control	Pain	Na	AD: 38.1 ± 5.7	Imaging	AD et DIE	None	203	B-PFSF FSDS SQOL-F	Hypothesis
Martinez-Zamora et al. 2021, J Min Invasive Gynecol[84]	Prospective	Endometriosis versus control	Pain	36	33.5 ± 6.0	Surgery	All types	Surgery	193	FSDS SQOL-F B-PFSF	Hypothesis Responsiveness
Yang et al. 2021, J Int Med Res[85]	Prospective	Endometriosis versus control	Pain	Na	No information	Surgery	All types	Other	140	FSFI	Hypothesis
Mira et al. 2020, Eur J Obstet Gynecol Reprod Biol[86]	Prospective	Treatment evaluation	Pain	2	35.1 ± 6.2	Imaging	All types	Hormonal and electrotherapy	101	FSFI	Responsiveness
Buggio et al. 2020, Lasers Med Sci[87]	Prospective	Treatment evaluation	Pain	12	35.6 ± 7.0	Histology	Vaginal endometriotic lesions	Surgery	19	FSFI	Responsiveness
Oppenheimer et al. 2020, AOGS[88]	Prospective	Treatment evaluation	Pain	12	33.0 ± 6.3	Surgery or imaging	All types	High-dose progestins	214	SAQ	Hypothesis Responsiveness

TABLE 1 (Continued)

References	Type of study	Objective of the study	Reason for consultation[a]	Duration of follow up (months)	Age Mean ± SD or median (min max)	Diagnosis[b]	Type of lesion	Type of treatment	*N*	Name of the sexual questionnaires	Name of the measurement properties according to Cosmin
Agarwal et al. 2020, J Sexual Med[89]	Prospective	Treatment evaluation	Pain	6	32.4 ± 6.4	Surgery	All types	Elagolix	1368	EHP30 sexual intercourse	Responsiveness
Taylor et al. 2020, Open access[90]	Prospective	Treatment evaluation	Pain	6	32.3 ± 6.6	Surgery	All types	Elagolix	1686	EHP30 sexual intercourse	Responsiveness
Philip et al. 2020, Ultrasound Obstet Gynecol[91]	Prospective	Treatment evaluation	Pain	6	33.4 ± 5.9	Imaging	Single rectosigmoid DIE lesion	Trans rectal High-intensity focused ultrasound	11	FSFI	Responsiveness

Abbreviations: AD, adenomyosis; B-PFSF, Brief Profile of Female Sexual Function; BISF-W, Brief Index of Sexual Functioning for Women; DIE, deep invasive endometriosis; DSFI, Derogatis Sexual Function Inventory; EHP30 SR, EHP30 Sexual relationship; FSDS, Female Sexual Distress Scale; FSFI, Female Sexual Function Index; FSQ, Female Sexual Quotient; GRISS, Golombok Rust Inventory of Sexual Satisfaction; GSSI, Global Sexual Satisfaction Index; ISS, Index of Sexual Satisfaction; KFSP, German version of the Massachusetts General Hospital Sexual Functioning Questionnaire; MFSQ, McCoy Female Sexuality Questionnaire; N, Number of patients in the study; Na, Not applicable; NETA, norethisterone acetate; PISQ 12, Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire (short form); QCSASC, Questionnaire of Cognitive Schema Activation in Sexual Context; QCSASC, Questionnaire of Cognitive Schema Activation in Sexual Context; SAQ, Sexual Activity Questionnaire; SDBQ, Sexual Dysfunctional Belief Questionnaire; SHOW-Q, Sexual Health Outcomes in Women Questionnaire; SIDI, Subjective Impact of Dyspareunia Inventory; SMQ, Sexual Modes Questionnaire; SQOL-F, Sexual Quality of life-Female; SSCS, Sexual Self-Consciousness Scale; SSFS, short sexual functioning scale; SSRS, revised Sabbatsberg Sexual Self-Rating Scale; SSS-W, Sexual Satisfaction Scale for Women; SVQ, Vaginal Changes Questionnaire.

[a]Reason for consultation: mixed: infertility, pain, bleeding.

[b]Diagnosis: mixed: histology or surgery or imaging or clinically.

[c]Both: Hormone and/or surgery.

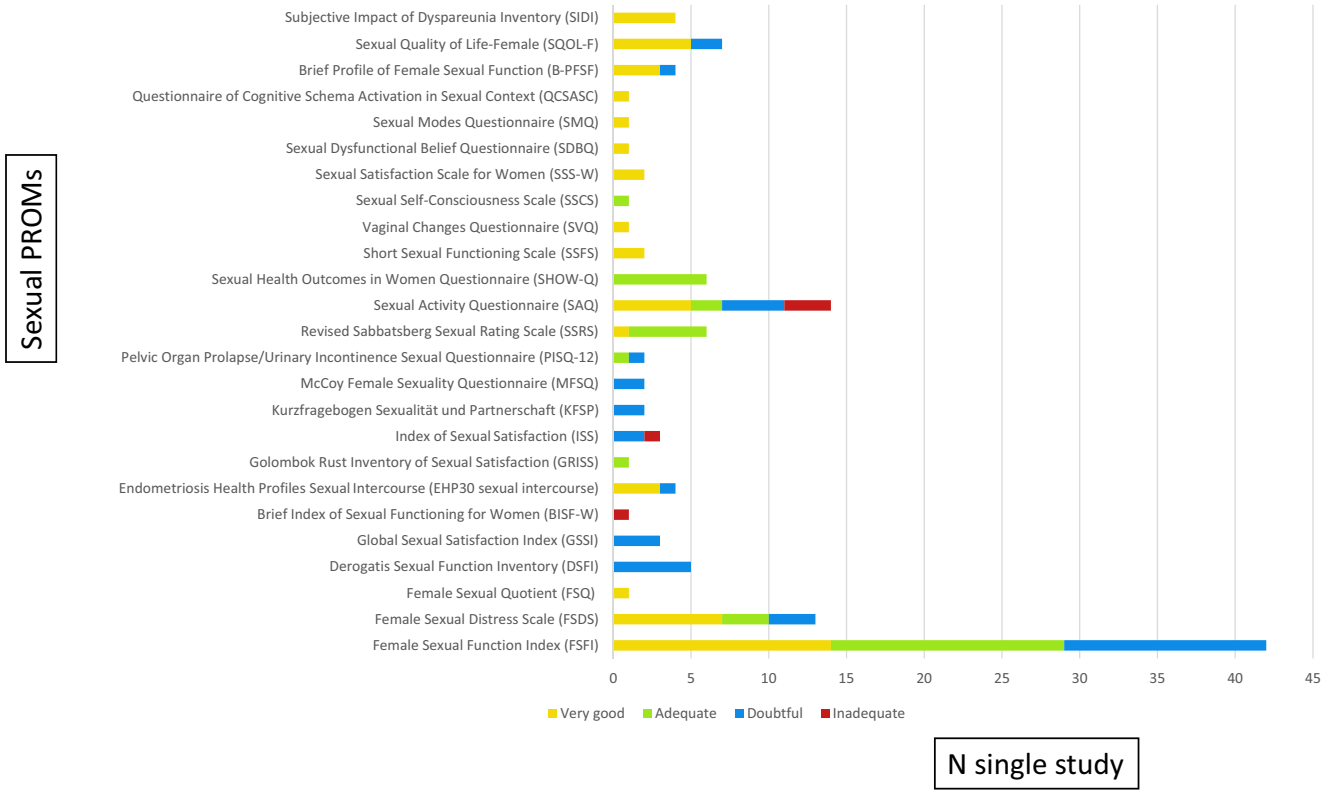

FIGURE 2 Risk of bias of each single study according to the COSMIN Checklist classified by patient-reported outcome measure (PROM). Note that an article can use several measurement properties per PROM and that a "study" corresponds to one measurement property (there can, therefore, be several measurement property studies for an article). The methodological quality of each single "study" is assessed by using the COSMIN risk of bias checklist (as "very good," "adequate," "doubtful," "inadequate quality").

