



Operated Male-to-Female Sexual Function Index: Validity of the First Questionnaire Developed to Assess Sexual Function after Male-to-Female Gender Affirming Surgery

Francesca Vedovo,* Lisa Di Blas, Chiara Perin, Nicola Pavan, Marta Zatta, Stefano Bucci, Girolamo Morelli, Andrea Cocci, Augusto Delle Rose, Simone Caroassai Grisanti, Giorgio Gentile, Fulvio Colombo, Luigi Rolle, Massimiliano Timpano, Paolo Verze, Lorenzo Spirito, Francesco Schiralli, Carlo Bettocchi, Giulio Garaffa, Alessandro Palmieri, Vincenzo Mirone and Carlo Trombetta

From the Department of Urology (FV, CP, NP, SB, CT) and Infectious Diseases Unit (MZ), ASUITS, Department of Life Sciences, University of Trieste (LDB), Trieste, Clinical Psychology Unit, AIED, Pordenone (CP), Department of Urology, University of Pisa, Pisa (GM), Department of Urology, University of Florence, Florence (AC, ADR, SCG), Andrology-Unit, Department of Gynaecology and Urology, University Hospital S. Orsola-Malpighi, Bologna (GGe, FC), Department of Urology, AO Health and Science City, University of Turin, Turin (LR, MT), Department of Urology, University of Naples, Federico II, Naples (PV, LS, AP, VM), and Urology, Andrology and Kidney Transplantation Unit, Department of Emergency and Organ Transplantation, University of Bari, Bari (FS, CB), Italy, and the Andrology Department, University College London Hospital, London (GGa), United Kingdom

Purpose: No questionnaire is currently available to evaluate sexual function after male-to-female gender affirming surgery. Such a limit leads to a suboptimal evaluation in postoperative sexual function in these patients. We developed and validated a new questionnaire, the oMtFSFI (operated Male-to-Female Sexual Function Index), for assessing sexual function in male-to-female patients after surgery.

Materials and Methods: A panel of experts in gender dysphoria defined the main content areas to be assessed, including genital self-image, desire, arousal, lubrication, orgasm, satisfaction and sexual pain. After a pretest on 10 patients the oMtFSFI was applied in the main study to 65 operated male-to-female patients, recruited at 7 Italian centers, and 57 women. The participants provided self-ratings on online oMtFSFI, Female Sexual Function Index, Beck Depression Inventory for Primary Care and Short Form Health Survey questionnaires. Operated male-to-female patients completed the oMtFSFI twice, 4 weeks apart.

Results: Principal component analysis performed on self-ratings provided by operated male-to-female patients on oMtFSFI items yielded a 3-domain structure of sexual dissatisfaction, sexual pain and genital self-image. The 3 domains were internally consistent and test-retest reliable. Convergent associations with Female Sexual Function Index scales emerged for sexual dissatisfaction and sexual pain but not for genital self-image. Male-to-female patients reported lower sexual function levels than cisgender women.

Conclusions: The present preliminary results support reliability and psychometric validity of the oMtFSFI in the assessment of key sexual function domains in transgender women, further revealing that genital self-image represents an assessment area to be considered in male-to-female patients, in addition to domains that are salient for cis women as well.

Abbreviations and Acronyms

BDI-PC = Beck Depression Inventory for Primary Care

FSFI = Female Sexual Function Index

MtF = male-to-female

oMtFp = operated MtF patients

oMtFSFI = operated Male-to-Female Sexual Function Index

SF-36 = Short Form Health Survey

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* Correspondence: Department of Urology, ASUITS, Trieste, Italy, Strada di Fiume 447, 34149 Trieste, Italy (e-mail: francesca.vedovo@gmail.com).

