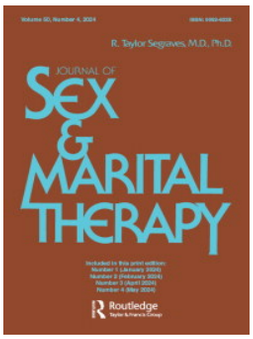

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RESEARCH ARTICLE

The Effectiveness of Online Sensate Focus Exercises in Enhancing Sexual Function and Intimacy Among Chinese Heterosexual Couples: A Randomized Controlled Trial

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ABSTRACT

We investigated the effectiveness of online Sensate Focus exercises, delivered online as a series of 11 animation videos, in improving participants' sexual functioning and enhancing intimacy, relationship and sexual satisfaction. We studied 35 Chinese heterosexual couples, assessed them at pretest, post-test, and a three-month follow-up. Compared to the waitlist control group, the experimental group showed improvement in orgasm in women, and this was maintained at follow-up. Also, for those with a lower function at pretest, the intervention was possibly effective in improving erectile function among men, as well as overall sexual function and pain among women. These improvements were maintained at follow-up as well. Findings from the current study suggest that online Sensate Focus intervention has potential in treating sexual dysfunction of Chinese heterosexual couples. It may also serve as the first part of a stepped care approach or be integrated with other medication or cognitive behavioral therapy treatment.

Introduction

Sexual dysfunctions are prevalent globally, affecting about 15–43% of men and 23–46% of women, with variations depending on age group and diagnostic criteria (Briken et al., 2020; Ishaq, Irfan, Bibi, Hussain, & Ismail, 2022; Jaafarpour, Khani, Khajavikhan, & Suhrabi, 2013; Marques Cerentini et al., 2023; Nguyen, Gabrielson, & Hellstrom, 2017; Oksuz & Malhan, 2006; Quilter, Hodges, von Hurst, Borman, & Coad, 2017). This raises important concerns because satisfaction with one's sex life is strongly associated with relationship quality and stability (O'Sullivan, Byers, Brotto, Majerovich, & Fletcher, 2016; Van Lankveld, Leusink, Van Diest, Gijs, & Slob, 2009). People who experience sexual dysfunctions express various levels of frustration, such as being upset and experiencing low self-worth and fear of losing their partner (O'Sullivan et al., 2016; Van Lankveld et al., 2009; Warren et al., 1997). As such, it is important to find cost-effective and scalable approaches to solve such issues.

One widely used treatment of sexual dysfunction is Sensate Focus (SF), a set of exercises cultivating non-demanding touch (Avery-Clark & Weiner, 2017). Given the non-voluntary nature of sexual arousal (Masters & Johnson, 1966, 1970), attempts to deliberately induce it can lead to increased nervousness and performance anxiety (McCabe, 2005; Meston, 2000; Meston & Gorzalka, 1996), activating the sympathetic nervous system and inhibiting sexual arousal (Alshak & Das, 2024; Meston, 2000). To remedy this, SF is a touching experience increasing focus on

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bodily sensations with attention directed away from negative cognitions and anxiety about the performance during intercourse (Avery-Clark & Weiner, 2017). In the process of implementing SF, spontaneous intimate connection is likely to arise, counteracting poor communication, low level of intimacy, and negative couple dynamics (Frank et al., 1978; Weiner & Avery-Clark, 2014). In later stages of SF, couples are encouraged to directly share what is pleasurable with each other (Weiner & Avery-Clark, 2014).

SF is widely utilized in clinical settings, with approximately 85% of clinicians employing it to treat different sexual dysfunctions, including arousal disorders, female orgasmic disorders, and erectile dysfunction(Cooper et al., 2015; Kang, Kim, Park, & Kim, 2018; Seal & Meston, 2020; Zarski, Berking, Fackiner, Rosenau, & Ebert, 2017). Despite the widespread use, there are few well-controlled studies on SF, with only four randomized controlled trials (RCTs) identified, all conducted in clinical samples of women in Western countries (Adam, De Sutter, Day, & Grimm, 2019; Hucker & McCabe, 2015; Jones & McCabe, 2011; Zarski et al., 2017). These RCTs embedded SF within a cognitive restructuring or cognitive behavioral treatment (CBT) framework, complicating the interpretation of SF's specific role in treatment outcomes. Also, whether SF works for men and its potential impact on couple intimacy and satisfaction remain open. Integrating modern technology into mental health treatment, particularly online interventions, is gaining traction, offering potential advantages such as enhancing accessibility especially for sexuality related topics which may be associated with embarrassment (Coren, Nath, & Prout, 2009; Dreischor et al., 2020; Meyers, Margraf, & Velten, 2022; Van Lankveld et al., 2009). In fact, three of the four aforementioned RCTs employed online interventions, but empirical research in this domain remains limited.

In China, likelihood of young people getting married and having children is lower compared to before and there is an increase in the absence of sex life for those who are in a relationship (Hong & Wang, 2023; Yu, Luo, & Xie, 2022). Changing expectations about satisfying relationship may underlie some of these changes. Since previous studies focused on Western samples, the current study aimed at filling the gap by investigating whether web-based, animation-demoed SF exercises could decrease Chinese heterosexual couples' sexual dysfunction levels and enhance their intimacy, relationship and sexual satisfaction.

Materials and methods

Participants

Forty-two Chinese heterosexual couples were recruited in three waves, with 18 pairs allocated to the experimental group and 24 pairs to the wait-list control group (men: $M = 26.88$, $SD = 4.84$; women: $M = 25.57$, $SD = 4.30$). To be included, the participants had to be adults aged over 18, self-identified as Chinese and fluent in Chinese, self-identified as having heterosexual or bisexual attraction, currently in a heterosexual relationship and in the last six months having had sex with their partner at least one time, and willing to enhance their relationship and sexual satisfaction. We excluded participants who were currently visiting a psychotherapist or taking medication because of mental health concerns. We also excluded participants who were experiencing physical abuse in the current relationship due to the potential risk of deteriorating abuse during the intervention.

Informed consent was obtained from all participants. Research plans for data collections were conducted in accordance with the ethical guidelines and regulations established by the Institutional Review Board at New York University Shanghai (FWA#00022531). Approval for the research was granted on July 1, 2021 (2021-036).

The average age of the participants was 26.23 years ($SD = 4.60$); 96.4% of them had a bachelor or higher degree; 60% of them were dating and 40% were married, 30% had one child aged between 1-7. The average relationship length was 37.88 months ($SD = 32.46$ months); average age during first-time sex was 20.59 ($SD = 4.32$); average number of total sexual partners was

2.06 ($SD = 1.07$). The participants reported an average of 36–45 h working time per week and rated their quality of sleep 5.57 ($SD = 0.92$) on a scale of 7. The experimental group and the waitlist control group had a significant difference in age, where $t(58.457) = -2.591$, $p = .012$. There were no significant differences in other demographic characteristics. No participants reported important negative life changes (e.g., divorce, car accident, bereavement, lose job, and other) at post-test or the three-month follow-up test.