Dienogest). The other questionnaires are reported in Table 2 with their level of evidence. We also provide the evaluation of each article in Table S2.

4 | DISCUSSION

This systematic review identified 25 PROMs used to assess sexual function in patients with endometriosis. Our analysis will help future research investigators as well as clinicians to choose the most appropriate PROM to evaluate sexual function. Most PROMs lack complete evaluation of measurement properties according to the COSMIN criteria. The two main properties evaluated were "hypothesis testing" and "responsiveness." This is mainly due to the fact that most studies were not designed to study the psychometric properties of the questionnaire used, but rather to assess sexual function between different groups (defined by the characteristics of the disease), or the responsiveness. The FSFI and the SAQ questionnaires emerged as having the best measurement properties according to the COSMIN criteria. The FSFI questionnaire appeared to be more relevant for evaluating medical treatment, and the SAQ for surgical treatment. The SIDI is the only specific questionnaire.

From our initial selection of articles assessing sexual outcomes, 34.5% were excluded because only dyspareunia was assessed. This underlines the difficulty of assessing sexual function in its entirety. Dyspareunia, although an important parameter for evaluating pain in patients with endometriosis, does not fit into the definition of a PROM evaluating sexual function. Indeed, a PROM measuring sexual function must take sexual function into account as a whole and should not be limited to the isolated evaluation of pain during penetration. For example, drug-induced pain relief might have a positive impact on sexual functioning but a negative impact on libido and desire.[93] Furthermore, changes in dyspareunia are not always correlated with sexual function.[36]

This highlights the importance of our work assessing the quality and ability of a PROM to capture the multidimensional aspect in this context.

Sexual function may be altered by many factors—endometriosis lesions with pelvic adhesions, fibrosis of the contact organs, and chronic inflammation (related to monthly bleeding, release of prostaglandins and inflammatory mediators, and chemical peritonitis)—resulting in dyspareunia such as genito-pelvic pain in vaginal penetration.[94] Furthermore, surgery with uterosacral ligament and segmental bowel resection as well as extensive dissection of the pararectal spaces may damage the inferior hypogastric nerve plexus, causing impairment in vaginal lubrication.[95,96]

We found that the FSFI was the most used questionnaire in endometriosis. There are two main reasons for its success: it is easy to use (19 items, response time of about 15–20 minutes) and the resulting score makes it possible to categorize women into those

TABLE 2 Measurement properties and risk of bias of sexual function assessment questionnaires according to the COSMIN criteria properties.

Measurement properties studied (No. of patients pooled)	Type of comparison or type of treatment	Summary of results	Criteria for good measurement properties (pooled data) (Terwee)	Risk of bias (According to COSMIN Checklist)	Level of evidence (according to COSMIN grades)	Languages
FSFI						
Hypothesis testing[21,24,25,28,31,34,65,66,70,73,74,79,81,85,92]	Endometriosis versus control	Endometriosis of the rectovaginal septum versus control: ES = −0.3, $p = 0.029$ Endometriosis versus control: Significant difference for total score and pain domain (ES = 0.6) and according to the studies: desire, arousal, lubrication, satisfaction, and orgasm domains[73]: significant difference in pain domain[81]: endometriosis vs. control significant difference in FSFI and all domains[85]: significant difference in sexual arousal domain, satisfaction and sexual pain domain	Sufficient	No	High	Italian, Dutch, German, Portuguese, Chinese, Polish
	Hormonal treatment versus placebo or versus surgical treatment	Between two progestins (Dienogest and NETA): No significant difference Medical treatment (Dienogest) versus control: Significant difference ($p = 0.001$) Continuous versus discontinuous hormone treatment: Difference in favor of continuous, ES = 3.57, $p = 0.001$ Surgical versus medical treatment: Surgery significantly more deleterious ES = −0.47	Sufficient	No	High	Italian, French, German, Japan
	Other (Sex education program)[70,74]	Significant difference	Sufficient	No	High	Iranian
	Surgical treatment (outcomes of nerve sparing)[79]	Significant difference in dysfunction (FSFI < 26.5)	Sufficient	Serious	Low	Italian

(Continues)

TABLE 2 (Continued)

Measurement properties studied (No. of patients pooled)	Type of comparison or type of treatment	Summary of results	Criteria for good measurement properties (pooled data) (Terwee)	Risk of bias (According to COSMIN Checklist)	Level of evidence (according to COSMIN grades)	Languages
Responsiveness[22,25,27,28,30–32, 36,54–58,62,66,70,71,74–77, 80,86,87,91,92]	Surgical or mixed treatment	At 3 months after surgery[75] significant difference ES = 0.82 $p \leq 0.001$ At 12 months Progression not always significant according to the studies[76] NS[77] Significant improvement total score, and desire score and pain score[87] Significant improvement of CO_2 laser ablation of vaginal endometriosis nodule ES = 1.13 Deep endometriosis and nerve-sparing surgical technique: Significant improvement of the total score and of the domains: desire, satisfaction, pain, arousal and orgasm no improvement in the lubrication domain	Sufficient	No	High	Italian, German, Turkish, Chinese, French
	Hormonal treatment	At 6 months or 12 months Progestin treatment or pregnancy: total score improvement: ES ranging from 0.4 to 5.4 Improvement in domains: Desire (ES = 0.82 to 1.23), satisfaction (ES = 0.46 to 1), arousal (ES = 0.45 to 1.36), lubrication (ES = 0.83), orgasm (ES = 0.71 to 1.64), dyspareunia (ES = 0.9 to 2.46) GnRH antagonist vs. placebo: Not significant Dihydrogestérone[80] Desire, satisfaction, orgasm scores increased significantly FSFI score increased significantly: ES = 0.84	Sufficient	No	High	Italian, Portuguese, English, Japanese, Turkish
	Other (herbal treatment)	No improvement of Silymarin	Insufficient	Very serious	Very low	Iranian
	Other (Sex education program)[70,74]	Significant difference ES = 1.4	Sufficient	No	Moderate	Iranian
	Other (Hormonal therapy and electrotherapy)	Significant improvement score with electrotherapy in lubrication and pain score and overall score	Sufficient	Serious	Moderate	Portuguese

TABLE 2 (Continued)

