

Efficacy of Psychological Interventions for Sexual Dysfunction: A Systematic Review and Meta-Analysis

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Abstract Sexual dysfunction is highly prevalent in the general population and associated with psychological distress and impaired sexual satisfaction. Psychological interventions are promising treatment options, as sexual dysfunction is frequently caused by and deteriorates because of psychological factors. However, research into the efficacy of psychological interventions is rather scarce and an up-to-date review of outcome studies is currently lacking. Therefore, we conducted a systematic review and meta-analysis of all available studies from 1980 to 2009 to examine the efficacy of psychological interventions for patients with sexual dysfunction. A total of 20 randomized controlled studies comparing a psychological intervention with a wait-list were included in the meta-analysis. The overall post-treatment effect size for symptom severity was $d = 0.58$ (95 % CI: 0.40 to 0.77) and for sexual satisfaction $d = 0.47$ (95 % CI: 0.27 to 0.70). Psychological interventions were shown to especially improve symptom severity for women with Hypoactive Sexual Desire Disorder and orgasmic disorder. Our systematic review of 14 studies comparing at least two active interventions head-to-head revealed that very few comparative studies are available with large variability in effect sizes across studies (d between -0.69 and 2.29 for symptom severity and -0.56 and 14.02 for sexual satisfaction). In conclusion, psychological interventions are effective treatment options for sexual dysfunction. However, evidence varies considerably across single disorders. Good evidence exists to date for female hypoactive sexual desire disorder and female orgasmic disorder.

Further research is needed on psychological interventions for other sexual dysfunctions, their long-term and comparative effects.

Keywords Sexual dysfunction · Treatment · Psychological · Meta-analysis · Review

Introduction

Sexual dysfunction is a common class of disorders, with estimates of current prevalence rates ranging up to 46 % of the general population (Simons & Carey, 2001). Sexual dysfunction is associated with impaired sexual and marital satisfaction as well as reduced quality of life (Althof et al., 2005; Laumann, Paik, & Rosen, 1999; Read, King, & Watson, 1997). The diagnostic category of sexual dysfunction according to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) comprises nine disorders summarized in four subgroups: sexual desire disorders (Hypoactive Sexual Desire Disorder, Sexual Aversion Disorder); arousal disorders (Male Erectile Disorder, Female Sexual Arousal Disorder); orgasm disorders (Female Orgasmic Disorder, Male Orgasmic Disorder, Premature Ejaculation); and pain disorders (Dyspareunia, Vaginismus). Temporary subclinical dysfunctions are also frequent. Sexual dysfunctions vary considerably in their lifetime prevalence: in women, Hypoactive Sexual Desire Disorders are most common (16 %), while Orgasmic Disorders (4 %) and Dyspareunia (3 %) are less frequent (Simons & Carey, 2001). In men, Hypoactive Sexual Desire Disorders have the highest lifetime prevalence as well (26 %), whereas Premature Ejaculation (5 %) and Erectile Dysfunction (about 5 %) are less common (Simons & Carey, 2001). Sexual dysfunction is thus a major health problem, calling for effective treatment options. Since psychological factors are important in the development, and, especially,

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the maintenance of sexual dysfunction (Althof et al., 2005), psychological interventions are promising treatments for sexual dysfunction. Compared to pharmacological treatment options, psychological interventions have two main advantages; that is, they do not have negative physical side effects, and they aim at the re-establishment of sexual functioning and the increase of sexual satisfaction beyond the reduction of target symptoms.

One of the first psychological interventions was the sex therapy approach of [Masters and Johnson \(1970\)](#). This intervention was typically provided by mixed-sex co-therapist teams and involved both partners of the couple. It included psychoeducation about the sexual response cycle, counseling, and behavioral exercises (“sensate focus”), which were meant to reduce performance anxiety and facilitate the re-experience of sexual pleasure. Treatment was provided daily over a course of 2–3 weeks. Since 1970, other treatment options have been developed. Many of them, however, are based on the program of Masters and Johnson. Modifications of sex therapy have included the implementation of the treatment by one therapist instead of a team, a lower frequency of treatment sessions, with one to two sessions per week instead of daily sessions, and a provision of the treatment in a group setting. Furthermore, so-called “arousal reconditioning” exercises have been added to enhance sexual desire and arousal, in order to facilitate positive sexual experiences. They include masturbation exercises, use of vibrators, working with sexual fantasies, and role-playing ([Kockott, 2007](#)). In contrast to the specialized sex therapy approach, four more general intervention strategies have been proposed for the treatment of patients with sexual dysfunctions ([Binik & Meana, 2009](#)): (1) cognitive restructuring/emotional regulation; (2) stimulus control/desensitization; (3) behavioral activation; and (4) relationship skills building. Specific interventions have been developed for some of the female sexual dysfunctions ([Bitzer & Brandenburg, 2009](#)). Other treatment options for sexual dysfunctions are marital or couple therapy, psychodynamic therapy, and cognitive therapy ([Althof et al., 2005](#)). A brief description of often used psychological interventions for sexual dysfunctions, as classified for our meta-analysis, can be found in [Table 1](#).