Design

The study was an experiment with a semi-randomized waitlist control design with oversampling to the experimental group in the beginning of the study. Regardless of the wave in which the participants joined the study, all of them filled out a pretest first. They were then randomly assigned to either the experimental group, which started the intervention right away, or the control group, which had a five-week waiting period. After five weeks, both groups filled out the first post-test questionnaire. Next, the control group started the intervention and filled out a second post-test when they in their turn completed the intervention. After that, a follow-up test followed three months after the intervention was finished for both groups.

See Figure 1 for the timeline of the study and the number of participants at each stage.

Instruments

The Pretest, Post-test, Post-test 2 (control group only), and Follow-up test all contained the same questions, except that Pretest also collected participants' background information (all later tests asked if they had experienced significant life changes since the last time they had reported the background information the first time).

Background variables

Participants reported their age, gender, educational level, relationship status, relationship length, sexual orientation, age of the first-time having sex, number of total sexual partners, total working time per week, and sleep quality.

Sexual dysfunction

For men, we used the Checklist for Early Ejaculation Symptoms (CHEES) (Jern, Piha, & Santtila, 2013) to assess ejaculation function, with higher scores indicating more early ejaculation symptoms. In a recent study based among Chinese men, a Chinese language version of CHEES was developed with a Cronbach α of .78 (Niu, Ventus, Jern, & Santtila, 2023). Evidencing concurrent validity, Niu et al. (in preparation) found that the Chinese version of CHEES had a correlation of .893, $p < .001$, with the Premature Ejaculation Diagnostic Tool (PEDT), a measure that has been previously validated for the Chinese population (Jiang et al., 2015). The Cronbach's α in the current sample was .72.

For measuring erectile function, we used the International Index of Erectile Function Questionnaire-5 (IIEF-5). According to previous research, IIEF-5 is the abridged version of the

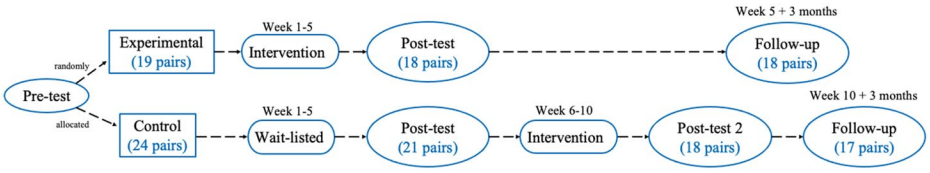


Figure 1. Timeline of the study.

International Index of Erectile Function, which offers sensitive, specific, and reliable measures of male sexual function (Rhoden, Telöken, Sogari, & Vargas Souto, 2002; Rosen et al., 1997). The relevant domains include erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction, with higher score meaning better function (Rosen et al., 1997). The Cronbach's α of the current sample was .85.

For women, we used the Female Sexual Function Index (FSFI), including the subscales of Desire, Arousal, Lubrication, Orgasm, Satisfaction, and Pain. According to Rosen et al. (2000), FSFI has shown high reliability and consistency in each domain as well as validity in clinical and non-clinical samples. It has also been translated into Chinese and previous studies have found the Chinese version to be reliable and valid among Chinese women (Liu et al., 2016; Ma, Pan, Lei, Zhang, & Kan, 2014; Sun, Li, Jin, Fan, & Wang, 2011). Higher scores indicate better female sexual function. In the current sample, Cronbach's α was .94 for the total scale.

Relationship satisfaction

We used the Relationship Assessment Scale to measure relationship satisfaction between the couple (Hendrick, 1988). It is a 7-item scale including questions like "How well does your partner meet your needs?" Participants answered each item on a 5-point scale ranging from 1 (low satisfaction) to 5 (high satisfaction) so that the higher total score means higher levels of satisfaction in the relationship. The Cronbach's α of the current sample was .83.

Intimacy

Personal Assessment of Intimacy in Relationships (PAIR), a 36-item measure encompassing five different factors was used to measure relationship intimacy (Schaefer & Olson, 1981). The five factors are emotional intimacy, social intimacy, sexual intimacy, intellectual intimacy, and recreational intimacy. Participants answered each item on a 5-point scale ranging from 1 (does not describe me/my relationship at all) to 5 (describes me/my relationship very well). An example statement is "My partner listens to me when I need someone to talk to." Only the summary score of all 36 items was used in analyses with higher value indicating higher levels of intimacy among the couple. The Cronbach's α of the current sample was .91.

Sexual satisfaction

Lastly, we used the Global Measure of Sexual Satisfaction in the Interpersonal Exchange Model of Sexual Satisfaction Questionnaire to measure sexual satisfaction (Byers, 1999). Participants rated their sex life on five 7-point dimensions: "Overall, how would you describe your sexual relationship with your partner?" from Good-Bad, Pleasant-Unpleasant, Positive-Negative, Satisfying-Unsatisfying, Valuable-Worthless, where higher total scores suggest greater satisfaction in their sex life. The Cronbach's α of the current sample was .93.

All questions were asked in Chinese and had been translated from psychometric measures which were originally in English (IIEF-5 and CHEES were obtained from previous studies conducted in Chinese, all other measures were translated into Chinese by the authors). Some measures were specifically created for the present study in Chinese and translated into English for the purposes of this manuscript. Additional questions not included in the analyses for this paper were also asked.

Intervention

Communication during the intervention was carried out online through the Chinese social media platform WeChat. Each couple was added in a separate group chat with the investigator, meaning that the 35 couples were in 35 different group chats. The investigator sent out instructions, animation videos, and reminders in the group chat. After the participants finished a particular

Table 1. Intervention schedule.

	Week 1	Week 2	Week 3	Week 4	Week 5
Monday	Self-Focus exercise—feelings of the body & Self-Focus exercise—movements of the body	Kegel Exercise	Sensate Focus—Non-genital Touching	Sensate Focus—Non-genital Touching with variations	Sensate Focus—Genital Touching
Tuesday	Gazing	Hugging			
Wednesday	Self-Focus exercise—exploration of the genitals	Kegel Exercise			
Thursday	Hugging	Gazing with variations	Sensate Focus—Non-genital Touching	Sensate Focus—Genital Touching	Sensate Focus—Genital Touching with variations
Friday	Gazing B (with variations)	Hugging			

exercise, they would report to the investigator in the chat and answer a quick question about their experience: "On a scale of 7, how comfortable did you feel when doing the exercise (1 = extremely uncomfortable; 7 = extremely comfortable)?" This was asked for the purpose of tracking their progress and therefore it was not included in the statistical analyses. All couples followed the same exercise schedule (see Table 1), which lasted for approximately 2–4 h per week, five weeks in total. From Week 3 to Week 5, only two days were needed for practice and participants were asked to select any two days during the week that were convenient for them, with a two-day interval between the practice sessions (i.e., they could choose Monday & Thursday as demonstrated in Table 1, or Tuesday & Friday, or Wednesday & Saturday, or Thursday & Sunday).