Measurement properties studied (No. of patients pooled)	Type of comparison or type of treatment	Summary of results	Criteria for good measurement properties (pooled data) (Terwee)	Risk of bias (According to COSMIN Checklist)	Level of evidence (according to COSMIN grades)	Languages
Reliability		Intraclass correlation test: 0.98	Sufficient	No	Moderate	Portuguese
SAQ (Sexual Activity Questionnaire)						
Hypothesis[20,48,82]	Correlation with quality of life scales Surgery with immediate or delayed resection of endometriosis lesions High doses progestins	Good correlation with quality of life score: EHP5 and EQ5D Not significant when comparing immediate or delayed management SAQ score significant lower when High dose progestins were used ES=−0.44	Sufficient	No	High	French, English
Responsiveness[20,42,45,48,49,53,61,82]	Surgical or medical treatment High dose progestins	Total score ES=0.3, pleasure domain (ES=0.9 to 1.2), habit domain (ES=0.4 [NS] to 1.1, [S]), discomfort domain (ES=−0.79 to −1.06 [S]) No amelioration between T0 and T1 when high dose progestins were used	Sufficient	No	High	French
	Surgical or medical treatment	MCID=2.2				
Structure validity[20]	Surgical or medical treatment	Unidimensional score	Sufficient	No	High	French
Internal consistency[20]	Surgical or medical treatment	Cronbach α=0.78 95% CI 0.74–0.81	Sufficient	No	High	French
FSDS						
Hypothesis[25,31,68,83,84]	Endometriosis vs. control AD vs. DIE vs. control Endometriosis Endometriosis versus control	Dyspareunia not associated with more sexual distress in endometriosis. Significant difference in AD and DIE vs. control ES (AD vs. control)=−1.35 No difference AD vs. DIE without AD Multivariate logistic regression model: sexual distress associated with greater avoidance of sex and negative impact of endometriosis on sex lives Significantly sexual distress (FSDS >15) when DIE compared with control group	Sufficient	No	Moderate (inconsistency)	Italian, English

(Continues)

TABLE 2 (Continued)

Measurement properties studied (No. of patients pooled)	Type of comparison or type of treatment	Summary of results	Criteria for good measurement properties (pooled data) (Terwee)	Risk of bias (According to COSMIN Checklist)	Level of evidence (according to COSMIN grades)	Languages
	Hormonal treatment	Continuous vs. sequential treatment Significant improvement in score with continuous treatment ES = −2.4 Dienogest vs. control: ES = - 4.9, $p = 0.001$	Sufficient	Serious	Moderate	Italian
Responsiveness[25,27,30,31,74,84]	Hormonal treatment	Continuous Dienogest versus sequential: ES = −2.25 to −5.4, $p = 0.001$	Sufficient	No	High	Italian
	Surgical treatment	Deep endometriosis: Significant improvement post op Peritoneal + vaginal endometriosis: No change	Sufficient	No	Moderate	Italian
	Other (Sex education program)	Significant difference	Sufficient	No	Moderate	Iranian
Female Sexual Quotient (FSQ)						
Hypothesis[23]	Endometriosis versus control	Significant improvement in total score and desire, arousal, pain and orgasm items	Sufficient	No	High	Italian
DSFI						
Hypothesis[3,46,47]	Type of endometriosis and surgical treatment	Comparison of US vs. control (without endometriosis) involvement: significant in all of the following domains: Relaxation after sex (ES = 0.67), satisfying orgasm (ES = 1.10), good communication with partner about sex (ES = 0.82), pain intensity (ES = −0.79), decreased orgasm intensity due to pain (ES = −1), frequency of sex in the last 3 months (ES = 0.57), sexual intercourse interruption due to pain (ES = - 0.58) Comparison of endometriosis surgery with US involvement versus no US involvement: In the absence of US involvement, no benefit of surgery for sexual variety, communication with the partner, and interruption of sexual intercourse for pain	Sufficient	No	High	Italian

TABLE 2 (Continued)

Measurement properties studied (No. of patients pooled)	Type of comparison or type of treatment	Summary of results	Criteria for good measurement properties (pooled data) (Terwee)	Risk of bias (According to COSMIN Checklist)	Level of evidence (according to COSMIN grades)	Languages
Responsiveness[46,47]	Surgical or mixed treatment	Endometriosis with US involvement: Significant for the following items: no satisfaction with sexual frequency (ES = −1.2), relaxation after sex (ES = 1.4 to 1.6), not enough sexual variety (ES = −0.6), not enough sexual duration (ES = −0.8 to −1.2), orgasm (ES = 1.7 to 2.1), communication with partner (ES = 0.45), sexual frequency (ES = 1.3 to 1.4), sexual pain (ES = −1.1 to −1.7), relaxation during sex (ES = −0.8 to 0.9); Not significant for: satisfaction with partner and libido	Sufficient	Serious	Moderate	Italian
BISF-W						
Hypothesis[37]	Surgical or mixed treatment	Not significant Desire (D1), Excitement (D2), Frequency of activity (D3), Receptivity (D4), Orgasm (D5), Relationship satisfaction (D6), Medical problems affecting sexuality (D7)	Sufficient	Extremely serious	Low quality	French
Responsiveness[37]	Surgical or mixed treatment	Significant with ES = 0.57 to 0.72 for arousal (D2), frequency of activity (D3), orgasm (D5) Not significant: desire (D1), receptivity (D4), relationship satisfaction (D6), medical problems affecting sexuality (D7) Composite score ES 1.73	Sufficient	Extremely serious	Low quality	French
EHP30 sexual intercourse /sexual relationship						
Responsiveness[64,82,89,90]	Hormonal treatment[82] Surgery (digestive segmental resection vs. shaving rectal) Medical Treatment (Elagolix 200 mg) Medical Treatment (Elagolix 200 mg)	ES = −0.71, $p = 0.0001$ Significant worse score for segmental resection vs. shaving rectal Dyspareunia responders had significant improvement in EHP30 sexual intercourse Significant improvement in EHP30	Sufficient	No	High	English, Dutch

(Continues)

TABLE 2 (Continued)

Measurement properties studied (No. of patients pooled)	Type of comparison or type of treatment	Summary of results	Criteria for good measurement properties (pooled data) (Terwee)	Risk of bias (According to COSMIN Checklist)	Level of evidence (according to COSMIN grades)	Languages
GRISS						
Hypothesis[44]	Endometriosis versus control	Comparison of chronic pain (with or without endometriosis) vs. control: Significant for domains relationship frequency, sexual satisfaction, sexual aversion, lack of expression of sensuality, vaginismus Not significant: sexual communication, anorgasmia Total GRISS	Sufficient	Serious	Moderate	Portuguese
ISS (Index of sexual satisfaction)						
Hypothesis [43,69]	Hormonal treatment	Comparison of two treatments: Non-significant difference	Sufficient	Very serious	Very low	English, Italian
Responsiveness[43]	Hormonal treatment	At 24 months significant for GnRH agonist	Sufficient	Very serious	Very low	English
McCoy Female Sexuality Questionnaire						
Responsiveness[39,40]	Surgical treatment	At 12 months: Significant for improved sexual satisfaction (ES = 0.2 to 0.56) Not significant for sexual problems and satisfaction with partner	Sufficient	Serious	Very low	Swedish
PISQ-12 (Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire)						
Hypothesis[59]	Surgical treatment	Not significant	Insufficient	Very serious	Very low	English
Responsiveness[59]	Surgical treatment	Not significant	Insufficient	Very serious	Very low	English
Revised Sabbatsberg Sexual Rating Scale						
Hypothesis [38,50,52]	Hormonal treatment	ES = 0.1 Not significant	Insufficient	Serious	Low quality	Italian
	Surgical treatment	Not significant between two surgical techniques ES = −0.1	Insufficient	Serious	Moderate	Italian
	Rectovaginal endometriosis vs. control	Significant for Sexual interest, sexual activity, sexual satisfaction, sexual pleasure, and ability to reach orgasm. Not significant for Importance of sex	Sufficient	No	High	Italian
Responsiveness[50–52]	Surgical treatment	ES = 0.4 to 0.5 or 14.5 (15 patients) $p < 0.05$	Insufficient	No	High	Italian
	Hormonal treatment	Not significant ES = 0.18 to 0.32	Sufficient	Serious	Low quality	Italian

