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CHAPTER 6

A PLISSIT-model intervention in people with type 2 diabetes with sexual problems: results from a cluster-randomized controlled trial in primary care

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ABSTRACT

Purpose: While sexual problems are prevalent among people with type 2 diabetes, they often remain unaddressed in primary care. We hypothesized that the use of a stepped-care sexual counseling strategy, such as PLISSIT (Permission, Limited Information, Specific Suggestions, Intensive Therapy), would lead to improved (sexual) well-being. A cluster-randomized clinical trial was conducted to evaluate the effectiveness of a PLISSIT-model-based intervention on sexual functioning, sexual satisfaction, and quality of life in people with type 2 diabetes with sexual problems in primary care.

Methods: Primary and secondary outcomes were measured with questionnaires at baseline, three and twelve months follow-up in 44 general practices between January 2015 and February 2017. Participants in the intervention group discussed sexual issues with a PLISSIT-trained general practitioner (GP); the control group received standard care. Longitudinal multilevel linear regression analyses were conducted, corrected for age and sex.

Results: In total, 150 participants with type 2 diabetes (78.7% men, mean age 62.7 (±8.5) years) were included (87 intervention; 63 control). PLISSIT-trained GPs reported a significant improvement in their competence to discuss sexual issues. Female sexual functioning significantly improved at three months follow-up (P=0.036): women in the intervention versus the control group had a 5.87 (SE 2.80) higher score on the Female Sexual Function Index. No other significant effects were observed.

Conclusions: Compared to standard care, the PLISSIT-model intervention improved short-term female sexual functioning in women. More intensive, specialized treatment may be necessary to improve male sexual functioning. The PLISSIT-framework may help GPs to discuss sexual health in diabetes care.

Trial registration: Dutch Trial Registry (NTR4807)

Keywords: PLISSIT, type 2 diabetes, sexual function, primary care, RCT.

INTRODUCTION

The prevalence of sexual dysfunction among men and women with type 2 diabetes is high. Erectile dysfunction (ED) is the most frequently reported sexual dysfunction (85%) in men with type 2 diabetes (1), followed by premature ejaculation (32-67%) (2; 3) and low sexual desire (25-40%) (2; 4; 5). In women with type 2 diabetes, high prevalence estimates of sexual dysfunction have been reported as well (6-8), including: low sexual desire (50-82%), low sexual arousal (34-68%), problems with orgasm (36-84%), and dyspareunia (10-46%). As sexual dysfunction can have a negative effect on a person's psychological well-being and health-related quality of life (9; 10), it therefore warrants clinical attention.

In the Netherlands, the majority of people with type 2 diabetes is treated in primary care. According to the Dutch clinical guideline for general practitioners (GPs), sexual problems should be addressed by the GP once a year (11). However, sexual problems appear to be one of the most frequently neglected complications in diabetes care (12), possibly due to a lack of time and training of GPs (13). The use of a stepped-care sexual counseling model, such as PLISSIT, has frequently been recommended as a tool to improve the discussion of sexual health in diabetes care (14). PLISSIT refers to the four stages of the model: Permission, Limited Information, Specific Suggestions, and Intensive Therapy (15). It has shown promising results in improving sexual functioning in women with sexual problems (16-18) and in various somatic patient populations with sexual dysfunction (19-23). Thus far, the effectiveness of the PLISSIT-model in improving the (sexual) well-being of people with type 2 diabetes has not been examined. We therefore conducted a cluster-randomized controlled trial (RCT) in people with type 2 diabetes in Dutch primary care to examine the PLISSIT model's effectiveness compared to standard care.

METHODS

Study design

A detailed description of the study methods has been published previously (24). This study was designed as a cluster RCT (Dutch Trial Registry (NTR4807)); randomization took place at the level of general practice. Data were collected in 44 participating general practices in the Netherlands between January 2015 and February 2017. The study was approved by the Medical Ethics Committee of the VU University Medical Center in Amsterdam, The Netherlands.

Participants and procedures

Men and women with type 2 diabetes aged 40-75 years who indicated to be dissatisfied about their sexual functioning and wanted to talk about their sexual problem(s) with their GP were eligible for study participation. Practice nurses were instructed on how to recruit participants for the study. Eligible participants were identified by the practice nurse based on screening with the Brief Sexual Symptom Checklist (BSSC) (25) during routine three-monthly control meetings. Recruitment took place in 45 practices between January 2015 and March 2016, of which one general practice did not recruit eligible participants.

After filling out the baseline questionnaire, participants received an information leaflet on diabetes and sexuality. In the intervention group, all participants were scheduled for an appointment with the GP to discuss sexual problems two weeks post-baseline. In the control group, the practice nurse asked whether the information leaflet was of sufficient help, and, if not, whether the participant would like to have an appointment with his/her GP.