Details of each exercise and links to animation videos are described in Table 2.

Procedure

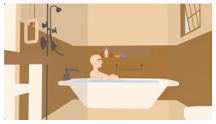
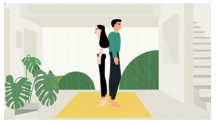
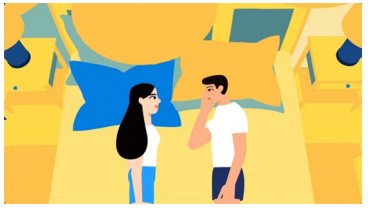
The three waves of participant recruitment were carried out identically so that an online screening survey was sent out on two Chinese online research worker platforms: Wen Juan Xing (https://www.wjx.cn/) and Credamo (https://www.credamo.com). Individuals in relationships were recruited through the screening survey first, then this person shared a recruitment invitation with their partner so that they could decide whether to join the intervention. Research workers on these platforms are relatively better educated and more urban than the Chinese general population. In total, 3282 individuals were contacted for screening, 42 couples continued to intervention, and 7 couples dropped out, resulting in 35 couples (18 in the experimental group and 17 in the waitlist control group) at three-month follow up. During the intervention process, the first author maintained communication with the participants, excluding the possibility that the participants would be bots.

Statistical analyses

Statistical analyses proceeded in four stages. First, demographic information, within-pair differences and correlations were analyzed *via* SPSS for Mac (Version 28), using Paired Samples *t*-test and Pearson Correlations. All following statistical analyses were conducted using R (Version 4.3.1). We employed Repeated Measures Analysis of Variance to assess the effects of intervention on sexual functioning comparing experimental group and the waitlist control group. Third, we performed Linear Mixed-effects Model to examine the effects on relationship and sexual satisfaction, as well as intimacy, accounting for the dependence between the two individuals within the couple. Lastly, Repeated Measures Analysis of Variance were conducted to investigate if improvements were maintained at three-month follow-up.

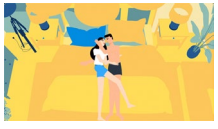
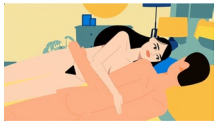
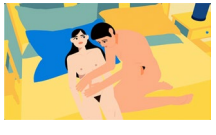
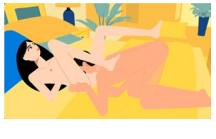
Given the different baseline levels between the experimental and control groups, this study utilized percentages to quantify the effects of intervention. Also, since the improvement was

Table 2. Description of each animation video used during intervention.

	Name	Instructions
	1. Self-Focus exercise—feelings of the body	When you are taking a shower, close your eyes and relax. 1. Be mindful: Notice the various sensations of your body: the temperature of the water on your skin. 2. Gently touch your arms, thigh, and shank with your bare hand. 3. Now, using a soap or body wash, touch your body again. Note the difference in sensation in touch. 4. After showering, touch different parts of your body with items possessing different textures. 5. First, use a towel to dry off and note any feelings or sensations. 6. Now touch your arms, belly, and thigh with a cotton cloth. 7. Repeat the previous step using a soft scarf.
	2. Self-Focus exercise—movements of the body	Do the following activities one at a time. Pay attention to how your body moves differently: 1. rubbing the arms and legs; 2. waving; 3. bending; 4. wiggling the toes; 5. stroking, scratching, then tossing the hair if you have long hair.
	3. Self-Focus exercise—exploration of the genitals	1. Observe your own body in a full-length mirror. 2. Use a hand mirror to explore your genitals and identify the genital anatomy: squatting, supported by pillows or cushions. 3. If you are male, view beneath your scrotum and perineal area; observe the difference in look when the penis is erect. 4. There are a lot of variations in penis size. Based on scientific research, penis size is not particularly important for female sexual satisfaction. 5. If you are female, part the outer labia and explore the difference in the appearance of the vulva when they are aroused. 6. There are various shapes of the vulva and the appearance of it varies from different individuals to individuals. This does not signal whether you are attractive or not, and also does not particularly determine male sexual satisfaction. 7. Try to find the clitoris.
	4. Gazing	1. Lie on your sides, facing each other but without touching, with your heads on your own separate pillows. 2. Gaze directly into your partner's eyes. 3. Maintain the gaze for five minutes, noticing your reactions (giggles, discomfort, wish to break the gaze, feelings of connection).
	5. Gazing with variations	1. Lie on your sides, facing each other but without touching, with your heads on your own separate pillows. 2. Gaze directly into your partner's eyes. 3. Halfway through the exercise, kiss the face of the other person, then return to the gaze. 4. Next, place your hand gently on each other's heart but still directly look at each other in the eyes. 5. Maintain the gaze for five minutes, noticing your reactions (giggles, discomfort, wish to break the gaze, feelings of connection).
	6. Hugging	1. Take off your shoes. 2. Stand firmly on your own two feet. 3. Hug. 4. Calm yourself by focusing on yourself. 5. Concentrate on what is happening to your body. 6. If you topple, re-balance, re-hug and continue. 7. Do this for five minutes per time, do it in the morning and once again in the evening.

(*Continued*)

Table 2. Continued.