TABLE 2 (Continued)

Measurement properties studied (No. of patients pooled)	Type of comparison or type of treatment	Summary of results	Criteria for good measurement properties (pooled data) (Terwee)	Risk of bias (According to COSMIN Checklist)	Level of evidence (according to COSMIN grades)	Languages
SHOW-Q (Sexual Health Outcomes in Women Questionnaire)						
Hypothesis[4,29,33,41]	Surgical treatment versus healthy women Quality of life scale comparison Segmental surgery versus nodular surgery	Operated patients are comparable with healthy women for satisfaction, desire and interference with pelvic problems but not for orgasm Correlation 0.32 with SF36 quality of life scale Not significant	Sufficient	No	High	Italian
Responsiveness[29,41]	Surgical treatment with hormonal treatment ± estrogen-progestin pill	Significant for satisfaction (ES = 2.55), orgasm (ES = 0.4), desire (ES = 1.8), interference with pelvic problem (ES = −5.5), discordance for orgasm not significant in other studies	Sufficient	No	High	Italian
SSFS (short sexual functioning scale)						
Hypothesis [35]	Surgical treatment with digestive resection versus without	Significant in terms of orgasm (less problem of orgasm in case of surgical treatment with intestinal resection)	Insufficient	No	High	Belgian
Responsiveness[35]	Surgical treatment with digestive endometriosis resection	Significant for pain and orgasm problems Not significant for desire and arousal	Insufficient	No	High	Belgian
SVQ (Vaginal Changes Questionnaire)						
Responsiveness[26]	Surgical treatment	Significant improvement in sexual satisfaction, sexual desire with close physical contact, sexual interest and frequency, decrease in lubrication problems, and dyspareunia and bleeding during sexual intercourse, improvement in the ability to have sexual intercourse, reach orgasm and relax after sexual intercourse	Sufficient	No	High	Danish
SSCS (Sexual Self-Consciousness Scale)						
Hypothesis [24]	Endometriosis versus control	Non-significant difference	Sufficient	No	High	Dutch

(Continues)

TABLE 2 (Continued)

Measurement properties studied (No. of patients pooled)	Type of comparison or type of treatment	Summary of results	Criteria for good measurement properties (pooled data) (Terwee)	Risk of bias (According to COSMIN Checklist)	Level of evidence (according to COSMIN grades)	Languages
SSS-W (Sexual Satisfaction Scale for Women)						
Hypothesis[67]	Endometriosis versus control	Significant difference ES = 0.38	Sufficient	No	High	Arabic
Responsiveness[67]	Surgical treatment	Significant improvement after surgery ES = 0.7	Sufficient	No	High	Arabic
SDBQ (Sexual Dysfunctional Belief Questionnaire)						
Hypothesis[73]	Endometriosis versus control	Significant difference	Sufficient	No	High	Italian
SMQ (Sexual Modes Questionnaire)						
Hypothesis[73]	Endometriosis versus control	No significant difference	Insufficient	No	High	Italian
QCSASC (Questionnaire of Cognitive Schema Activation in Sexual Context)						
Hypothesis[73]	Endometriosis versus control	No significant difference	Insufficient	No	High	Italian
SQOL-F (Sexual Quality of life-Female)						
Hypothesis[74,78,83,84]	Other (Sex education program) DIE+ adenomyosis vs. DIE AD vs. DIE vs. control DIE vs. control	Significant difference Significant higher score for group with no adenomyosis ES = −0.43 Significant difference in AD and DIE vs. control ES (AD vs. control) = 1.89 No difference AD vs. DIE without AD Significant difference	Sufficient	No	High	Iranian, Italian, Spanish
Responsiveness[74,78,84]	Other (Sex education program) Hormonal treatment DIE+ adenomyosis vs. DIE Surgery treatment and DIE	Significant difference EF = 0.73 Significant difference: Slightly greater when adenomyosis ES = 2.16 Significant improvement after surgery and DIR	Sufficient	No	High	Iranian, Italian, Spanish
B-PFSF (Brief Profile of Female Sexual Function)						
Hypothesis[78,83,84]	DIE+ adenomyosis vs. DIE AD vs. DIE vs. control DIE vs. control	Significant difference: Higher with no adenomyosis score ES = −0.33 Significant difference in AD and DIE vs. control ES (AD vs. control) = 0.66 No difference AD vs. DIE without AD Significant lower score when DIE vs. control	Sufficient	No	High	English; Italian, Spanish

TABLE 2 (Continued)

Measurement properties studied (No. of patients pooled)	Type of comparison or type of treatment	Summary of results	Criteria for good measurement properties (pooled data) (Terwee)	Risk of bias (According to COSMIN Checklist)	Level of evidence (according to COSMIN grades)	Languages
Responsiveness[78,84]	Hormonal treatment: DIE+ adenomyosis vs. DIE Surgery treatment and DIE	Significant difference Slightly greater when adenomyosis No difference when no DIE no adenomyosis ES=0.73 Significant improvement in B-PFSF score	Sufficient	No	High	English; Italian, Spanish
SIDI (Subjective Impact Of Dyspareunia Inventory)						
Hypothesis[72]	Endometriosis with dyspareunia	Sexual dysfunction significantly associated with greater Sexual and relationship concerns, poorer partner support and higher Endurance than participants without sexual dysfunction	Sufficient	No	High	Italian
Structure validity[72]	Endometriosis with dyspareunia	Four factors structure, examining the impact of dyspareunia in terms of Sexual Concerns (Factor 1), Relationship concern (Factor 2), Partner Support (Factor 3), and Endurance of Pain (Factor 4)	Sufficient	No	High	Italian
Construct validity[72]	Endometriosis with dyspareunia	SIDI scores significantly correlated with all the FSFI domains and total score (convergent validity), as well as with the HADS subscales and total score, and the RSES (concurrent validity)	Sufficient	No	High	Italian
Internal consistency[72]	Endometriosis with dyspareunia	Cronbach's α = Factor 1: 0.88 Factor 2: 0.86 Factor 3: 0.75 Factor 4: 0.87	Sufficient	No	High	Italian

Note: (1) The column "Criteria for good measurement properties (pooled data) (Terwee)" corresponds to the Table 4 (*updated criteria for good measurement properties*) of the COSMIN manual for systematic reviews of PROMs (https://cosmin.nl/wp-content/uploads/COSMIN-syst-review-for-PROMs-manual_version-1_feb-2018.pdf). (2) The column "Risk of bias (Pooled data) (According to COSMIN Checklist)" corresponds to the Table 7 (*Instructions on downgrading for risk of bias*) of the COSMIN manual for systematic reviews of PROMs (https://cosmin.nl/wp-content/uploads/COSMIN-syst-review-for-PROMs-manual_version-1_feb-2018.pdf). (3) The column "Level of evidence (according to COSMIN grades)" corresponds to the Table 6 (*modified grade approach for grading the quality of evidence*) of the COSMIN manual for systematic reviews of PROMs (https://cosmin.nl/wp-content/uploads/COSMIN-syst-review-for-PROMs-manual_version-1_feb-2018.pdf).