Intervention group

GPs in the intervention group were trained by a certified sexologist to perform stepped-care sexual counseling according to the PLISSIT-model. GPs were instructed to adopt the model as a dynamic approach to consultation, tailored to the participants' sexual problems and (possible) care needs, including, when necessary, returning to or skipping steps (26).

In short, the GP first set the agenda and inquired if the participant was willing to talk about his or her sexual health and sexuality during step 1 (Permission). After permission had been given by the participant, the GP provided general information during step 2 (Limited Information), such as explaining the effects of diabetes on sexual functioning (26). To be able to provide Specific Suggestions in step 3, GPs were trained in taking a short sexual history to understand the participant's particular complaint. Examples of specific suggestions include the use of lubricants and medication adjustment. Step 1-3 were aimed at directly helping the participants within a relatively short period of time (15). For complex sexual problems or problems that could not sufficiently be addressed in the previous steps, step four of the model was applied (Intensive Therapy) (26). This step will almost always have consisted of referring the patient to specialized care, for which an overview of local referral possibilities was provided to each GP (24).

A questionnaire to measure the GP's knowledge and self-perceived competence with discussing sexual problems in people with type 2 diabetes was administered before and 3-4 weeks after the training. Knowledge was evaluated by scoring eight true-or-false statements, (score range 0-8). Competence with discussing sexuality in primary care was evaluated by scoring five statements, as measured on a five point scale ranging from completely agree to completely disagree (score range 5-25). To check for attention bias, GPs in the control group filled out the questionnaire at recruitment and after 3-4 weeks.

Control group

In the control group, GPs provided standard care (11). In order to establish equal referral options for both study arms, GPs in the control condition received the same overview of local referral possibilities.

Measures

Self-reported data were captured at baseline, and after three and twelve months follow-up using validated questionnaires (27-32). Participants were informed that they could skip items on sexuality that were perceived as too personal. To evaluate the execution of the study protocol, care use among participants was assessed with a questionnaire at three months follow-up.

Primary outcome measures included sexual function, satisfaction with sexual function, and quality of life. Male sexual functioning was measured with the International Index of Erectile Function (IIEF) (cut-off ≤25 on ED domain score) (27). Female sexual function was assessed with the Female Sexual Function Index (FSFI) (cut-off ≤26.55) (28). Satisfaction with sexual function was measured using a Visual Analogue Scale (VAS) (range 0-10). Quality of life was measured with the Short Form-12 item survey (SF-12) with scores summated for the Physical Component Summary (PCS) and Mental Component Summary (MCS) scales, using population norm scores (29).

Secondary outcome measures included depressive symptoms, sexual distress, and emotional well-being. Depressive symptoms were assessed with the Patient Health Questionnaire (PHQ-9) (cut-off ≥10) (31). Sexual distress was assessed with the Female Sexual Distress Scale-Revised (FSDS-R) (cut-off ≥11) (30). Although the FSDS-R was originally developed for women, the items are considered to be gender neutral (33). Emotional well-being was assessed with the World Health Organisation-Five Well-Being Index (WHO-5) (cut-off <50) (32).

Randomization and blinding

Forty general practices were enrolled and randomly allocated to one of the study arms by block randomization (19 intervention; 21 control). Practices were matched in blocks of equal size based on their location and number of patients. During the recruitment phase, five additional control practices were recruited to improve the inclusion of participants in the control group of which four included eligible participants. In total, 19 intervention and 25 control practices participated in the study. Patients were blinded to the randomization status; GPs and practice nurses could not be blinded.

Statistical methods

The sample size was based on a 25% improvement in sexual functioning between the intervention and control group. With 90% power and a 5% significance level, and taking into account cluster randomization by assuming an intra-cluster correlation coefficient of 0.05, and 20% drop-out, 195 participants in total were needed.

Baseline data were described as mean (standard deviation (SD)) or N (%) stratified for intervention status. Normality assumptions were checked for the continuous variables. Baseline data were tested for differences by allocation with independent T-tests and Chi-square tests. To evaluate the effect of the training of the care providers, knowledge and competence change scores were constructed. A positive change score indicated improvement. Independent T-tests of the change score were performed between care providers of the intervention and control group.

Multilevel linear regression analyses were conducted to determine the effectiveness of the PLISSIT-model intervention. Data were analyzed longitudinally to study the overall and time-specific intervention effects. All data were analyzed as intention-to-treat. The intervention effect was evaluated in a model with a three-level structure (level 1 (lowest level): individual observations within a participant at baseline, three and twelve months follow-up; level 2: participants; and level 3: practices) and with a random intercept on the two lowest levels. All crude analyses were corrected for their respective baseline outcome score; analyses were additionally adjusted for age and sex.