	Name	Instructions
	7. Kegel exercise	1. Find the pelvic floor muscles: when you are peeing, intentionally stop peeing in the middle, the muscles you contract are the pelvic floor muscles. 2. Sit or lie comfortably and contract these muscles for a count of 10. 3. Release slowly to a count of five. 4. Repeat 10 times. 5. Then contract and release the muscles as quickly as you can 10 times. 6. Now contract and hold for as long as you can. 7. Repeat these exercises twice a day.
	8. Sensate Focus—Non-genital Touching	1. First re-do the gazing and the hugging exercises to create a connection. 2. With Partner 2 lying on their front, Partner 1 explores Partner 2's body, avoiding breasts, buttocks and genitals. 3. Examining areas where you wouldn't normally venture, such as behind the ears, backs of the knees and between the toes. 4. Touching and caressing the body, with bare hands only, using different pressures. 5. Partner 2 shouldn't object to the exploration unless there is a good reason. 6. Do this for 5 min. 7. Partner 2 turns onto their back, so that Partner 1 can explore their front, avoiding genitals. 8. Do this for another five minutes, then swap roles. 9. Partner 2 now explores Partner 1's body. 10. Afterwards, engage in non-sexual cuddling, where non-sexual means it is not understood to be a precursor to sex, nor intended to sexually arouse, but is the simple enjoyment of cuddling in and of itself.
	9. Sensate Focus—Non-genital Touching with variations	1. First re-do the gazing and the hugging exercises to create a connection. 2. Both of you lie on your back, follow the instructions in Sensate Focus—Non-genital Touching, but touch each other's body simultaneously for 5 mins. 3. Then use lotion, instead of bare hands, to assist with the touch. Do it for another 3 min. 4. Next, use a towel to touch each other. 5. Afterwards, do small kisses, licking and blowing gently across the skin, but remain sensual rather than sexual.
	10. Sensate Focus—Genital Touching	1. Involves procedures in Sensate Focus—Non-genital Touching, but includes breasts, buttocks and genitals. 2. But there is no demand for performance or response, just to be curious. 3. Use deliberately arousing touch, but keep your focus on personal interest. 4. Shouldn't be seeking orgasm; if orgasm happens, it doesn't necessarily signal the end of the experiment, both of you should refocus and continue.
	11. Sensate Focus—Genital Touching with variations	1. Involves procedures in Sensate Focus—Genital Touching, but includes breasts, buttocks and genitals. 2. During your turn at being touched, take your partner's hands and lead them to areas you wish to be touched. 3. Incorporation of sex toys: Using different types of vibrators to stimulate the clitoris may be useful, especially to help the woman who has not experienced an orgasm. Using it to stimulate nipples and anus area may be enjoyable too. Communicate with your partner about what frequency and pressure of the stimulation is pleasurable for you. 4. Try oral sex: oral sex applied on the clitoris and areas around it may be especially enjoyable. But the pressure used and how directly the clitoris is stimulated varies. It may cause pleasure or pain, so that communication about what is enjoyable is paramount. 5. Still, use deliberately arousing touch, but keep your focus on personal interest. 6. Shouldn't be seeking orgasm; if orgasm happens, it doesn't necessarily signal the end of the experiment, each partner should refocus and continue.

Note. Here is the link to Video 8 Sensate Focus—Non-genital Touching: https://www.youtube.com/watch?v=Q2pO3geZM8Q. The rest of the videos can be obtained from the authors for research purposes.

expected in sexual function, one-tailed p was used for significance value. For analyses of relationship and sexual satisfaction, as well as intimacy, two-tailed p was used for significance value when gender was included as an exploratory factor. When gender was not considered, one-tailed p was used.

For Repeated Measures ANOVAs, power analyses conducted at WebPower (https://webpower.psychstat.org/wiki/start) showed that the sample had adequate power to detect effects for CHEES; acceptable for IIEF-5; and low for FSFI.

Missing values

Due to a technical mistake, eight participants lacked information on the dependent variables on pretest. Prior to analyses, all missing values were imputed using the Expectation Maximization procedure in SPSS. We conducted analyses both using the data without and with imputed values. The pattern of results remained largely the same.

Results

Effects of sensate focus intervention on sexual function

Table 3 presents the baseline sexual function of the participants. Most men had low likelihood of fulfilling diagnostic criteria of early ejaculation, with 4.8% of them being indicative of early ejaculation. However, with the cutoff score of 21 (Rosen, Cappelleri, Smith, Lipsky, & Peña, 1999), 2.4% of men had strong indications of erectile dysfunction, 7.2% had low to moderate indication, and 38% had low indication. In total, 47.6% of the male participants scored below the cutoff score. On the other hand, 33.3% of women scored lower than the 26.55 cutoff score of FSFI (Rosen et al., 2000). There was no significant difference between the experimental group and the waitlist control group in terms of sexual function at baseline. In sum, even if we recruited participants from a non-clinical sample, sexual dysfunctions were still relatively prevalent.

A series of Repeated Measures ANOVAs was conducted to examine the effects of the SF intervention on sexual function. The results showed that there was a significant Intervention x Time interaction on female arousal (subscale of Arousal in FSFI), $F(1, 40) = 5.73$, $p = .011$ (one-tailed, changing from $M = 14.1$ at pretest to $M = 15.8$ at post-test for the experimental group), as well as on female orgasm (subscale of Orgasm in FSFI), $F(1, 40) = 3.79$, $p = .030$ (one-tailed,

Table 3. Mean, Standard Deviations, and between-group differences of sexual function at pretest.

	Sensate focus		Control		Between-group differences
Variable	*M*	*SD*	*M*	*SD*	*p* (two-sided)
CHEES	10.93	2.94	9.60	3.39	.19
IIEF-5	21.43	2.37	20.07	5.38	.28
FSFI-Total	26.45	6.96	27.29	5.14	.65
FSFI-Desire	6.67	2.11	7.24	1.30	.32
FSFI-Arousal	14.06	4.70	15.15	5.28	.49
FSFI-Lubrication	16.33	4.64	15.98	3.75	.79
FSFI-Orgasm	9.89	4.55	11.44	3.75	.23
FSFI-Satisfaction	12.00	3.40	11.79	2.66	.82
FSFI-Pain	11.44	3.43	10.80	3.28	.54

Note. CHEES: The total score of the Checklist for Early Ejaculation Symptoms. The higher the number is, the more early ejaculation symptoms one has. IIEF-5: The total score of the International Index of Erectile Function Questionnaire-5. The higher the number is, the fewer erectile dysfunction one has. FSFI-Total: The Total score of Female Sexual Function Index (FSFI). The higher the number is, the fewer sexual dysfunctions one has. FSFI-Desire: The subscale of Desire in FSFI. The higher the number is, the fewer sexual dysfunctions one has. FSFI-Arousal: The subscale of Arousal in FSFI. The higher the number is, the fewer sexual dysfunctions one has. FSFI-Lubrication: The subscale of Lubrication in FSFI. The higher the number is, the fewer sexual dysfunctions one has. FSFI-Orgasm: The subscale of Orgasm in FSFI. The higher the number is, the fewer sexual dysfunctions one has. FSFI-Satisfaction: The subscale of Satisfaction in FSFI. The higher the number is, the fewer sexual dysfunctions one has. FSFI-Pain: The subscale of Pain in FSFI. The higher the number is, the fewer sexual dysfunctions one has.

changing from $M = 9.9$ at pretest to $M = 11.4$ at post-test for the experimental group), meaning that the intervention was effective in improving arousal and orgasm in women. No other significant interactions were found among women, and none were found among men.

Comparison of low-functioning vs. high-functioning group

We next split the participants into a low-functioning group and a high-functioning group based on their pre-intervention scores (i.e., cutoff by pre-intervention median), investigating whether the intervention would be more effective for low-functioning versus high-functioning participants. Figure 2 presents the percentage changes of sexual function for each group.

Among men, two people in the low-functioning group had scores indicative of early ejaculation, and the rest had low possibility of having early ejaculation. For erectile function, 95% of the men in the low-functioning group scored below the cutoff score, with low to strong indications of erectile dysfunction. Formal statistical analyses showed that there was a significant interaction of Intervention × Time × Pre-Intervention Functioning Level on male erectile function (IIEF-5), $F(1, 38) = 3.22$, $p = .041$ (one-tailed), showing that the low-functioning group in the experimental group improved significantly from $M = 19.5$ at pretest to $M = 21.9$ at post-test. No other significant interactions were found.