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THE available literature does not provide any questionnaire aimed at evaluating sexual function after male-to-female gender affirming surgery.^{1–3} The assessment of sexual function in these patients is routinely performed using tools designed for natal females, such as the Female Sexual Function Index.⁴ This limit leads to a suboptimal evaluation, especially in domains like lubrication and dyspareunia.¹ Generally, FSFI scores in MtF patients are similar to those observed in cis women with sexual dysfunction.¹ Therefore, we developed and preliminarily validated a new questionnaire, the operated Male-to-Female Sexual Function Index, to assess sexual function in patients who have undergone MtF gender affirming surgery.

METHOD

Study Sample

Initially, online questionnaires were administered to 125 operated MtF patients and to 80 volunteer women. Overall 73 oMtFp and 68 cis women participated in the main study, but 8 oMtFp and 11 natal women filled in the material partially and, therefore, were excluded from the study. Mean age in the final sample was 38.5 ± 9.3 years for 65 oMtFp and 37.7 ± 11.5 years for 57 cis women.

Procedure

MtF participants were recruited during followup visits in 7 centers in Italy, from northern to southern areas. Italian speaking patients older than age 18 who had undergone gender affirming surgery at least 6 months before data collection were included in the study. The control group was age matched with the MtF sample and recruited for a study on sexual health through advertisements on Twitter and Facebook® groups, flyers distributed at the centers involved in the study and via e-mails sent to cis women who participated in previous psycho-sexological studies (table 1). An e-mail was sent to patients with an invitation to participate in an anonymous web based survey investigating sexual health, clearly stating that

sexual function was the topic of investigation and that sexual activity dealt with penetration, masturbation, petting and sexual desire. A web link to the survey was provided in the e-mail. All the involved participants gave informed consent. The study was approved by the ethical institutional review board (protocol number N.O. 43/2016).

Materials

After providing some demographic and medical information, the participants self-reported on the questionnaires.

Operated Male-to-Female Sexual Function Index. Preliminarily, a panel of experts in gender dysphoria (4 uro-andrologists and 3 psycho-sexologists) defined salient content areas to be represented, including genital self-image, desire, arousal, lubrication, orgasm, satisfaction and sexual pain. The items were generated to be as clear and unbiased as possible with respect to age, ethnicity, education and sexual orientation. The response format was on a 1 to 4 Likert scale, and some items were in the reverse form so as to take random or acquiescent response styles into account. An initial version of the questionnaire consisted of 19 items and it was administered to 10 operated MtF volunteers recruited at 3 different centers. Patients were asked to indicate which words they found difficult to understand. Easier synonyms were suggested and they were encouraged to openly express any comment. For the most part patients understood instructions, items and response options. The expert panel revised the preliminary version and deleted only 1 unclear item. The final version of the oMtFSFI consisted of the remaining 18 items that were administered in the present study. The oMtFp completed the oMtFSFI twice, 4 weeks apart.

Beck Depression Inventory for Primary Care. This version consists of 7 items that tap affective symptoms only. Each item is rated on a scale ranging from 0 to 3. Scores in the range of 0 to 3 indicate low depression, 4 to 6 mild depression, 7 to 9 moderate depression and 10 to 21 severe depression.⁵ Cronbach's alpha was 0.89 for the present sample. oMtFp and control samples did not differ significantly in mean levels ($\eta^2=0.02$, $p > 0.07$).

Short Form Health Survey. The SF-36 is a self-report questionnaire and assesses generic health status in people older than 14 years. It assesses 8 domains which cover physical, social, emotional and medical health.^{6,7} The SF-36 items present different response choices, and must be scored so as to obtain average scale scores ranging from 0 to 100, with higher scores indicating better functioning and health conditions. Alphas ranged from 0.74 (social functioning) to 0.92 (physical functioning) for the present sample. oMtFp reported higher scores than natal females in the domains of energy ($\eta^2=0.04$, $p \leq 0.05$) and general health ($\eta^2=0.05$, $p \leq 0.05$).