People with missing data during follow-up were tested for differences in baseline characteristics. Independent T-tests and Chi-square tests were performed between participants with and without missing data during follow-up, stratified for allocation of treatment.

The following sensitivity analyses were conducted to test the robustness of our data: 1) an analysis without the participants (N=8) recruited from the four practices that were included after randomization; 2) a per protocol analysis, excluding intervention participants (N=18) who reported to not have had a consultation with their GP; 3); an analysis to study people with imputed partner satisfaction scores on the FSFI (item 14, 15) and IIEF (item 14); these participants originally scored 'not applicable' for partner satisfaction; 4) an analysis of the FSFI and IIEF that included solely people who reported to have been sexually active in the last 4 weeks. Sexual activity is a prerequisite for evaluating these questionnaires, but due to low numbers, we decided to include every participant in our main analysis.

A P-value <0.05 was considered to be statistically significant. Descriptive statistics were performed with IBM SPSS Statistics (Version 22.0, IBM Corp). Multilevel analyses were performed using MLwiN (version 2.22, Centre for Multilevel Modelling, University of Bristol, UK) (34).

RESULTS

Participants

In total, 150 participants were included: 87 in the intervention and 63 in the control group (see Figure 1). Baseline characteristics of the study participants are shown in Table 1. Most participants were men (78.7%) and the mean age of participants was 62.7 (±8.5) years.

At three months post-intervention, overall loss to follow-up was 15.3%, with 18.4% in the intervention and 11.1% in the control group (P=0.222). In the intervention group, people with missing data at three months follow-up more often were treated with oral diabetes medication at baseline. At 12 months post-intervention, overall loss to follow-up was 21.3%, with 25.3% in the intervention and 15.9% in the control group (P=0.165). In the intervention group, people with missing data at twelve months more often were treated with oral diabetes medication and more often had comorbid conditions at baseline. No significant differences in loss to follow-up were observed in the control group.

GP training

Competence change scores of GPs significantly differed between the intervention group (3.6 (±3.0)) and the control group (0.0 (±1.8); P<0.001). Knowledge change scores of GPs did not significantly differ between the intervention group and control group (0.1 (±1.1) vs. 0.3 (±0.7); P=0.472).

PLISSIT

The outcomes of the participants at baseline, three and twelve months follow-up are presented in Table 2. No harms or unintended effects were reported in either arm of the trial. Table 3 shows the results of the longitudinal linear multilevel regression analysis of the intervention effect. For our primary outcomes, a significant intervention effect was observed for female sexual functioning as measured by the FSFI at three months follow-up. In adjusted analyses, the intervention effect was 5.87 (standard error 2.80) between women in the intervention vs. the control group (P=0.036). No other significant effects in men or women were observed at three or twelve months follow-up.

Sensitivity analyses 1 and 2 showed similar results (data not shown). Analysis 3 and 4 showed similar results for male sexual dysfunction (data not shown), but the intervention effect for female sexual dysfunction disappeared (see Appendixes 1 and 2).

Care use

As shown in Table 4, significantly more participants in the intervention group received an information leaflet on diabetes and sexuality compared to the controls (70.4% vs. 57.1%; P=0.024). In addition, intervention participants more often had an appointment with their GP (70.4% vs. 33.9%; P<0.001).

DISCUSSION

This study concerned a cluster RCT that aimed to evaluate the effectiveness of a PLISSIT-model intervention in people with type 2 diabetes with sexual problems in primary care in the Netherlands. A statistically significant improvement in female sexual functioning was observed at three months follow-up. In addition, PLISSIT-trained GPs experienced a significant improvement in their self-perceived competence to discuss sexual issues, compared to control group GPs.

Our results must be interpreted with caution. First, the FSFI sum score does not reach the validated threshold in the intervention group, which means that the majority still has sexual dysfunction at three months follow-up (83.3%). Second, based on sensitivity analyses, it seemed that PLISSIT was

only effective in improving sexual functioning for women with a partner. For women without a partner, it could be that GPs had less options to improve sexual function during counseling. Third, the significant intervention effect among women was not observed at twelve months follow-up. This could indicate waning of the intervention effect or that the regression analysis may have been underpowered due to low numbers at twelve months follow-up.