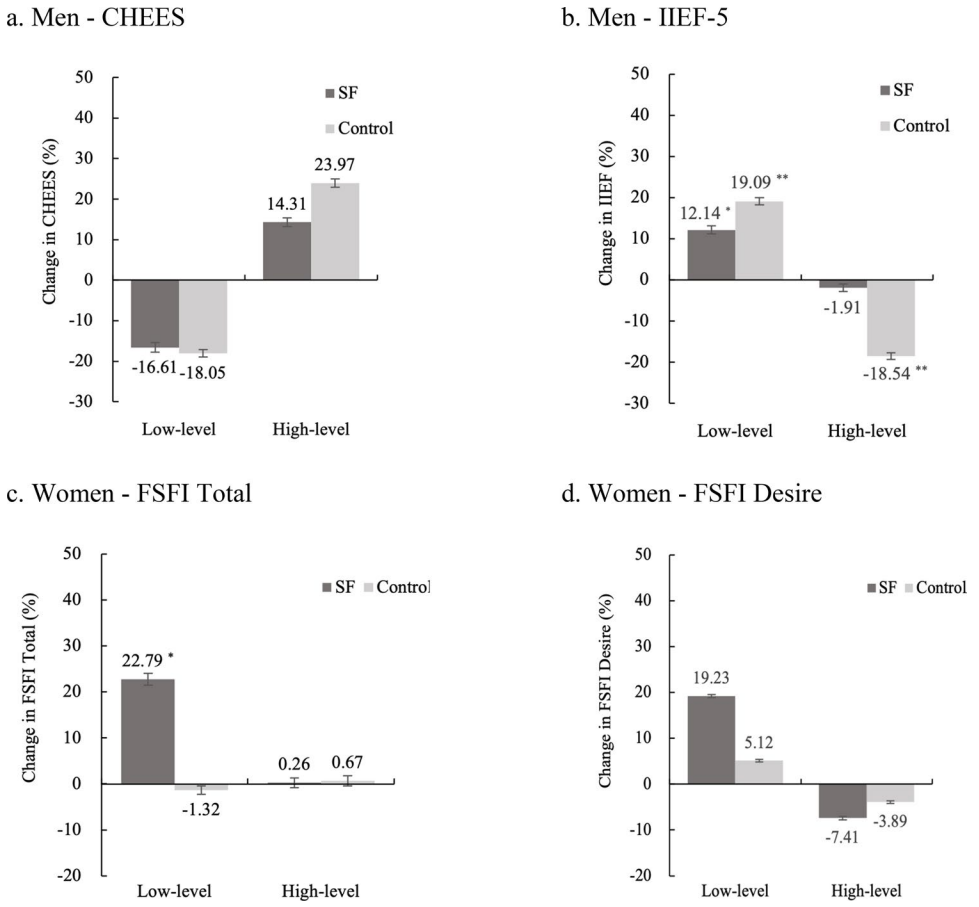


Figure 2. Percentage Improvement in Sexual Function from Pre to Post-Intervention in Sensate Focus Intervention and Control Groups Depending on Pre-Intervention Functioning Level (Low vs. High). *Note.* * $p < .05$ (one-tailed), ** $p < .01$ (one-tailed), based on the significance of the interaction between Time × Group × High/Low functioning (split by median) using Repeated Measures ANOVA. SF: Sensate Focus intervention group; Control: waitlist control group. For CHEES, higher values indicate fewer early ejaculation symptoms. For all other scales, higher values indicate more improvement from Pre to Post-Intervention.

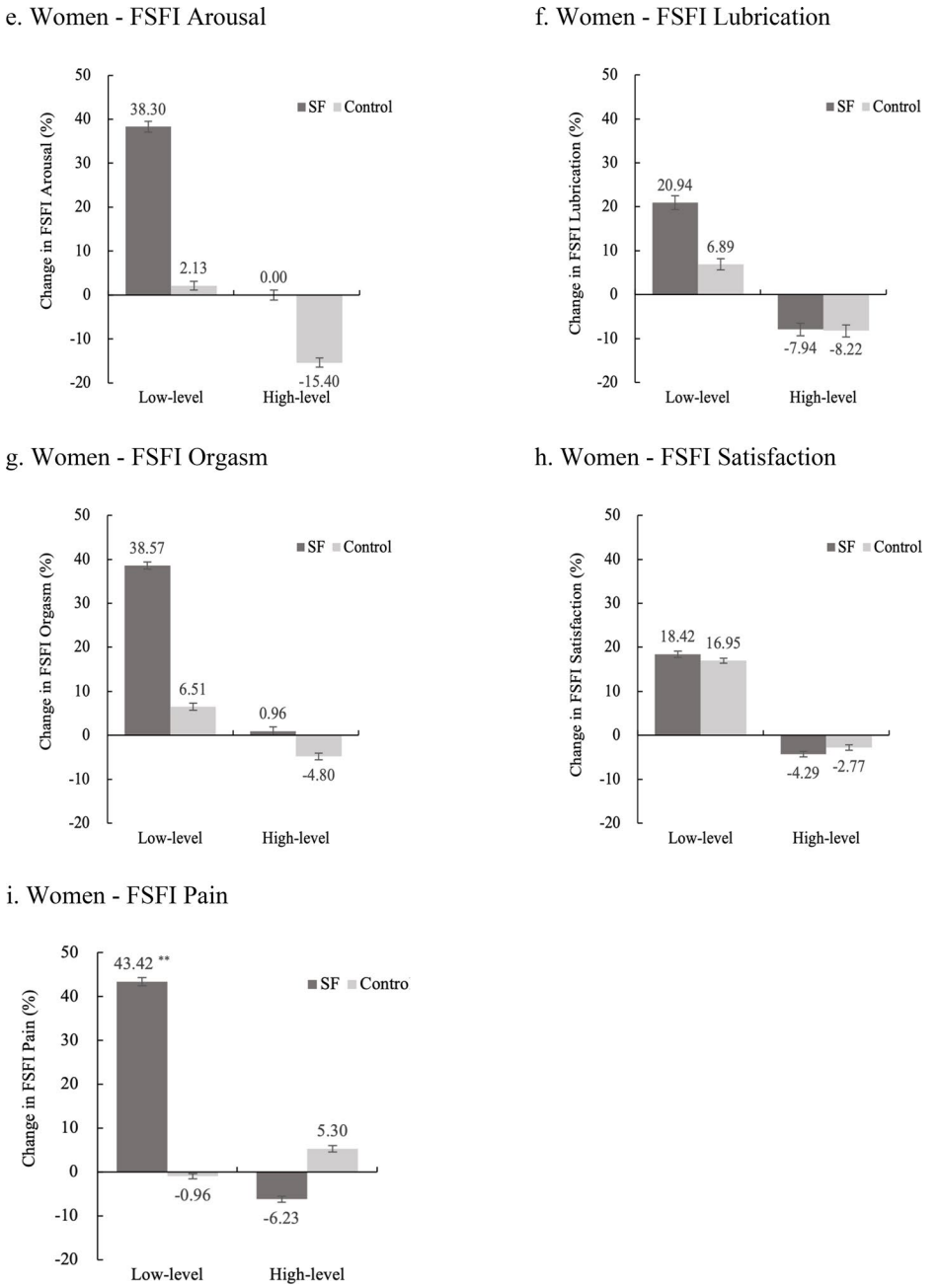


Figure 2. Continued.