These more recently developed interventions for sexual dysfunction require efficacy research to justify their use in health care. Systematic reviews and meta-analyses help to integrate the current state of knowledge and thus facilitate the translation of research results into practice. [Heiman and Meston \(1997\)](#) published a review of efficacy studies on psychological and medical interventions for sexual dysfunction. The studies were evaluated according to the American Psychological Association’s criteria for empirically supported treatments ([Chambless & Ollendick, 2001](#)). According to these criteria, in short, “well-established” treatments have been shown to be significantly superior to placebo or equally effective as another established treatment. “Probably efficacious” treatments have been shown to be significantly superior

to wait-list control. In the review by [Heiman and Meston \(1997\)](#), “well-established” treatments were available for Primary Female Orgasmic Disorder and Erectile Dysfunction, and “probably efficacious” treatments for Secondary Female Orgasmic Disorder, and, possibly, for Vaginismus and Premature Ejaculation. It was noted that there were a lack of studies on psychological interventions for other disorders, such as Hypoactive Desire Disorder, Sexual Aversion, Dyspareunia, and Delayed Orgasm in men. Apart from that, [Heiman and Meston](#) criticized the methodological quality in many studies, such as the lack of control groups, treatment manuals, and measures of sexual satisfaction.

To our knowledge, no up-to-date meta-analysis and review has investigated the efficacy of psychological interventions for diverse sexual dysfunctions in randomized controlled trials (RCTs). Such an overview of effective psychological interventions can serve as a guideline for practitioners to provide patients with adequate psychological interventions, in order to reduce symptoms and increase sexual satisfaction. The present study provides an up-to-date review of the efficacy of psychological interventions for patients with diverse sexual dysfunctions. A second goal is the meta-analytic aggregation of studies of the efficacy of psychological interventions against a wait-list control group, with regard to reductions of symptom severity and improvement of sexual satisfaction, while taking into account patient and study characteristics as potential moderators.

Method

Literature Search

The literature search was based on a comprehensive initiative to set up a database of references to clinical studies investigating the effectiveness of any psychological intervention for a range of mental disorders. The following bibliographic databases relevant to the field of psychotherapy outcome research and medicine were searched: Embase, Medline, PsycINFO, Cochrane Central Register of Controlled Trials, and Psynex. Searches were carried out combining keywords and text words relating to specific psychological interventions, RCTs, and specific mental disorders. The last search for studies on various mental disorders was performed in December 2008 to identify studies published between 1980 and 2007. This search resulted in 48,667 references, which were stored in the reference database program EndNote X3. For the present meta-analysis, all references related to the search terms: “sex*” OR “erecti*” OR “dyspareunia” OR “vaginism*” OR “orgasm*” OR “ejaculat*” OR “impoten*” were considered for inclusion. This search resulted in 6,781 records. Next, an updated search for studies on sexual dysfunction published in the years 2008 and 2009 was performed by searching the Cochrane Central Register of Controlled Trials using the above-mentioned search terms. This