The treatment of sexual dysfunction in people with type 2 diabetes is challenging. On the one hand, GPs have previously indicated that a lack of training impedes the discussion of sexual issues in primary care (13). The PLISSIT model seems like a useful framework that may help GPs with sexual counseling. On the other hand, if sexual dysfunction is due to irreversible pathophysiological damage caused by diabetes and/or ageing, room for improvement of the 'physical' aspect of sexual functioning may be limited. Improving (sexual) well-being more often will then be focused on accepting the dysfunction and/or trying to find alternative ways to enjoy sexuality. This applies to both men and women, although it is thought that a woman's sexuality is more capable to adapt to changing circumstances, which is also known as 'erotic plasticity' (35). Based on our findings, improving male sexual function may require more intense or specialized treatment than can be offered in primary care (PLISSIT step 4), for example treatment by a sexologist or intracavernosal injections as advised by a urologist (1). However, due to the study design, we cannot disentangle whether the PLISSIT model was ineffective at this point, or that the control group was an unfair comparison as referral options were equal in both arms.

This is the first RCT that studied the effectiveness of the PLISSIT model in people with type 2 diabetes in daily primary care. Our pragmatic trial closely matched daily primary care, where the practice nurse identifies care needs during routine control visits, and sexual issues are discussed in detail with the GP during a separate consultation.

Some limitations of our study need to be addressed. First, despite our efforts, we were unable to reach the necessary sample size. Because recruitment was difficult, it was decided that three 76/77-year old participants were included, which did not affect our findings (data not shown). Second, we included fewer female than male participants. Even though practice nurses were instructed to recruit both sexes, some expressed that it was more easy for them to approach men than women (36). Moreover, women were less often eligible to participate: women less often reported to be sexually dissatisfied or to have a need for care, compared to men (36). An equal percentage of eligible men

and women agreed to participate in the study (data not shown). Finally, by choosing a pragmatic design with a high external validity, the internal validity was compromised. To illustrate, Step 1 (Permission), was already performed when the participant was screened for care needs by the practice nurse.

To conclude, compared to standard primary care, the PLISSIT-model based intervention significantly improved short-term sexual functioning in women, but not in men with type 2 diabetes with sexual problems in Dutch primary care. More intensive treatment outside primary care may be necessary to improve male sexual functioning. The PLISSIT-model offers a framework that may help GPs to discuss sexual health in diabetes care.

Figure 1. Flowchart diagram according to CONSORT statement.