Among women, two thirds of the people in the low-functioning group scored below the cutoff score of FSFI, indicating female sexual dysfunction. There was a significant interaction of Intervention × Time × Pre-Intervention Functioning Level on female overall sexual function (FSFI-Total), $F(1, 38) = 5.07$, $p = .015$ (one-tailed), changing from $M = 20.0$ at pretest to $M = 24.6$ at post-test for the low-functioning group. This means that compared to the high-functioning group, female sexual function in the low-functioning experimental group improved significantly more. Also, there was a significant interaction of Intervention × Time × Pre-Intervention Functioning Level on female pain (subscales of Pain in FSFI), $F(1, 38) = 11.20$, $p = .001$ (one-tailed),

changing from $M = 7.7$ at pretest to $M = 11.0$ at post-test for the low-functioning group. This means that similar to overall female sexual function, the intervention was especially effective in reducing pain in the low-functioning experimental group. No other significant interactions were found.

Effects of sensate focus intervention on relationship and sexual satisfaction as well as intimacy

A series of Linear Mixed-effects Model analyses were conducted to examine the effects of the SF intervention and gender on relationship satisfaction, intimacy, and sexual satisfaction. No significance in any of interactions was found.

Comparison of low-functioning vs. high-functioning group

When including the Pre-Intervention Functioning Level as a factor, no significant interactions were found (Relationship Satisfaction: Intervention × Time × Gender × Pre-Intervention Functioning Level, $t(111.92) = -0.63$, $p = .531$; Intimacy: Intervention × Time × Gender x Pre-Intervention Functioning Level, $t(111.91) = -0.02$, $p = .987$; Sexual Satisfaction: Intervention × Time × Gende r × Pre-Intervention Functioning Level, $t(113.10) = 0.257$, $p = .798$). Figure 3 presents the percentage change of relationship satisfaction, intimacy, and sexual satisfaction.

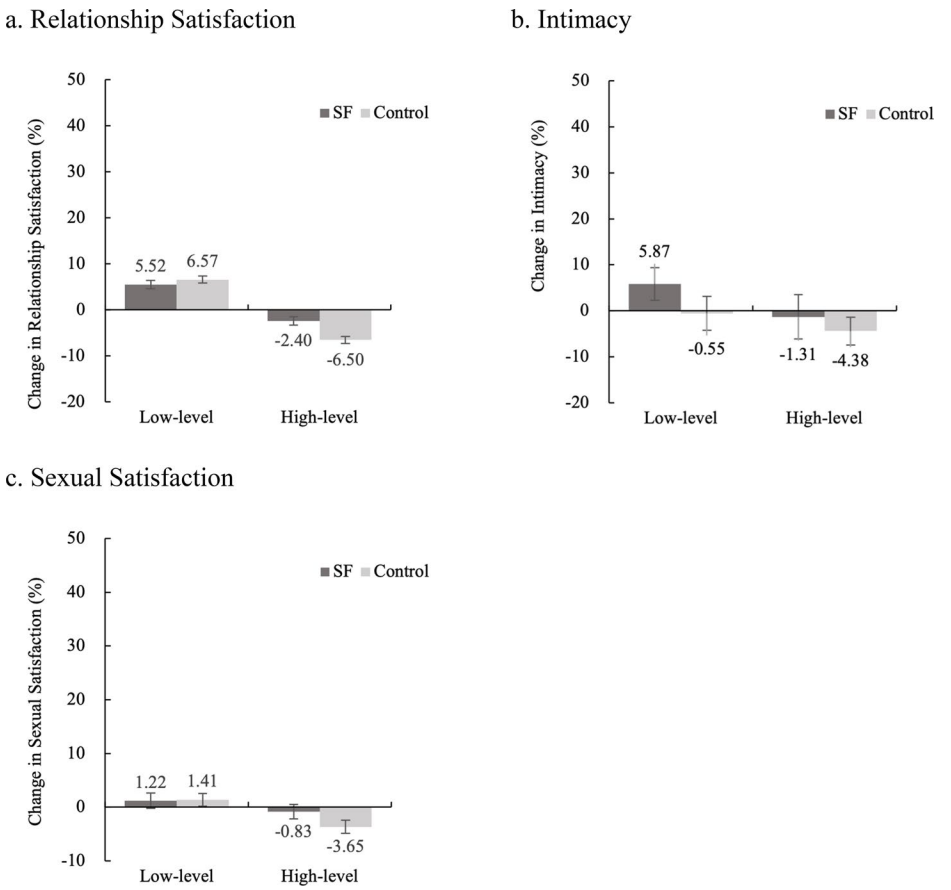


Figure 3. Percentage Improvement in Relationship and Sexual Satisfaction, as well as Intimacy, from Pre- to Post-Intervention in Sensate Focus Intervention and Control Groups Depending on Pre-Intervention Functioning Level (Low vs. High). *Note*. SF: Sensate Focus intervention group; Control: waitlist control group. Higher values indicate more improvement from Pre to Post-Intervention.

Associations between the dependent variables within participants and between the man and the woman in the couple

Pearson Correlations were computed both how the dependent variables correlated within sexes (i.e. how a man's sexual dysfunctions correlated with his sexual satisfaction) and between sexes (i.e. how a woman's sexual dysfunctions correlated with her partner's sexual dysfunctions). As shown in Table 4, male erectile function (IIEF-5) was positively associated with female orgasm and pain, and the men's perception of the level of intimacy in the relationship was positively associated with female sexual function, women's perception of relationship and sexual satisfaction, as well as the women's perception of level of intimacy. Notably, the man and the woman's reports of intimacy were highly correlated, higher than sexual and relationship satisfaction which were not significantly associated. Moreover, when looking at within sex correlations, early ejaculation symptoms were strongly associated with erectile function among men, meaning that less early ejaculation symptoms indicate better erectile function. Among women, the FSFI total score were positively related to all subscales of FSFI, relationship and sexual satisfaction, as well as intimacy. This demonstrates that better overall female sexual function was associated with higher relationship and sexual satisfaction, and intimacy.