Abbreviations: AD, adenomyosis; DIE, deep invasive endometriosis; ES, Effect size *d* Cohen; HADS, Hospital Anxiety and Depression Scale; MCID, Minimal Clinically Important Difference; NETA, norethisterone acetate; NS, non-significant; RSES, Rosenberg Self-Esteem Scale; S, significant; SR, sexual relations; US, Utero-sacral ligaments; vs, versus; Definition responsiveness, pre-treatment versus post-treatment (pre-operative vs. post-operative).

who do or do not suffer from sexual dysfunction (sexual dysfunction: yes/no) based on a defined cut-off of 26.5.[97] However, the FSFI was originally developed for patients who have a partner and are sexually active. Hence, a low FSFI score may be related either to the absence of a sexual partner or to the absence of sexual intercourse due to the dyspareunia associated with endometriosis. Even if this questionnaire is easy to use, it takes a relatively long time to answer, and is multidimensional, making it more complicated to interpret.

The SAQ, although less used, has been validated in an endometriosis population with a psychometric validation study (with complete validation properties[20]) and also has the advantage of having a well-defined minimum clinically important difference, which may be very useful for research. The minimum clinically important difference is described as the smallest difference in score in the domain of interest that patients perceive as beneficial and that would mandate, in the absence of troublesome side effects and excessive cost, a change in patient management.[98]

Compared with the FSFI, the SAQ is simpler to use (10 items, response time of about 5–10 minutes), and sexual inactivity is captured by questions asked in Part 2 of the questionnaire (unlike the FSFI). Hence, the score from this questionnaire is only used for patients who are sexually active. One interesting property is that it is unidimensional,[20] which facilitates the calculation and use of the score. Unidimensionality is an interesting property for clinician use in everyday practice to monitor the effect of the treatment of endometriosis on sexual function.[88]

A third questionnaire, the SHOW-Q distinguished itself by good measurement properties for "hypothesis" and "responsiveness," although it is less frequently used.

Various PROMs—such as the SHOW-Q, FSFI, Derogatis Sexual Function Inventory, Golombok Rust Inventory of Sexual Satisfaction, SSFS,[3,4,41,99] or SAQ[20]—have been used in recent years to assess sexual dysfunction in the general population (other than the endometriosis population). Measurement properties vary according to the context and to the disease.[100] All the aforementioned PROMs have been validated in the general population but only the SAQ has specifically been validated in endometriosis.[20] Some of these questionnaires have shortcomings for assessing sexual function in women with endometriosis: some questions may address topics that are not relevant to these women while neglecting other important aspects of the disease. Interestingly, the SIDI is the only PROM that has been developed and validated specifically for women with endometriosis. This questionnaire assesses the subjective impact of dyspareunia. The validation study has been recently published (June 21, 2022) and did not provide information on the responsiveness of this questionnaire. This information should soon be available if the SIDI is used to evaluate therapeutic strategies.

Our study is the first systematic review analyzing PROMs of sexual function in the field of endometriosis. The use of the COSMIN checklist to evaluate their measurement properties allowed us to rigorously evaluate the qualities and shortcomings of the different PROMs reported in the literature through a precise analysis of their measurement properties.

Some limitations deserve to be mentioned. Articles of interest were identified using the PubMed database alone. Nevertheless, we also searched for articles in the reference lists of the included articles and only identified two additional articles. Furthermore, one should note that PubMed lists the vast majority of accepted and published articles in the field of endometriosis. Another limitation, as previously explained, is that most of the studies were not designed to study the psychometric properties of the questionnaire but rather to assess sexual function between different groups.

Future clinical research should focus on developing a well-designed questionnaire for use in women with endometriosis. This questionnaire should be specific to endometriosis, similar to the SIDI, and should possess good measurement properties for evaluating both medical treatment, like the FSFI, and surgical treatment, like the SAQ.

5 | CONCLUSION

In this systematic literature review of sexual function assessment questionnaires in endometriosis, the FSFI and the SAQ questionnaires emerged as having the best measurement properties according to the COSMIN criteria. The FSFI questionnaire would appear to be more relevant for evaluating medical treatment, and the SAQ for surgical treatment. The SIDI is the only specific questionnaire, but its responsiveness remains to be defined. Our study will help the development of future tools by providing an overview of all the measurement properties investigated by PROMs assessing sexual function in a population of patients with endometriosis.

AUTHOR CONTRIBUTIONS

Anne Oppenheimer and Arnaud Fauconnier designed the study. Anne Oppenheimer and Florence Boitrelle reviewed all articles included in the systematic review. Anne Oppenheimer and Arnaud Fauconnier wrote the manuscript. All authors reviewed and modified the manuscript, and approved the final version for submission.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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REFERENCES