Table 1 Definition of psychological interventions for Sexual Dysfunction

1. Sexual skills training (SST): Interventions focusing exclusively on exercises in order to help patients attain effective sexual functioning strategies. Exercises are either practiced by single persons or the couple and may include masturbation training, sensate focus exercises, the stop-and-start-technique, etc.
2. Sex therapy (ST): This approach is based on the sexual response cycle by Masters and Johnson (1970). The intervention is typically delivered by a male and female co-therapy team and necessarily comprises psychoeducation, couple exercises (e.g., sensate focus exercises) as well as counselling. This category of treatments includes standardized sex therapy as described by Masters and Johnson (1970) as well as modifications. The latter are often delivered by only one therapist.
3. Cognitive-behavioral therapy (CBT): Interventions aiming at modifying dysfunctional beliefs (cognitive restructuring). An emphasis of this treatment is on homework assignments, outside-of-session activities, psychoeducation, and acquisition of skills. Therapists exert an active influence via therapeutic interactions and topics of discussion.
4. Marital therapy (MT): Interventions focusing on relationship problems. Strategies include communication training, social skills training, or cognitive interventions such as perspective taking, in order to improve mutual understanding.
5. Systematic desensitization (SD): A behavior therapy technique in which muscle relaxation is used to reduce the anxiety associated with certain situations (Rimm & Masters, 1974). Vaginal dilator training is included in this category.
6. Educational intervention (ED): Interventions focusing exclusively on disseminating information about psychological and physiological changes that occur during the sexual response.
7. Other psychotherapy (OP): e.g., psychodynamic therapy, hypnotherapy, rational emotive therapy, etc.

search resulted in additional 345 records. These were added to the abovementioned 6,781 records and screened for inclusion in the meta-analysis.

Inclusion Criteria

We included RCTs that compared either a specific psychological intervention with wait-list, or two specific psychological interventions against each other, or a combination of psychological treatment and medication with medication only. We did not consider comparative studies with medication treatment since substances and dose might vary between studies and stratified analyses for each substance and dose would be necessary. Studies were eligible if they included adults suffering from any kind of full or subclinical sexual dysfunction as listed in the DSM-IV (APA, 2000) or in the International Classification of Diseases (ICD-10) (World Health Organization, 2004). For studies to qualify for inclusion no formal diagnostic procedure was necessary, however. Instead we included studies if authors reported having included patients seeking treatment for low sexual desire, sexual aversions, problems with

sexual arousal, erectile dysfunction, problems with orgasm, or pain with sexual activity. Studies could either investigate patients suffering from one and the same sexual dysfunction or patients with diverse sexual dysfunctions (referred to below as “mixed sexual dysfunctions”). Psychological interventions had to aim to meet at least one of the following objectives: (1) modification of dysfunctional cognitions about sexuality; (2) enhancement of sexual arousal and desire; (3) acquisition of control of physical reactions related to the sexual response cycle; or (4) improvement of the relationship between sexual partners. The psychological interventions had to comprise at least four sessions and could be provided in a variety of settings (i.e., individual, couple, group, self-help). In order to be included, a study had to have been published between 1980 and 2009 as a full journal article, and had to include the data required to compute treatment effects; there were no language restrictions imposed.

Study Selection

References were screened for inclusion by two authors (H.S. and S.F.), according to a structured manual (the manual is available on request from the corresponding author). For a reliability analysis of the selection process, a random sample of 5% of all references was independently rated by two authors (H.S. and S.F.). The percentage of agreement and inter-rater variability was 91.63% ($\kappa = 0.83$), which indicates very good reliability of study selection. In cases of ambiguity, a definite decision was taken by consensus with a senior researcher (J.B.). Four papers were in Chinese. The corresponding authors were contacted and asked for translation of the most important parts of the paper, and one author replied. The three remaining studies were translated using the web-based translation application Google translate (Google, 2011).

Outcome Measures

We defined two outcome dimensions to be relevant for estimating treatment effects in our study: the pre-specified primary outcome was self-rated symptom severity; the secondary outcome was self-rated sexual satisfaction. When more than one outcome measure was reported per outcome dimension, we extracted the outcome measure that was highest on a pre-specified hierarchy of outcomes. We listed the outcome measures used in the primary studies and determined how frequently each measure was used. The scales that were used most frequently in the primary studies were given precedence. Results from intention-to-treat analyses, which included all randomized patients, were preferred over results from completer analyses that excluded treatment drop-outs.