Female Sexual Function Index. The FSFI is considered a gold standard for the assessment of sexual function in females.⁴ It presents 19 items and assesses the 6 domains of desire, arousal, lubrication, orgasm, satisfaction and sexual pain. Weighted scale scores are summed

Table 1. Descriptive statistics of the study sample

	oMtFp	Cis Women	p Value*
Mean age (SD)	38.5 (9.2)	37.7 (11.5)	>0.05
No. ethnicity (%):			
Caucasian	61 (93.8)	57 (100)	
Hispanic	4 (6.2)	-	
No. education level (%):			<0.001
Junior high school	30 (46.2)	4 (7.0)	
High school	19 (29.2)	17 (29.8)	
Bachelor's degree or higher	16 (24.6)	36 (63.2)	
No. engaged in a relationship (%)	46 (70.8)	46 (80.7)	>0.05
No. partner gender (%):			>0.05
Male	59 (90.8)	54 (94.5)	
Female	5 (7.7)	2 (3.5)	
Male + female	1 (1.5)	1 (1.7)	
No. hormone replacement (%)	53 (81.5)	13 (22.8)	<0.001
No. sexual activity in last mo (%)	43 (66.2)	44 (77.2)	>0.05

* ANOVA or chi-square statistics.

to obtain a general FSFI score, with higher scores indicating greater satisfaction. An FSFI total score of 26.55 has been determined to be the optimal cutoff for differentiating women with and without sexual dysfunction.⁸ After excluding participants who reported they had had no sexual activity in the last 4 weeks, alphas ranged from 0.82 (satisfaction) to 0.90 (orgasm) for the present sample.

Analyses

Preliminary descriptive analyses and mean comparisons between target and control subsamples were conducted to test whether the 2 subsamples were similar to each other in terms of demographic characteristics. Principal component analysis was performed on the 18 items of the oMtFSFI to explore its empirical structure and detect its main domains. Varimax rotation allowed us to obtain a simple and interpretable structure and uncorrelated domain scores. Pearson zero order correlations were observed between the oMtFSFI empirical scales and external criteria such as FSFI. In addition, regression analysis allowed us to take into account intercorrelations among predictors and estimate their neat contributions in accounting for variability in the oMtFSFI scale scores. Internal consistency of the oMtFSFI empirical scales was estimated via Cronbach's alpha and 1-month test-retest reliabilities were also observed.

RESULTS

Descriptive Statistics

Table 1 presents a summary of the study participant baseline characteristics. The 2 groups were comparable with respect to ethnicity, being engaged in a relationship, sexual orientation and sexual activity in the last month ($p > 0.05$). Compared to natal women, oMtFp reported a lower educational level and greater use of hormone replacement therapy ($p < 0.001$). Lastly, transgender participants underwent affirming surgery up to 19 years earlier (range 0 to 19, 33.8% at 1 year or less, $M = 5.1 \pm 5.1$). All oMtFp underwent penile skin inversion vaginoplasty and none of the cis women reported surgery on external genitalia.

Principal Component Analysis

Preliminary descriptive analyses showed that items were normally distributed, with the exception of items 1 and 18 for oMtFp only. Principal component analysis on the 18 items of the questionnaire was performed on the whole sample (121) as well as each of the 2 subsamples. Specifically, for oMtFp the first 5 eigenvalues were 7.39 (accounting for 41.06% of the total variance), 2.28 (12.66%), 1.82 (10.10%), 1.21 (6.73%) and 0.96 (5.32%). These results suggested exploring a 3-component solution after varimax rotation (supplementary table, <https://www.jurology.com>). Items positively and highly loading on (mostly greater than 0.70, ie greater than 49% of shared variance) and, therefore, mainly

contributing to define the first component, suggested general dissatisfaction with sexual activity, with higher component scores indicating greater dissatisfaction. This domain was labeled sexual dissatisfaction and it accounted for 33.9% of the total variance after rotation. Items dealing with how the participants perceived their genital appearance primarily loaded on the second component (15.7% of accounted variance) and were labeled genital self-image. Higher scores indicated greater uneasiness with their genital appearance. The third component dealt with dyspareunia, also including an item on lubrication and, therefore, was labeled sexual pain, with higher scores indicating more pain (14.3% of accounted variance). When components were extracted and rotated from the whole sample, the solution in the supplementary table (<https://www.jurology.com>) was statistically replicated, with congruence coefficients for matching components ranging between 0.95 (genital self-image) and 0.99 (sexual dissatisfaction).⁹