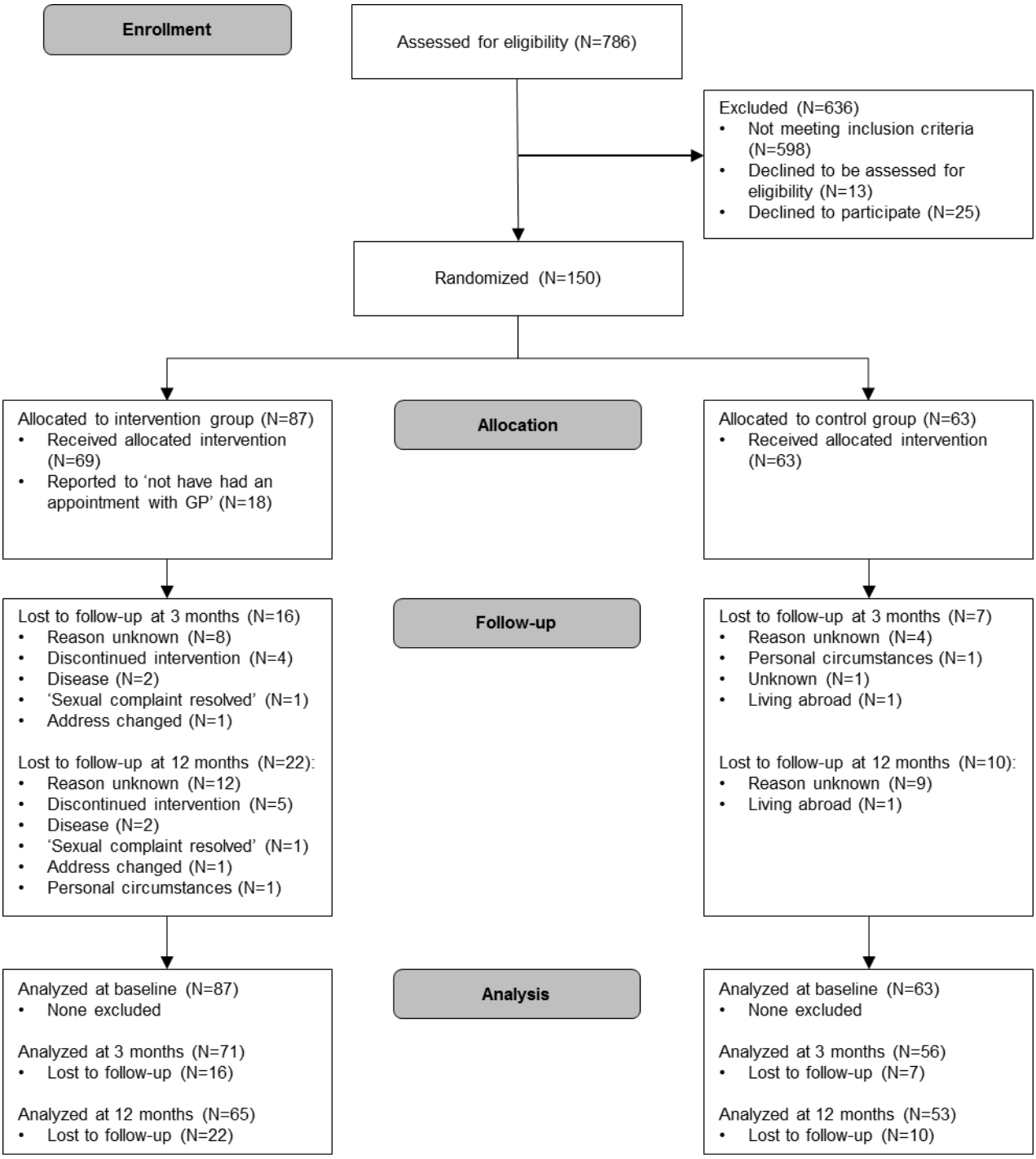

Table 1. Baseline characteristics of the participants, stratified for allocation of treatment.

	Total population	Intervention group	Control group	P-value
Socio-demographic characteristics	**N=150**	**N=87**	**N=63**	
– Sex (% men)	118 (78.7%)	64 (73.6%)	54 (85.7%)	0.073
– Age (mean years (±SD))	62.7 (±8.5)	63.5 (±8.4)	61.7 (±8.5)	0.184
– Educational level (% low education)*	80 (53.3%)	45 (51.7%)	35 (55.6%)	0.761
– Ethnicity (% Dutch native)†	114 (76.0%)	66 (75.9%)	48 (76.2%)	0.478
– Marital status (% married/cohabiting)	124 (82.7%)	71 (81.6%)	53 (84.1%)	0.457
Medical characteristics	**N=150**	**N=87**	**N=63**	
– BMI (mean BMI kg/m ^{2} (±SD))	29.7 (±4.3)	29.4 (±4.2)	30.1 (±4.4)	0.333
– Smoking status (% current smoker)	26 (17.3%)	13 (14.9%)	13 (20.6%)	0.572
– Diabetes duration (mean years (±SD))	8.8 (±6.0)	9.0 (±5.6)	8.6 (±6.5)	0.690
– Oral medication (% yes)‡	121 (80.7%)	70 (80.5%)	51 (81.0%)	0.940
– Insulin use (% yes)‡	25 (16.6%)	13 (14.8%)	12 (19.0%)	0.486
– Diabetes complication(s) (% yes) ‡	61 (40.7%)	35 (40.2%)	26 (41.3%)	0.950
– Other types of medications (mean number (±SD))	2.3 (±1.3)	2.3 (±1.4)	2.2 (±1.1)	0.546
– Other diseases (mean number (±SD))	1.0 (±1.0)	1.1 (±0.9)	0.9 (±0.9)	0.214
– Menopausal status (women only)	**N=32**	**N=23**	**N=9**	
- % post-menopause	17 (53.1%)	12 (52.2%)	5 (55.6%)	0.233
Sexual-health related characteristics	**N=150**	**N=87**	**N=63**	
– Sexual orientation (% heterosexual)	147 (98.0%)	85 (97.7%)	62 (98.4%)	0.678
– Important to be sexually active (% yes)	108 (72.0%)	62 (71.3%)	46 (73.0%)	0.783
– Sexual partner in the past 4 weeks (% yes)	102 (68.0%)	57 (65.5%)	45 (71.4%)	0.620
– Sexual activity in past 4 weeks (% yes)§	102 (68.0%)	58 (66.7%)	44 (69.8%)	0.896
– Infection of the glans of the penis (men only)	**N=118**	**N=64**	**N=54**	
- % yes	4 (3.4%)	3 (4.7%)	1 (1.9%)	0.390
– Infection of the vagina (women only)	**N=32**	**N=23**	**N=9**	
- % yes	8 (25.0%)	7 (30.4%)	1 (11.1%)	0.288

Data are shown as N (%) or mean (±SD). Abbreviations: BMI: body mass index; SD: standard deviation.* Level of education was categorized as: no education or low education (elementary education, low vocational education, lower general secondary education), middle education (intermediate vocational education, higher general secondary education and pre-university education) and high education (higher vocational education, university). † Ethnicity was coded based on the country of birth of the participant and parents. If the participant and both parents were born in the Netherlands, the participant was coded as Dutch native. If the participant and one or both of the parents were born outside the Netherlands, the participant was coded as 1st generation migrant. If the participant was born in the Netherlands and one or both of the parents were born outside the Netherlands, the participant was coded as 2nd generation migrant. If the participant was born outside the Netherlands and both parents were born in the Netherlands, the participant was coded as Dutch native . ‡ Multiple answers possible § Sexual activity referred to 'every activity that turns you on sexually, including masturbation'.