Data Extraction

We classified interventions according to seven pre-specified categories of psychological interventions: sexual skills training (SST), sex therapy (ST), cognitive-behavioral therapy (CBT), marital therapy (MT), systematic desensitization (SD), educational intervention (ED), and other psychotherapy (OP) (for descriptions of psychological interventions, see Table 1). Medication (MD), minimal contact (MC) or wait-list (WL) served as control conditions. For each intervention, the treatment setting was classified according to the following categories: individual, couple, group, self-help or mixed setting. Then we assessed methodological quality by five important quality indicators in RCTs: adequacy of generation of allocation sequence, adequacy of analyses, adequacy of manual use, diagnostic quality, and sample representativeness (Foa & Meadows, 1997; Jüni, Altman, & Egger, 2001). The generation of allocation sequence was considered adequate if the investigators responsible for patient selection were unable to predict the allocation of patients to treatment conditions. Analyses were considered adequate if all recruited patients were analyzed in the group to which they were originally allocated, regardless of the intervention received (intention-to-treat principle). The use of manuals was considered adequate if a manual was explicitly used by the therapists for treatment implementation. Diagnostic quality was considered high if patients were diagnosed either using standardized measures (e.g., standardized clinical interviews or according to the DSM-III-R/IV or ICD-9/10 criteria), self-rating instruments, or through physical examinations for male patients (e.g., nocturnal penile tumescence testing). Sample representativeness was considered high if studies reported less than two exclusion criteria being related to comorbidity (comorbid psychiatric Axis I disorders, drug or alcohol abuse/dependence, or somatic disorders). The respective criterion was regarded as not fulfilled if no information was provided.

All data were extracted in duplicate on a standardized computerized form (Epidata 3.1. (The Epidata Association, 2011)) by two investigators (H.S. and S.F.). Disagreements were resolved after review by two researchers (T.M. and J.B.), which concluded in one final coding based on mutual consent. All investigators were trained with a manual, which included operational descriptions of all relevant data, during a two-day training workshop (the manual is available from the corresponding author upon request).

Generation of Effect Sizes and Data Analysis

Between-group effect sizes (ES) were calculated by subtracting the post-treatment means of two intervention groups and dividing the difference by the pooled standard deviation (Cohen's d). The resulting effect size was then adjusted to obtain Hedge's g , an effect measure that corrects for biases due to small sample sizes (Hedges & Olkin, 1985). An effect

size of 0.20 indicates a small effect, 0.50 indicates a medium effect and 0.80 indicates a large effect size difference between groups (Cohen, 1988). If the reported data were insufficient for ES calculation, different approximation procedures were applied. For example, in three studies means were reported without standard deviations and were therefore imputed from validation studies or other studies using the same scale (Libman et al., 1991; ter Kuile, Brauer, & Laan, 2006; ter Kuile, van Lankveld, Kalkhoven, & van Egmond, 1999). When both mean scores and standard deviations were lacking, ES were calculated with the effect size determination program (Wilson, 2001), using the following routines: *t-test (Independent)* if t -values from independent t -tests were reported; Proportions (*Dichotomous*), *Arcsine Method* if dichotomous outcomes were reported; *One-way ANOVA ($k=2$)* if F -values with two degrees of freedom were reported; and, *t-test, p -value only* with $df=2$ if p -values stemming from independent t -tests or from ANOVAs or ANCOVAs with two degrees of freedom. For non-significant results with no reported p -values, p was set to .5 and the effect size was calculated again with the option *t-test, p -value only* with $df=2$. When t -values for dependent samples were reported, within-groups effect sizes were computed for each condition using the option *t-test (Dependent)* with $r=.5$ as correlation between pre and post-test. Between-group effect sizes were calculated by subtracting both within-group effect sizes. If Wilcoxon's Z was reported, the effect size was determined using the following formula $r = \frac{Z}{\sqrt{N}}$. For studies including couples, the couple was regarded as one subject for statistical analyses. If outcomes were reported separately for men and women, the scores were averaged.

We initially conducted a meta-analysis of all studies comparing any psychological intervention with a wait-list to estimate the effect of psychological interventions on symptom severity and sexual satisfaction for sexual dysfunction. Studies comparing psychological interventions in patients with an additional medication treatment were not considered here, since the variability of pharmacological agents was too large. To determine whether estimated treatment effects were affected by the type of sexual dysfunction or methodological quality we performed meta-analyses stratified by these characteristics. P -values for interaction between study characteristics and treatment effects were estimated. All statistical analyses were done with STATA 11 and 12 by the command *metan* and *metareg* (Harris et al., 2006). The reported summary statistics were calculated as random effects models based on the idea of heterogeneity between studies. Pooling was done according to the DerSimonian and Laird method (DerSimonian & Laird, 1986), using inverse variance of the primary studies as implemented in the command *metan* in STATA.