External Correlates

Table 2 reports Pearson simple correlations between the oMtFSFI component scores and BDI-PC, FSFI and SF-36 scales for the oMtFp. oMtFSFI sexual dissatisfaction was mainly associated with the concurrent scales of FSFI orgasm, arousal and desire. In addition, oMtFp who scored higher on sexual dissatisfaction also reported higher scores on BDI-PC and lower levels on SF-36 emotional well-

Table 2. Concurrent zero order correlations between the 3 oMtFSFI components and BDI, FSFI and SF-36 scale scores

	Sexual Dissatisfaction	Sexual Pain	Genital Self-Image
Being sexually active	-0.39*	-0.17	-0.36*
BDI-PC	0.34*	0.02	0.35*
FSFI:			
Desire	-0.77†	0.03	-0.36*
Lubrication	-0.53†	-0.26	-0.35†
Orgasm	-0.85†	-0.08	-0.08
Satisfaction	-0.59†	-0.22	-0.41*
Sexual pain	-0.32†	-0.72†	-0.33†
Arousal	-0.82†	-0.10	-0.41*
Total score	-0.80†	-0.27	-0.28
SF-36:			
Physical functioning	-0.27†	0.02	-0.23
Role limitations due to physical health	-0.28†	-0.18	-0.25†
Role limitations due to emotional problems	-0.38*	-0.13	-0.33*
Energy	-0.38*	-0.10	-0.38*
Emotional well-being	-0.40*	-0.12	-0.43†
Social functioning	-0.36*	-0.17	-0.35*
(low) Pain	-0.23	0.08	-0.13
General health	-0.26†	-0.13	-0.32*

Sample size 43 (only sexually active MtF participants) to 61.

* $p \leq 0.01$.

† $p \leq 0.001$.

‡ $p \leq 0.05$.

being, role limitations due to emotional problems, energy and social functioning. A comparable pattern of associations was observed for cis women. oMtFSFI sexual pain correlated with the concurrent FSFI pain scale. No one-to-one correspondence emerged between genital self-image and FSFI scales, although some significant modest associations emerged. Moreover, genital self-image correlated moderately with BDI-PC and SF-36 scales, thus suggesting that such a self-perception might be relevant for psychological well-being of MtF patients and cis women as well.

Regression analyses were performed on the data set, with each of the oMtFSFI domains as dependent variables, and FSFI, SF-36 and BDI-PC scales as predictors, in order to take into account intercorrelations among independent variables. For oMtFp, FSFI arousal ($\beta = -0.32, p \leq 0.05$), orgasm ($\beta = -0.48, p \leq 0.001$) and desire ($\beta = -0.25, p \leq 0.05$) accounted for $R^2_{adj} = 0.81$ of the total variance of oMtFSFI sexual dissatisfaction component scores. FSFI arousal ($\beta = -0.51, p \leq 0.001$) and orgasm ($\beta = -0.45, p \leq 0.001$) were significant predictors in the control sample as well. FSFI pain ($\beta = -0.77, p \leq 0.001$) and SF-36 role limitations due to emotional problems ($\beta = 0.26, p \leq 0.05$) predicted $R^2_{adj} = 0.49$ of the total variance of oMtFSFI sexual pain. For cis women FSFI pain ($\beta = -0.74, p \leq 0.001$), satisfaction ($\beta = 0.32, p \leq 0.01$) and lubrication ($\beta = -0.28, p \leq 0.01$) were the main predictors. Lastly, FSFI lubrication accounted for $R^2_{adj} = 0.17$ of the total variance of oMtFSFI genital self-image in the oMtFp, but FSFI satisfaction ($\beta = 0.46, p \leq 0.01$) and orgasm ($\beta = 0.35, p \leq 0.01$) mainly accounted for the total variance of individual differences in genital self-image in cis women. No associations emerged between oMtFSFI domains and patient age or years since surgical intervention.