Effects of intervention at follow-up

In order to investigate whether the effect of intervention was maintained at the three-month follow-up, a series of Repeated Measures ANOVAs was conducted on the variables that had significant changes from pre-intervention to post-intervention. The results showed that from post-intervention to follow-up, no significant differences were found on female orgasm (the subscale of Orgasm in FSFI). When including pre-intervention functioning level as a factor (i.e., low functioning group vs. high functioning group), no significant differences were found on erectile function (IIEF-5), overall female sexual function (FSFI-Total) and female pain (the subscale of Pain in FSFI). This means that the improvements were maintained three months after the intervention. However, significant changes were found in female arousal (the subscale of Arousal in FSFI) [post-intervention: $M = 15.8$, $SE = 0.84$; follow-up: $M = 14.7$, $SE = 0.79$, $F(1, 17) = 4.43$, $p = .05$ (two-tailed)]. This means that the improvement of female arousal was not maintained at follow-up—it became worse compared to the post-intervention level.

Discussion

The present study found that the SF intervention was effective in improving female arousal and orgasm. The effect on female orgasm was maintained at a 3-month follow-up while the effect on arousal did not. Compared to the group with higher starting levels (i.e., better sexual functioning, or higher relationship and sexual satisfaction), the SF intervention was more effective in improving the lower starting group's erectile function among men, as well as overall sexual function and pain among women. These three improvements were maintained at follow-up as well. This means that the SF intervention may be more effective in improving the conditions of those with a lower starting level, and the effects are likely to be maintained for a longer period of time. Nevertheless, the SF intervention was not significantly effective in improving intimacy, relationship and sexual satisfaction among couples.

The effectiveness of SF in improving overall female sexual function for the low-functioning group was in line with previous literature. Hucker and McCabe (2015) found that their Pursuing Pleasure program, with sensate focus exercises three times per week throughout the eleven weeks of treatment, was helpful for women with mixed female sexual problems. Their participants showed improvements in all the subdomains of FSFI except for pain (Hucker & McCabe, 2015). Specifically, the improved orgasmic function of all female participants also resonates with previous research in female orgasmic disorder. SF was found to be an important

Table 4. Correlations between sexual function, relationship satisfaction, intimacy, and sexual satisfaction.

Men\Women	CHEES	IIEF-5	FSFI-total	FSFI-desire	FSFI-arousal	FSFI-lubrication	FSFI-orgasm	FSFI-satisfaction	FSFI-pain	Relationship satisfaction	Intimacy	Sexual satisfaction
CHEESa	1									.048	−.223	−.055
IIEF-5b	−.450**	1								−.153	.144	−.045
FSFI-Totalc	−.091	.302	1							.381*	.484**	.461**
FSFI-Desired	−.069	.072	.711**	1						.459**	.564**	.486**
FSFI-Arousale	−.044	.241	.756**	.620**	1					.030	.401**	.242
FSFI-Lubricationf	−.124	.167	.662**	.265	.370*	1				.071	.187	.278
FSFI-Orgasmg	−.161	**.347***	.862**	.456**	.648**	.526**	1			.175	.355*	.250
FSFI-Satisfactionh	.125	.003	.658**	.486**	.259	.319*	.428**	1		.776**	.360*	.591**
FSFI-Paini	−.098	**.429****	.785**	.454**	.382*	.463**	.647**	.546**	1	.337*	.335*	.313*
Relationship Satisfactionj	.006	−.056	−.003	.147	.121	−.247	.078	−.032	−.102	.163	.224	.203
Intimacyk	−.242	.046	**.423****	**.405****	.184	.240	**.357***	**.481****	.270	**.529****	**.715****	**.487****
Sexual Satisfactionl	−.274	.119	2.47	.199	.363*	−.145	.244	.254	.142	.113	.262	.002

Note. *$p < .05$. **$p < .01$. Highlights in gray indicate that the correlations were between the man and the woman within the couple, and highlights in bold indicate that there was a significant correlation within the pair (i.e., the man's response was significantly associated with the woman's response).

[a]CHEES: The total score of the Checklist for Early Ejaculation Symptoms. The higher the number is, the more early ejaculation symptoms one has.

[b]IIEF-5: The total score of the International Index of Erectile Function Questionnaire-5. The higher the number is, the fewer erectile dysfunction one has.

[c]FSFI-Total: The Total score of Female Sexual Function Index (FSFI). The higher the number is, the fewer sexual dysfunctions one has.

[d]FSFI-Desire: The subscale of Desire in FSFI. The higher the number is, the fewer sexual dysfunctions one has.

[e]FSFI-Arousal: The subscale of Arousal in FSFI. The higher the number is, the fewer sexual dysfunctions one has.

[f]FSFI-Lubrication: The subscale of Lubrication in FSFI. The higher the number is, the fewer sexual dysfunctions one has.

[g]FSFI-Orgasm: The subscale of Orgasm in FSFI. The higher the number is, the fewer sexual dysfunctions one has.

[h]FSFI-Satisfaction: The subscale of Satisfaction in FSFI. The higher the number is, the fewer sexual dysfunctions one has.

[i]FSFI-Pain: The subscale of Pain in FSFI. The higher the number is, the fewer sexual dysfunctions one has.

[j]Relationship Satisfaction: The total score of Relationship Assessment Scale. The higher the number is, the higher relationship satisfaction one has.

[k]Intimacy: The total score of the Personal Assessment of Intimacy in Relationships. The higher the number is, the higher level of intimacy one has in the relationship.

[l]Sexual Satisfaction: The total score of the Global Measure of Sexual Satisfaction (GMSEX). The higher the number is, the higher sexual satisfaction one has.

technique, either introduced as part of the physical sensations treatment during a partnered activity or combined with other therapy (e.g., counseling, behavioral therapy, couple or group therapy) (Marchand, 2021). Patients employed SF treatment showed a good successful rate of having orgasm and the effects were maintained at follow-up ranging from one to three years (Marchand, 2021).

A couple of factors may explain our finding that the increase in female arousal at post-test was not maintained at the 3-month follow-up. First, our participants were recruited from a non-clinical sample, so that there may be less room for improvements compared to previous research that was conducted among women with diagnosed sexual dysfunction. In other words, a ceiling effect may be at play. Also, participants were not instructed to do anything during the three-month post-intervention period. There might be a sudden increase in their arousal right after the SF intervention, but their functioning or the sex life dynamic with their partner may fall back to normal after the intervention.

According to the clinical guide of erectile dysfunction treatment, medical treatment, including prescribed medicine and surgery, plays an important role (McVary, 2011). SF is included as a part of psychological treatment as a behavioral technique, but few studies have examined its effectiveness in treating male sexual dysfunction (McVary, 2011). Only one study by Price, Reynolds, Cohen, Anderson, and Schochet (1981), looked into a group treatment of erectile dysfunction for men without partners, and SF exercises were rated low in the helpfulness of the treatment components. This means that no previous studies had systematically investigated the exact role of SF in treating erectile dysfunction for those who are in a relationship. Nevertheless, erectile function is related to arousal. Echoing the improvements in arousal in women, SF intervention may be particularly helpful in enhancing arousal-related functions and beneficial for men with lower functioning levels before treatment.