1. Zondervan KT, Becker CM, Missmer SA. Endometriosis. *N Engl J Med*. 2020;26(382):1244-1256.
2. Pluchino N, Wenger JM, Petignat P, et al. Sexual function in endometriosis patients and their partners: effect of the disease and consequences of treatment. *Hum Reprod Update*. 2016;22:762-774.
3. Ferrero S, Esposito F, Abbamonte LH, Anserini P, Remorgida V, Ragni N. Quality of sex life in women with endometriosis and deep dyspareunia. *Fertil Steril*. 2005;83:573-579.
4. Montanari G, Di Donato N, Benfenati A, et al. Women with deep infiltrating endometriosis: sexual satisfaction, desire, orgasm, and pelvic problem interference with sex. *J Sex Med*. 2013;10:1559-1566.
5. Casey PM, MacLaughlin KL, Faubion SS. Impact of contraception on female sexual function. *J Womens Health (Larchmt)*. 2017;26:207-213.
6. Zethraeus N, Dreber A, Ranehill E, et al. Combined oral contraceptives and sexual function in women—a double-blind, randomized, placebo-controlled trial. *J Clin Endocrinol Metab*. 2016;101:4046-4053.
7. Sanders SA, Graham CA, Bass JL, Bancroft J. A prospective study of the effects of oral contraceptives on sexuality and well-being and their relationship to discontinuation. *Contraception*. 2001;64:51-58.
8. Rellini A, Meston C. The sensitivity of event logs, self-administered questionnaires and photoplethysmography to detect treatment-induced changes in female sexual arousal disorder (FSAD) diagnosis. *J Sex Med*. 2006;3:283-291.
9. U.S. Department of Health and Human Services FDA Center for Drug Evaluation and Research, U.S. Department of Health and Human Services FDA Center for Biologics Evaluation and Research, U.S. Department of Health and Human Services FDA Center for Devices and Radiological Health. Guidance for industry: patient-reported outcome measures: use in medical product development to support labeling claims: draft guidance. *Health Qual Life Outcomes*. 2006;4:79.
10. Marshall S, Haywood K, Fitzpatrick R. Impact of patient-reported outcome measures on routine practice: a structured review. *J Eval Clin Pract*. 2006;12:559-568.
11. Chen J, Ou L, Hollis SJ. A systematic review of the impact of routine collection of patient reported outcome measures on patients, providers and health organisations in an oncologic setting. *BMC Health Serv Res*. 2013;13:211.
12. Santana MJ, Feeny D. Framework to assess the effects of using patient-reported outcome measures in chronic care management. *Qual Life Res*. 2014;23:1505-1513.
13. Mokkink LB, Prinsen CAC, Bouter LM, de Vet HCW, Terwee CB. The COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) and how to select an outcome measurement instrument. *Braz J Phys Ther*. 2016;20:105-113.
14. Mokkink LB, Terwee CB, Patrick DL, et al. The COSMIN study reached international consensus on taxonomy, terminology, and definitions of measurement properties for health-related patient-reported outcomes. *J Clin Epidemiol*. 2010;63:737-745.
15. Elsman EBM, Butcher NJ, Mokkink LB, et al. Study protocol for developing, piloting and disseminating the PRISMA-COSMIN guideline: a new reporting guideline for systematic reviews of outcome measurement instruments. *Syst Rev*. 2022;11:121.
16. Mokkink LB, de Vet HCW, Prinsen CAC, et al. COSMIN risk of bias checklist for systematic reviews of patient-reported outcome measures. *Qual Life Res*. 2018;27:1171-1179.
17. Prinsen CAC, Mokkink LB, Bouter LM, et al. COSMIN guideline for systematic reviews of patient-reported outcome measures. *Qual Life Res*. 2018;27:1147-1157.
18. Kazis LE, Anderson JJ, Meenan RF. Effect sizes for interpreting changes in health status. *Med Care*. 1989;27(3 Suppl):S178-S189.
19. Rosnow RL, Rosenthal R. Computing contrasts, effect sizes, and counternulls on other people's published data: general procedures for research consumers. *Psychol Methods*. 1996;1:331-340.
20. Oppenheimer A, Panel P, Rouquette A, du Cheyron J, Deffieux X, Fauconnier A. Validation of the sexual activity questionnaire in women with endometriosis. *Hum Reprod*. 2019;34:824-833.
21. Cozzolino M, Magro-Malosso ER, Tofani L, Coccia ME. Evaluation of sexual function in women with deep infiltrating endometriosis. *Sex Reprod Healthc*. 2018;16:6-9.
22. Vercellini P, Ottolini F, Frattaruolo MP, Buggio L, Roberto A, Somigliana E. Shifting from oral contraceptives to norethisterone acetate, or vice versa, because of drug intolerance: does the change benefit women with endometriosis? *Gynecol Obstet Invest*. 2018;83:275-284.
23. Fairbanks F, Abdo CH, Baracat EC, Podgaec S. Endometriosis doubles the risk of sexual dysfunction: a cross-sectional study in a large amount of patients. *Gynecol Endocrinol*. 2017;33:544-547.
24. de Graaff AA, van Lankveld J, Smits LJ, van Beek JJ, Dunselman GAJ. Dyspareunia and depressive symptoms are associated with impaired sexual functioning in women with endometriosis, whereas sexual functioning in their male partners is not affected. *Hum Reprod*. 2016;31:2577-2586.
25. Caruso S, Iraci M, Cianci S, Fava V, Casella E, Cianci A. Comparative, open-label prospective study on the quality of life and sexual function of women affected by endometriosis-associated pelvic pain on 2 mg dienogest/30 μg ethinyl estradiol continuous or 21/7 regimen oral contraceptive. *J Endocrinol Invest*. 2016;39:923-931.
26. Riiskjaer M, Greisen S, Glavind-Kristensen M, Kesmodel US, Forman A, Seyer-Hansen M. Pelvic organ function before and after laparoscopic bowel resection for rectosigmoid endometriosis: a prospective, observational study. *BJOG*. 2016;123:1360-1367.
27. Fritzer N, Tammaa A, Haas D, et al. When sex is not on fire: a prospective multicentre study evaluating the short-term effects of radical resection of endometriosis on quality of sex life and dyspareunia. *Eur J Obstet Gynecol Reprod Biol*. 2016;197:36-40.
28. Vercellini P, Bracco B, Mosconi P, et al. Norethindrone acetate or dienogest for the treatment of symptomatic endometriosis: a before and after study. *Fertil Steril*. 2016;105:734-743.e3.
29. Di Donato N, Montanari G, Benfenati A, et al. Sexual function in women undergoing surgery for deep infiltrating endometriosis: a comparison with healthy women. *J Fam Plann Reprod Health Care*. 2015;41:278-283.
30. Caruso S, Iraci Sareri M, Casella E, Ventura B, Fava V, Cianci A. Chronic pelvic pain, quality of life and sexual health of women treated with palmitoylethanolamide and α-lipoic acid. *Minerva Ginecol*. 2015;67:413-419.
31. Caruso S, Iraci M, Cianci S, Casella E, Fava V, Cianci A. Quality of life and sexual function of women affected by endometriosis-associated pelvic pain when treated with dienogest. *J Endocrinol Invest*. 2015;38:1211-1218.
32. Morotti M, Sozzi F, Remorgida V, Venturini PL, Ferrero S. Dienogest in women with persistent endometriosis-related pelvic pain during norethisterone acetate treatment. *Eur J Obstet Gynecol Reprod Biol*. 2014;183:188-192.
33. Di Donato N, Montanari G, Benfenati A, et al. Do women with endometriosis have to worry about sex? *Eur J Obstet Gynecol Reprod Biol*. 2014;179:69-74.
34. Evangelista A, Dantas T, Zendron C, Soares T, Vaz G, Oliveira MAP. Sexual function in patients with deep infiltrating endometriosis. *J Sex Med*. 2014;11:140-145.
35. van den Broeck U, Meuleman C, Tomassetti C, et al. Effect of laparoscopic surgery for moderate and severe endometriosis on depression, relationship satisfaction and sexual functioning:

comparison of patients with and without bowel resection. *Hum Reprod*. 2013;28:2389-2397.
36. Vercellini P, Frattaruolo MP, Somigliana E, et al. Surgical versus low-dose progestin treatment for endometriosis-associated severe deep dyspareunia II: effect on sexual functioning, psychological status and health-related quality of life. *Hum Reprod*. 2013;28:1221-1230.
37. Dubuisson J, Pont M, Roy P, Golfier F, Raudrant D. Female sexuality after surgical treatment of symptomatic deep pelvic endometriosis. *Gynecol Obstet Fertil*. 2013;41:38-44.
38. Vercellini P, Somigliana E, Buggio L, Barbara G, Frattaruolo MP, Fedele L. "I can't get no satisfaction": deep dyspareunia and sexual functioning in women with rectovaginal endometriosis. *Fertil Steril*. 2012;98:1503-1511.e1.
39. Kössi J, Setälä M, Mäkinen J, Härkki P, Luostarinen M. Quality of life and sexual function 1 year after laparoscopic rectosigmoid resection for endometriosis. *Colorectal Dis*. 2013;15:102-108.
40. Setälä M, Härkki P, Matomäki J, Mäkinen J, Kössi J. Sexual functioning, quality of life and pelvic pain 12 months after endometriosis surgery including vaginal resection. *Acta Obstet Gynecol Scand*. 2012;91:692-698.
41. Mabrouk M, Montanari G, Di Donato N, et al. What is the impact on sexual function of laparoscopic treatment and subsequent combined oral contraceptive therapy in women with deep infiltrating endometriosis? *J Sex Med*. 2012;9:770-778.
42. Meuleman C, Tomassetti C, D'Hoore A, et al. Clinical outcome after CO_2 laser laparoscopic radical excision of endometriosis with colorectal wall invasion combined with laparoscopic segmental bowel resection and reanastomosis. *Hum Reprod*. 2011;26:2336-2343.
43. Guzick DS, Huang LS, Broadman BA, Nealon M, Hornstein MD. Randomized trial of leuprolide versus continuous oral contraceptives in the treatment of endometriosis-associated pelvic pain. *Fertil Steril*. 2011;95:1568-1573.
44. Tripoli TM, Sato H, Sartori MG, de Araujo FF, Girão MJBC, Schor E. Evaluation of quality of life and sexual satisfaction in women suffering from chronic pelvic pain with or without endometriosis. *J Sex Med*. 2011;8:497-503.
45. Meuleman C, D'Hoore A, van Cleynenbreugel B, Beks N, D'Hooghe T. Outcome after multidisciplinary CO_2 laser laparoscopic excision of deep infiltrating colorectal endometriosis. *Reprod Biomed Online*. 2009;18:282-289.
46. Ferrero S, Abbamonte LH, Giordano M, Ragni N, Remorgida V. Deep dyspareunia and sex life after laparoscopic excision of endometriosis. *Hum Reprod*. 2007;22:1142-1148.
47. Ferrero S, Abbamonte LH, Parisi M, Ragni N, Remorgida V. Dyspareunia and quality of sex life after laparoscopic excision of endometriosis and postoperative administration of triptorelin. *Fertil Steril*. 2007;87:227-229.
48. Abbott J, Hawe J, Hunter D, Holmes M, Finn P, Garry R. Laparoscopic excision of endometriosis: a randomized, placebo-controlled trial. *Fertil Steril*. 2004;82:878-884.
49. Abbott JA, Hawe J, Clayton RD, Garry R. The effects and effectiveness of laparoscopic excision of endometriosis: a prospective study with 2–5 year follow-up. *Hum Reprod*. 2003;18:1922-1927.
50. Vercellini P, Aimi G, Busacca M, Apolone G, Uglietti A, Crosignani PG. Laparoscopic uterosacral ligament resection for dysmenorrhea associated with endometriosis: results of a randomized, controlled trial. *Fertil Steril*. 2003;80:310-319.
51. Soysal ME, Soysal S, Gurses E, Ozer S. Laparoscopic presacral neurolysis for endometriosis-related pelvic pain. *Hum Reprod*. 2003;18:588-592.
52. Vercellini P, De Giorgi O, Mosconi P, Stellato G, Vicentini S, Crosignani PG. Cyproterone acetate versus a continuous monophasic oral contraceptive in the treatment of recurrent pelvic pain after conservative surgery for symptomatic endometriosis. *Fertil Steril*. 2002;77:52-61.
53. Garry R, Clayton R, Hawe J. The effect of endometriosis and its radical laparoscopic excision on quality of life indicators. *BJOG*. 2000;107:44-54.
54. Alberico D, Somigliana E, Bracco B, et al. Potential benefits of pregnancy on endometriosis symptoms. *Eur J Obstet Gynecol Reprod Biol*. 2018;230:182-187.
55. Sansone A, de Rosa N, Giampaolino P, Guida M, Laganà AS, Di Carlo C. Effects of etonogestrel implant on quality of life, sexual function, and pelvic pain in women suffering from endometriosis: results from a multicenter, prospective, observational study. *Arch Gynecol Obstet*. 2018;298:731-736.
56. Uccella S, Gisone B, Serati M, et al. Functional outcomes of nerve-sparing laparoscopic eradication of deep infiltrating endometriosis: a prospective analysis using validated questionnaires. *Arch Gynecol Obstet*. 2018;298:639-647.
57. Vercellini P, Donati A, Ottolini F, et al. A stepped-care approach to symptomatic endometriosis management: a participatory research initiative. *Fertil Steril*. 2018;109:1086-1096.
58. Paulo Leonardo-Pinto J, Laguna Benetti-Pinto C, Angerame Yela D. When solving dyspareunia is not enough to restore sexual function in women with deep infiltrating endometriosis treated with dienogest. *J Sex Marital Ther*. 2019;45:44-49.
59. Riley K, Benton A, Deimling TA, Kunselman AR, Harkins GJ. Surgical excision versus ablation for superficial endometriosis associated pain: a randomized controlled trial. *J Minim Invasive Gynecol*. 2019;26:71-77.
60. Vercellini P, Frattaruolo MP, Rosati R, et al. Medical treatment or surgery for colorectal endometriosis? Results of a shared decision-making approach. *Hum Reprod*. 2018;33:202-211.
61. Abokhrais IM, Denison FC, Whitaker LHR, et al. A two-arm parallel double-blind randomised controlled pilot trial of the efficacy of Omega-3 polyunsaturated fatty acids for the treatment of women with endometriosis-associated pain (PurFECT1). *PLoS One*. 2020;15:e0227695.
62. Andersson JK, Khan Z, Weaver AL, Vaughan LE, Gemzell-Danielsson K, Stewart EA. Vaginal bromocriptine improves pain, menstrual bleeding and quality of life in women with adenomyosis: a pilot study. *Acta Obstet Gynecol Scand*. 2019;98:1341-1350.
63. Lermann J, Topal N, Renner SP, et al. Comparison of preoperative and postoperative sexual function in patients with deeply infiltrating endometriosis with and without bowel resection. *Eur J Obstet Gynecol Reprod Biol*. 2019;239:21-29.
64. Pokrzywinski R, Soliman AM, Chen J, Snabes MC, Taylor HS, Coyne KS. Responsiveness evaluation and recommendation for responder thresholds for endometriosis health profile-30: analysis of two phase III clinical trials. *J Womens Health (Larchmt)*. 2020;29:253-261.
65. Jia SZ, Leng JH, Sun PR, Lang JH. Prevalence and associated factors of female sexual dysfunction in women with endometriosis. *Obstet Gynecol*. 2013;121:601-606.
66. D'Hooghe T, Fukaya T, Osuga Y, et al. Efficacy and safety of ASP1707 for endometriosis-associated pelvic pain: the phase II randomized controlled TERRA study. *Hum Reprod*. 2019;34:813-823.
67. Kfoury M, Barakat H, Hallit S, Saliba S. Association between endometriosis and sexual satisfaction among a sample of lebanese women. *BMC Womens Health*. 2023;23:164.
68. Privitera G, O'Brien K, Misajon R, Lin CY. Endometriosis symptomatology, dyspareunia, and sexual distress are related to avoidance of sex and negative impacts on the sex lives of women with endometriosis. *Int J Environ Res Public Health*. 2023;20:3362.
69. Maiorana A, Alfano P, Mercurio A, et al. Quality of life and clinical factors in women with endometriosis, the role of dienogest vs EE/dienogest over time: a single-center study. *Arch Gynecol Obstet*. 2023;307:1503-1512.