Table 2. Outcomes at baseline, 3 months and 12 months, stratified for allocation of treatment.

	Intervention group			Control group		
	Baseline	**3 months**	**12 months**	**Baseline**	**3 months**	**12 months**
Primary outcome measures	**N=87**	**N=71**	**N=65**	**N=63**	**N=56**	**N=53**
Male sexual dysfunction	**N=64**	**N=53**	**N=47**	**N=54**	**N=48**	**N=46**
IIEF sum score (range 5-75)	**N=47**	**N=40**	**N=34**	**N=41**	**N=40**	**N=33**
– Mean (±SD)	33.2 (±14.1)	37.8 (±16.0)	35.0 (±15.4)	37.8 (±15.3)	39.9 (±16.0)	37.4 (±16.7)
– Erectile dysfunction based on cut-off score (%yes)	56 (96.6%)	48 (94.1%)	40 (90.9%)	44 (89.8%)	38 (86.4%)	39 (90.7%)
Female sexual dysfunction	**N=23**	**N=18**	**N=18**	**N=9**	**N=8**	**N=7**
FSFI sum score (range 2-36)	**N=16**	**N=12**	**N=12**	**N=7**	**N=6**	**N=4**
– Mean (±SD)	18.5 (±7.8)	21.6 (±4.9)	23.5 (±7.9)	19.0 (±7.8)	18.4 (±6.1)	15.5 (±10.3)
– Female sexual dysfunction based on cut-off score (%yes)	14 (87.5%)	10 (83.3%)	8 (66.7%)	6 (85.7%)	5 (83.3%)	4 (100%)
Satisfaction with sexual functioning						
VAS scale 0-10	**N=83**	**N=70**	**N=64**	**N=59**	**N=52**	**N=49**
– Mean (±SD)	2.8 (±2.1)	3.7 (±2.2)	3.8 (±2.3)	3.2 (±2.3)	4.0 (±2.2)	3.8 (±2.3)
- Unsatisfied (0-4)	63 (72.4%)	42 (59.2%)	39 (60.0%)	42 (66.7%)	27 (48.2%)	26 (49.1%)
- Neutral (5)	12 (13.8%)	10 (14.1%)	8 (12.3%)	7 (11.1%)	12 (21.4%)	11 (20.8%)
- Satisfied (6-10)	8 (9.2%)	18 (25.4%)	17 (26.2%)	10 (15.9%)	13 (23.2%)	12 (22.6%)
- Missing	4 (4.6%)	1 (1.4%)	1 (1.5%)	4 (6.3%)	4 (7.1%)	4 (7.5%)
Quality of life (SF-12)						
PCS (range 0-100)	**N=81**	**N=61**	**N=58**	**N=54**	**N=51**	**N=46**
– Mean (±SD)	46.3 (±10.5)	46.8 (±9.7)	46.6 (±9.6)	45.2 (±9.1)	45.8 (±8.9)	45.5 (±9.3)
MCS (range 0-100)	**N=81**	**N=61**	**N=58**	**N=54**	**N=51**	**N=46**
– Mean (±SD)	51.1 (±9.2)	50.7 (±8.9)	51.8 (±8.4)	48.3 (±10.1)	47.2 (±10.8)	49.0 (±9.7)
Secondary outcome measures						
Depressive symptoms						
PHQ-9 sum score (range 0-27)	**N=78**	**N=62**	**N=60**	**N=50**	**N=45**	**N=42**
– Mean (±SD)	4.3 (±4.8)	4.6 (±5.3)	3.7 (±3.6)	5.4 (±5.5)	5.6 (±5.7)	5.6 (±4.9)
– Depression based on cut-off score (% yes)	10 (12.8%)	8 (12.9%)	3 (5.0%)	11 (22.0%)	10 (22.2%)	9 (21.4%)

Sexual distress						
FSDS-R sum score (range 0-52)	**N=78**	**N=68**	**N=60**	**N=60**	**N=54**	**N=48**
– Mean (±SD)	22.0 (±9.9)	22.0 (±11.5)	20.0 (±12.3)	22.5 (±12.3)	21.2 (±13.3)	20.2 (±12.9)
– Sexual distress based on cut-off score (%yes)	66 (84.6%)	58 (85.3%)	48 (80.0%)	50 (83.3%)	42 (77.8%)	37 (75.5%)
Emotional well-being						
WHO-5 sum score (range 0-100)	**N=80**	**N=66**	**N=62**	**N=58**	**N=55**	**N=49**
– Mean (±SD)	61.1 (±23.1)	61.3 (±22.9)	63.0 (±21.9)	57.2 (±22.6)	55.6 (±24.9)	57.6 (±22.5)