Descriptive Statistics, Cutoff Scores and Reliability

Table 3 presents descriptive statistics and reliabilities for the 3 oMtFSFI scales for oMtFp and natal females. Internal consistency and test-retest values indicated that the questionnaire was reliable. The 2 subsamples significantly differed on their mean levels, with cis women reporting lower scores on the total score with $F_{1,121} = 23.03$ ($p \leq 0.001, \eta^2 = 0.16$) as well as on all 3 scales, with $F_{1,121} = 9.89$ ($p \leq 0.01, \eta^2 = 0.08$) for sexual dissatisfaction, $F_{1,121} = 37.42$ ($p \leq 0.001, \eta^2 = 0.24$) for sexual pain and $F_{1,121} = 8.30$ ($p \leq 0.01, \eta^2 = 0.07$) for genital self-image. Concurrently, 32% of the sexually active oMtFp vs 14% of the cis women were below the FSFI cutoff score, suggesting critical levels of sexual discomfort (chi-squared 4.40, $p \leq 0.05$).

Table 3. Descriptive statistics, percentiles and reliabilities for the oMtFSFI questionnaire

Items	Operated MtF Pts				Cis Women			
	Sexual Dissatisfaction	Sexual Pain	Genital Self-Image	Total Score	Sexual Dissatisfaction	Sexual Pain	Genital Self-Image	Total Score
Cronbach's alpha	0.93 (0.93)	0.64 (0.72)	0.74 (0.75)	0.90 (0.90)	0.92	0.80	0.62	0.87
Test-retest*	0.91	0.72	0.75	0.89	0.92	0.80	0.62	0.87
Mean (SD)	23.83 (8.31)	8.23 (2.71)	7.04 (2.99)	39.11 (11.12)	19.49 (6.71)	5.43 (2.26)	5.68 (2.07)	30.45 (8.25)
Min/max	10/40	4/16	4/16	18/72	10/40	4/13	4/16	18/72
Skewness	0.25	0.65	1.39	0.37	1.04	2.40	1.38	0.75
Kurtosis	-1.12	0.77	1.45	-0.83	1.17	7.82	1.90	0.21
Floor %	1.4	9.9	15.5	0	3.1	46.9	39.1	1.8
Ceiling %	2.8	1.4	1.4	0	1.6	1.6	1.6	0
Percentiles:								
50	23.0	8.0	6.0	38	19.0	4.0	5.0	28.5
80	33.0	10.0	9.0	49.6	25.0	7.0	7.0	36
90	35.0	11.4	12.2	55.4	28.4	8.3	8.0	42.3
95	38.7	14.7	14.0	59.4	36.1	10.0	10.2	48.5

Cronbach's alphas were observed at the first measurement occasion and for MtF patients alphas observed 1 month later are shown in parentheses. * Test and retest occasions were 3 to 4 weeks apart (in 56).

Table 4. Preliminary range values for discriminating normal from progressively critical levels in MtF patients

Range	Sexual Dissatisfaction	Sexual Pain	Genital Self-Image	Total Score
Normal	10–25	4–6	4–5	18–36
Mild to moderate	26–33	7–10	6–9	37–49
Borderline critical	34–35	11	10–12	50–55
Critical	Greater than 35	Greater than 11	Greater than 12	Greater than 55

In addition to percentiles observed for each subsample we sought the score that minimized the percentage of cis women below it and maximized the percentage of oMtFp above it in order to provide a preliminary efficient cutoff for normal vs progressively increasing difficulties in sexual functioning. For example, a total score of 36 corresponded to 43 percentiles in cis women but 82 in oMtFp and, therefore, represents the scores discriminating between normal vs mild levels. Score ranges are presented in table 4, with the 80 percentiles discriminating between mild and borderline levels, and 90 percentiles between borderline and critical levels.