70. Tajik M, Shahali S, Shadjoo K. The co-effect of sensate focus technique and sexual position changing on sexual function of women who use medical treatment for endometriosis. *J Obstet Gynaecol*. 2022;42:3706-3711.
71. Mirzaei N, Jahanian Sadatmahalleh S, Rouholamin S, Nasiri M. A randomized trial assessing the efficacy of Silymarin on endometrioma-related manifestations. *Sci Rep*. 2022;12:17549.
72. Facchin F, Barbara G, Buggio L, Dridi D, Frassineti A, Vercellini P. Assessing the experience of dyspareunia in the endometriosis population: the Subjective Impact of Dyspareunia Inventory (SIDI). *Hum Reprod*. 2022;37:2032-2041.
73. Rossi V, Galizia R, Tripodi F, Simonelli C, Porpora MG, Nimbi FM. Endometriosis and sexual functioning: how much do cognitive and psycho-emotional factors matter? *Int J Environ Res Public Health*. 2022;19:5319.
74. Matloobi M, Amini L, Shahali S, et al. Effect of sex education on sexual function and sexual quality of life in women with endometriosis: a quasi-experimental study. *Int J Gynaecol Obstet*. 2022;159:702-710.
75. Halici BNA, Aktoz F, Kabakci M, Kiran G, Ozcan P. Analysis of preoperative and postoperative quality of life, sexual function, and sleep in patients with endometriosis: a prospective cohort study. *Arch Gynecol Obstet*. 2023;307:113-120.
76. Zhang N, Sun S, Zheng Y, et al. Reproductive and postsurgical outcomes of infertile women with deep infiltrating endometriosis. *BMC Womens Health*. 2022;22:83.
77. Dior UP, Reddington C, Cheng C, Levin G, Healey M. Sexual function of women with deep endometriosis before and after surgery: a prospective study. *J Sex Med*. 2022;19:280-289.
78. Alcalde AM, Martínez-Zamora MÁ, Gracia M, et al. Assessment of quality of life, sexual quality of life, and pain symptoms in deep infiltrating endometriosis patients with or without associated adenomyosis and the influence of a flexible extended combined oral contraceptive regimen: results of a prospective, observational study. *J Sex Med*. 2022;19:311-318.
79. Ianieri MM, Raimondo D, Rosati A, et al. Impact of nerve-sparing posterolateral parametrial excision for deep infiltrating endometriosis on postoperative bowel, urinary, and sexual function. *Int J Gynaecol Obstet*. 2022;159:152-159.
80. Yalçın Bahat P, Yücel B, Yuksel Ozgor B, et al. The effect of dydrogesterone on sexual function in endometriosis. *J Obstet Gynaecol*. 2022;42:1276-1279.
81. Mińko A, Turoń-Skrzypińska A, Rył A, et al. Endometriosis—a multifaceted problem of a modern woman. *Int J Environ Res Public Health*. 2021;18(15):8177.
82. Scheepers WFW, Maas JWM, van de Kar MMA. Bowel function and quality of life following surgery for deep endometriosis. *J Psychosom Obstet Gynaecol*. 2022;43(3):334-339.
83. Alcalde AM, Martínez-Zamora MÁ, Gracia M, Ros C, Rius M, Carmona F. Assessment of quality of sexual life in women with adenomyosis. *Women Health*. 2021;61:520-526.
84. Martínez-Zamora MA, Coloma JL, Gracia M, Rius M, Castelo-Branco C, Carmona F. Long-term follow-up of sexual quality of life after laparoscopic surgery in patients with deep infiltrating endometriosis. *J Minim Invasive Gynecol*. 2021;28:1912-1919.
85. Yang X, Xu X, Lin L, et al. Sexual function in patients with endometriosis: a prospective case-control study in China. *J Int Med Res*. 2021;49(4):3000605211004388.
86. Mira TAA, Yela DA, Podgaec S, Baracat EC, Benetti-Pinto CL. Hormonal treatment isolated versus hormonal treatment associated with electrotherapy for pelvic pain control in deep endometriosis: randomized clinical trial. *Eur J Obstet Gynecol Reprod Biol*. 2020;255:134-141.
87. Buggio L, Monti E, Liverani C, Frattaruolo MP, Dridi D, Somigliana E. Carbon dioxide (CO_2) laser ablation of symptomatic vaginal endometriosis: a pilot study. *Lasers Med Sci*. 2021;36(6):1227-1233.
88. Oppenheimer A, Verdun S, Perot M, du Cheyron J, Panel P, Fauconnier A. Do high-dose progestins impair sexual function in women treated for endometriosis? A prospective observational longitudinal study. *Acta Obstet Gynecol Scand*. 2021;100:850-859.
89. Agarwal SK, Soliman AM, Pokrzywinski RM, Snabes MC, Coyne KS. Clinically meaningful reduction in dyspareunia is associated with significant improvements in health-related quality of life among women with moderate to severe pain associated with endometriosis: a pooled analysis of two phase III trials of Elagolix. *J Sex Med*. 2020;17:2427-2433.
90. Taylor HS, Soliman AM, Johns B, Pokrzywinski RM, Snabes M, Coyne KS. Health-related quality of life improvements in patients with endometriosis treated with Elagolix. *Obstet Gynecol*. 2020;136:501-509.
91. Philip CA, Warembourg S, Dairien M, et al. Transrectal high-intensity focused ultrasound (HIFU) for management of recto-sigmoid deep infiltrating endometriosis: results of phase-I clinical trial. *Ultrasound Obstet Gynecol*. 2020;56:431-442.
92. Vercellini P, Crosignani PG, Somigliana E, Berlanda N, Barbara G, Fedele L. Medical treatment for rectovaginal endometriosis: what is the evidence? *Hum Reprod*. 2009;24(10):2504-2514.
93. Buster JE. Managing female sexual dysfunction. *Fertil Steril*. 2013;100:905-915.
94. Zondervan KT, Becker CM, Koga K, Missmer SA, Taylor RN, Viganò P. Endometriosis. *Nat Rev Dis Primers*. 2018;4:9.
95. Landi S, Ceccaroni M, Perutelli A, et al. Laparoscopic nerve-sparing complete excision of deep endometriosis: is it feasible? *Hum Reprod*. 2006;21:774-781.
96. Hendren SK, O'Connor BI, Liu M, et al. Prevalence of male and female sexual dysfunction is high following surgery for rectal cancer. *Ann Surg*. 2005;242:212-223.
97. ter Kuile MM, Brauer M, Laan E. The female sexual function index (FSFI) and the female sexual distress scale (FSDS): psychometric properties within a Dutch population. *J Sex Marital Ther*. 2006;32:289-304.
98. Jaeschke R, Singer J, Guyatt GH. Measurement of health status. Ascertaining the minimal clinically important difference. *Control Clin Trials*. 1989;10:407-415.
99. Fritzer N, Haas D, Oppelt P, et al. More than just bad sex: sexual dysfunction and distress in patients with endometriosis. *Eur J Obstet Gynecol Reprod Biol*. 2013;169:392-396.
100. Sechrest L. Validity of measures is no simple matter. *Health Serv Res*. 2005;40(5 Pt 2):1584-1604.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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