Data are shown as N (%) or mean (±SD). Abbreviations: FSDS-R: Female Sexual Distress Scale-Revised; FSFI: Female Sexual Function Index; IIEF: International Index of Erectile Function; MCS: Mental Component Summary; PCS: Physical Component Summary; PHQ-9: Patient Health Questionnaire; SD: standard deviation; SF-12: Short Form-12 item survey; VAS: Visual Analogue Scale; WHO-5: World Health Organisation-Five Well-Being Index.

Table 3. Longitudinal multilevel linear regression analysis on the intervention effect of the trial.

	Intervention effect					
	Overall	**P-value**	**3 months**	**P-value**	**12 months**	**P-value**
Primary outcome measures						
Male sexual dysfunction (IIEF, range 5-75)						
– Crude	1.45 (1.95)	0.457	1.01 (2.57)	0.695	1.97 (2.35)	0.401
– Adjusted	1.56 (1.95)	0.424	1.09 (2.57)	0.670	2.10 (2.36)	0.374
Female sexual dysfunction (FSFI, range 2-36)						
– Crude	3.11 (2.52)	0.216	**6.15 (3.06)**	**0.045**	1.87 (2.91)	0.520
– Adjusted	2.87 (2.20)	0.192	**5.87 (2.80)**	**0.036**	1.47 (2.64)	0.577
Satisfaction with sexual function (VAS, range 0-10)						
– Crude	0.15 (0.29)	0.612	0.17 (0.35)	0.631	0.12 (0.34)	0.717
– Adjusted	0.20 (0.29)	0.507	0.22 (0.35)	0.532	0.17 (0.34)	0.618
Quality of life (SF-12): physical component score (PCS, range 0-100)						
– Crude	-0.98 (0.95)	0.302	-1.02 (1.22)	0.403	-0.94 (1.17)	0.422
– Adjusted	-1.07 (0.97)	0.272	-1.13 (1.24)	0.363	-1.01 (1.18)	0.392
Quality of life (SF-12): mental component score (MCS, range 0-100)						
– Crude	0.87 (1.08)	0.419	0.24 (1.42)	0.864	1.44 (1.36)	0.290
– Adjusted	0.98 (1.04)	0.347	0.45 (1.41)	0.751	1.46 (1.33)	0.272
Secondary outcome measures						
Depressive symptoms (PHQ-9, range 0-27)						
– Crude	0.21 (0.51)	0.676	0.35 (0.61)	0.569	0.10 (0.59)	0.868
– Adjusted	0.02 (0.51)	0.967	0.12 (0.62)	0.843	-0.06 (0.59)	0.923
Sexual distress (FSDS-R, range 0-52)						
– Crude	-0.49 (1.45)	0.733	-1.30 (1.73)	0.450	0.18 (1.66)	0.915
– Adjusted	-0.79 (1.49)	0.594	-1.62 (1.76)	0.358	-0.12 (1.69)	0.944
Emotional well-being (WHO-5, range 0-100)						
– Crude	3.95 (2.36)	0.095	2.31 (3.07)	0.453	5.39 (2.94)	0.067

– Adjusted	3.58 (2.40)	0.138	1.95 (3.10)	0.529	4.95 (2.96)	0.095

Data are shown as regression coefficient (standard error). Abbreviations: FSDS-R: Female Sexual Distress Scale-Revised; FSFI: Female Sexual Function Index; IIEF: International Index of Erectile Function; MCS: Mental Component Summary; PCS: Physical Component Summary; PHQ-9: Patient Health Questionnaire; SF-12: Short Form-12 item survey; VAS: Visual Analogue Scale; WHO-5: World Health Organisation-Five Well-Being Index. Analyses were adjusted for age at baseline and sex; analyses with male and female sexual dysfunction were corrected only for age at baseline. All models consisted of a three-level structure: level 1: observations within patients; level 2: patients in practices; level 3: practices in intervention/control group. All models were fitted with a random intercept on level 1 (observations) and level 2 (patients).

Table 4. Three months post-intervention care use among study participants, stratified for allocation of treatment.