DISCUSSION

The aim of the present study was to develop a new questionnaire, the operated Male-to-Female Sexual Function Index, to assess sexual function in patients who underwent MtF gender affirming surgery. This questionnaire was designed to be a clinically valid assessment tool that addresses the multidimensional nature of sexual function in operated MtF patients.

The oMtFSFI was developed in 3 steps, including panel selection of the initial items, a pilot study and a main study. From principal component analysis 3 domains of sexual function were identified and labeled sexual dissatisfaction, genital self-image and sexual pain. Overall the results showed that the questionnaire we developed evaluates sexual satisfaction validly by representing its main sub-elements of orgasm, desire and arousal.^{10–12} In addition, the results revealed that this domain is linked with emotional experience in oMtFp but not in cis women. Therefore, sexuality likely represents a constituent element of their self-identity in which they invest deeply. The domain of sexual pain is validly assessed in the oMtFSFI as well, with oMtFp reporting higher levels of dyspareunia,^{1,3} mostly due to significant differences in satisfaction levels for neovagina sizes.

The oMtFSFI presents a new domain with no direct correspondence in the FSFI, namely genital self-image. However, this scale is related to FSFI lubrication in oMtFp and to sexual satisfaction and

orgasm in cis women. Weyers et al evaluated body image using a visual analog scale and in that study transgender women were, on average, very satisfied with their genital appearance.¹ The oMtFp analyzed in that study appeared to experience specific difficulties, especially concerning arousal, lubrication and pain.^{1,3} Also in our study lubrication seems to be an impactful problem for these patients.

A preliminary scoring system was developed for each domain as well as for the full scale. On the basis of the observed percentiles we proposed that any operated MtF patient who scores 55 or more on the general scale should be considered at risk for sexual dysfunction. Individual domains and full scale scores were internally consistent and test-retest reliable.

In terms of study limitations we acknowledge that our preliminary study needs to be cross-validated in a larger sample. In addition, data should be routinely collected in clinical settings to include any possible patients and avoid biases due to voluntary participation. Sample representativeness is currently difficult to evaluate, as several studies have tried to estimate the prevalence of transgenderism but the variation in reported prevalence is considerable.^{13,14} More instruments to be applied concurrently would help depict psychological profiles of oMtFp with higher vs lower sexual dysfunction levels, whereas a longitudinal study would help understand preoperative and postoperative risk and protective factors from sexual dysfunction and its correlated psychological well-being variables such as depression.

CONCLUSIONS

These preliminary results support the reliability and psychometric validity of the operated Male-to-Female Sexual Function Index in the assessment of key dimensions of sexual function in transgender women. To our knowledge, the oMtFSFI represents a first systematic step toward a valid and reliable assessment of sexual function after male-to-female gender affirming surgery. Such a tool might aid in functional outcome evaluation, allowing us to compare, for the first time, the different surgical techniques in a standardized manner.

Appendix. oMtFSFI study group

Department of Urology, Azienda Sanitaria Universitaria Integrata di Trieste, Department of Urology, University of Pisa, Department of Urology, University of Florence, Andrology-Unit, Department of Gynecology and Urology, University Hospital S.Orsola-Malpighi, Bologna, Department of Urology, AO Città della Salute e della Scienza, University of Turin, Department of Urology,

University of Naples, Federico II, Urology, Andrology and Kidney Transplantation Unit, Department of Emergency and Organ Transplantation,

University of Bari, Italy and Andrology Department, University College London Hospital, London, United Kingdom.

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