The extremely high agreement between the man and the woman in the couple regarding intimacy is of note, suggesting that while the experienced sexual and relationship satisfaction of a man and a woman in a couple may have some discrepancy, a shared sense of intimacy is commonly strong. The PAIR measure seems to effectively capture this dynamic.

Not in line with our hypotheses, the results showed that the SF intervention was not significantly effective in improving intimacy, relationship and sexual satisfaction among couples, even though there were some small percentage improvements in the experimental group as shown in Figure 3. One possible explanation is the ceiling effect, meaning that the participants in our sample may be very satisfied with their relationship already and there is not much room for change (relationship satisfaction: average was 29.6 out of 35; sexual satisfaction: average was 30.6 out of 35), even though it seems that there was room for improvement for intimacy (average was 147.6 out of 180). Secondly, the intervention only lasted for five weeks, which might be too short to allow profound changes in the relationship.

In addition, SF sex therapy is usually practiced under clinicians' guidance in clinical settings (Fichten, Libman, & Brender, 1983; Shanahan, 2023). SF often includes a stage of banning penile-vaginal intercourse, meaning that couples are instructed to practice non-genital touching first but have restrictions to intercourse and should actively avoid orgasm (Fichten et al., 1983; Sarwer & Durlak, 1997). This is because banning intercourse can put the emphasis on non-genital caressing, which will redirect the patients' attention to their sensation feelings, rather than their performance—hopefully reducing performance anxiety in sex (Fichten et al., 1983). The couple regularly checks in with the clinician as they progress in the non-genital touching exercises and discusses with the clinician about when to move on to genital touching and having intercourse (Campbell, 2020). This means that clinicians are involved in treatment, asking clients for feedback and helping them deal with specific distractions arising from SF exercises (Fichten et al., 1983; Shanahan, 2023). However, this was not a step in our intervention since we implemented it fully online and without a clinician's involvement. Lastly, all participants followed the same exercise schedule, which might work differently for different couples. Unlike in the actual sex therapy where the clinician decides the progress and the exercise schedule, our designed schedule may

not be the best fit for some participants. Not receiving guidance or feedback may be a factor that there was no significant increase in their intimacy, relationship and sexual satisfaction.

This study has several strengths. First, we used a randomized controlled, longitudinal design, which is the first of its kind in studies about the effectiveness of SF sex therapy. In comparison to the waitlist control group and the follow-up at three months, our study presents evidence for the efficacy of practicing SF exercises online without a clinician's intervention. Secondly, SF exercises have never been demonstrated through animation videos. Our method of developing animated videos, with detailed audio instructions, makes the intervention, we believe, more engaging, interactive, and enhances the participants' motivation. In fact, 35% of the participants were interested in coming to the interview with us and sharing their experience, further indicating that they had a good experience and would like to talk more about it. SF exercises include a lot of action (i.e., body movements), and the format of animation videos made the instructions clearer for the participants. Since everyone followed the same, accurate, and standardized protocol, better fidelity is likely.

Moreover, the online delivery using animation videos is scalable, meaning that it can easily be promoted to a much wider audience in a short time, potentially benefiting more people who have similar concerns. Also, our participants were Chinese heterosexual couples, adding an important piece to the field by focusing on an underrepresented population. As previous research in SF sex therapy mostly targeted Western, White samples, it is crucial to investigate whether SF works in a different cultural context.

The present study showed that online SF intervention has potential to improve female sexual functioning, particularly in enhancing orgasm and reducing pain, as well as a possible treatment for male erectile dysfunction. It confirms the previous findings about SF being effective in treating female sexual dysfunction and extends that SF can be utilized to treat male arousal-related disorders as well. Specifically in China, where sex education is lacking and access to sex therapy treatment is limited or almost non-existent (Qin & Zhang, 2023), online self-help programs like this serve as a useful, quickly accessible tool for those experiencing sexual problems.

Furthermore, online SF intervention can be integrated with medical treatment of sexual dysfunction, and it can be the first part of a stepped-care model for further treatment. For example, SF exercises can be introduced as part of the psychological treatment, in addition to medicine prescription. In previous research about the treatment of premature ejaculation, SF combined with drug treatments was found to have better outcomes than drug treatment alone (Cooper et al., 2015). Also, for those who are seeking sex therapy or couple therapy, online SF makes them be able to receive timely digital care on the first day that they reach out for help. This is consistent with the stepped-care model about mental health proposed by Cornish (2020), that online SF intervention steps up to more intense and advanced care if the sexual problems do not improve after this self-helped online program.

The study had some limitations. First, participants' responses may have been affected by a desirability bias as they were aware when they were receiving the intervention. Second, our sample size was small, and the results may not be generalized to the whole Chinese population. For instance, the sample in our study was well-educated, and not geographically representative. In addition, the Chinese version of CHEES, IIEF-5, Relationship Assessment Scale, PAIR, and GMSEX have not been validated in the Chinese language and population.

Lastly, we did not actually examine if there was less performance anxiety after the intervention, making the cognitive process mediating the effects of SF unknown. In other words, it remains difficult to tell what happened during the moments of doing SF exercises. For example, it would be important to check if their anxiety level went down after exercises, or if their thinking process changed.

Future research should examine the effectiveness of online SF intervention in a larger and more representative sample of both the clinical and non-clinical Chinese population, and potentially other populations. This would also address the likely ceiling effects of our study, determining if the online SF intervention benefits individuals with sexual dysfunction who meet the

threshold for clinical diagnosis. Additionally, the current study did not have direct measurements of performance anxiety or thoughts before, during, and after the SF intervention. Future studies could have clear and systematic measures about this and uncover how SF alters the participants' cognition. In the third place, we only included heterosexual couples in the study for the sake of animation videos that were made in heterosexual scenarios. As studies about sexual dysfunction and treatment targeting sexual and gender minorities are needed, future research should expand the scope to LGBTQ+ couples.

Conclusion

Sexual satisfaction plays an important role in relationship satisfaction and intimacy, yet sexual dysfunction is not rare. Our results indicate that the online self-helped SF exercises, delivered through animation videos with audio instructions, are effective in improving female orgasm for all women. It is also effective in improving the low-functioning group's erectile function, overall female sexual function, and pain. Those improvements were maintained at a three-month follow-up. Future research conducted in a larger sample size, exploring the cognitive process of SF exercises, and concerning its effectiveness among LGBTQ+ couples, is warranted.

Disclosure statement

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

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Data availability statement

The data file can be obtained from the authors.

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