	Total	Intervention group	Control group	P-value
	N=127	**N=71**	**N=56**	
Received an information leaflet (% yes)	82 (64.6%)	50 (70.4%)	32 (57.1%)	0.024
Appointment with GP (% yes)	69 (54.3%)	50 (70.4%)	19 (33.9%)	<0.001
Follow-up appointment(s) with GP	**N=69**	**N=51**	**N=19**	0.374
– 1 follow-up appointment	18 (26.1%)	12 (24.0%)	6 (31.6%)	
– 2 follow-up appointments	2 (2.9%)	1 (2.0%)	1 (5.3%)	
– No	37 (53.6%)	26 (52.0%)	11 (57.9%)	
– Missing	12 (17.4%)	12 (22.0%)	1 (5.3%)	
Referral to sexology specialist (% yes)	13 (10.2%)	8 (11.3%)	5 (8.9%)	0.854
Type of sexology specialist* (%yes)	**N=13**	**N=8**	**N=5**	NT
– Urologist	5 (38.5%)	2 (25.0%)	3 (60.0%)	
– Psychologist	3 (23.1%)	2 (25.0%)	1 (20.0%)	
– Sexologist	3 (23.1%)	1 (12.5%)	2 (40.0%)	
– Gynecologist	1 (7.7%)	1 (12.5%)	0 (0%)	
– Internist	1 (7.7%)	0 (0%)	1 (20.0%)	
– Physiotherapist	1 (7.7%)	1 (12.5%)	0 (0%)	
– Unknown	1 (7.7%)	1 (12.5%)	0 (0%)	

Data are shown as N (%). Abbreviations: GP: General practitioner; NT: not tested due to low numbers. * Multiple answers possible

Appendix 1. Sensitivity analysis FSFI with imputed mean scores for missing partner satisfaction items.

	Intervention group			Control group		
	Baseline	**3 months**	**12 months**	**Baseline**	**3 months**	**12 months**
Female sexual dysfunction	**N=23**	**N=18**	**N=18**	**N=9**	**N=8**	**N=7**
FSFI sum score (range 2-36)	**N=21**	**N=18**	**N=17**	**N=9**	**N=6**	**N=5**
– Mean (±SD)	15.5 (±8.9)	15.7 (±9.5)	18.3 (±10.5)	15.5 (±9.7)	18.4 (±6.1)	16.1 (±9.1)
– Female sexual dysfunction based on cut-off score (%yes)	19 (90.5%)	16 (88.9%)	13 (76.5%)	8 (88.9%)	5 (83.3%)	5 (100%)
	Intervention effect					
Longitudinal multilevel linear regression analysis	**Overall**	**P-value**	**3 months**	**P-value**	**12 months**	**P-value**
– Crude	-1.24 (2.76)	0.654	-0.64 (3.83)	0.868	-1.75 (3.52)	0.619
– Adjusted	-1.20 (2.73)	0.661	-0.40 (3.80)	0.916	-1.86 (3.49)	0.594

Data are shown as N (%) or mean (±SD), or as regression coefficient (standard error). Abbreviations: FSFI: Female Sexual Function Index; SD: standard deviation. Analyses were adjusted for age at baseline. All models consisted of a three-level structure: level 1: observations within patients; level 2: patients; level 3: practices. All models were fitted with a random intercept on level 1 (observations) and level 2 (patients).

Appendix 2. Sensitivity analysis FSFI with sexually active women only.

	Intervention group			Control group		
	Baseline	**3 months**	**12 months**	**Baseline**	**3 months**	**12 months**
Female sexual dysfunction	**N=23**	**N=18**	**N=18**	**N=9**	**N=8**	**N=7**
FSFI sum score (range 2-36)	**N=11**	**N=10**	**N=10**	**N=5**	**N=5**	**N=2**
– Mean (±SD)	21.9 (±5.8)	22.1 (±5.2)	26.2 (±4.5)	22.2 (±4.5)	18.5 (±6.8)	23.9 (±0.5)
– Female sexual dysfunction based on cut-off score (%yes)	9 (69.2%)	8 (66.7%)	6 (75.0%)	4 (30.8%)	4 (33.3%)	2 (25.0%)
	Intervention effect					
Longitudinal multilevel linear regression analysis	**Overall**	**P-value**	**3 months**	**P-value**	**12 months**	**P-value**
– Crude	1.77 (2.48)	0.475	2.73 (2.81)	0.331	0.77 (2.54)	0.762
– Adjusted	0.97 (1.86)	0.602	1.96 (2.26)	0.386	-0.21 (1.96)	0.915

Data are shown as N (%) or mean (±SD), or as regression coefficient (standard error). Abbreviations: FSFI: Female Sexual Function Index; SD: standard deviation. Analyses were adjusted for age at baseline. All models consisted of a three-level structure: level 1: observations within patients; level 2: patients; level 3: practices. All models were fitted with a random intercept on level 1 (observations) and level 2 (patients).

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