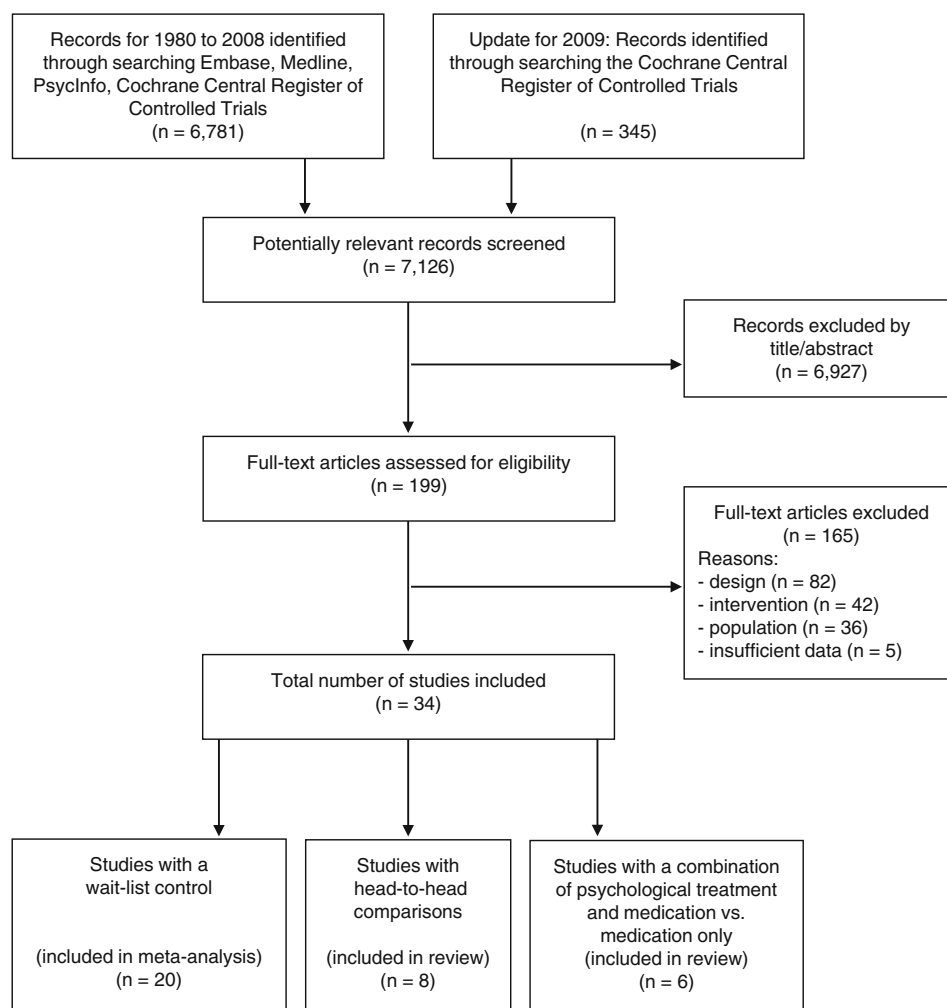
Heterogeneity between the studies was assessed by examining forest plots of studies and through I^2 statistics. The I^2 value, ranging from 0 to 100 %, indicates the magnitude of between-study heterogeneity. I^2 values of <25 % indicate low; 25 to

<50 %, moderate; and 50 to 75 %, high heterogeneity (Higgins, Thompson, Deeks, & Altman, 2003). The presence of a publication bias was examined using funnel plots and the Egger regression test (Egger, Smith, Schneider, & Minder, 1997).

Results

The literature search resulted in a total of 7,126 references (Fig. 1). Of these, 6,927 references were excluded on the basis of their titles and abstracts. The remaining 199 studies were retrieved for a detailed evaluation. A total of 34 studies met our inclusion criteria. Of the 34 studies, 20 compared a psychological intervention with wait-list, 8 studies compared specific psychological interventions head-to-head, and 6 studies compared a combination of psychological treatment and medication with medication only. Due to the large number of available psychological interventions (7) and the high number of sexual dysfunctions (8) the number of possible head-to-head comparisons was large, and the number of studies using the same head-to-head comparison in a specific dysfunction was low.

Fig. 1 PRISMA flow diagram, showing identification and selection process of eligible studies



Thus, meta-analytic pooling of comparisons of two psychological interventions or combined treatments with medication alone was not reasonable. Our meta-analysis included the 20 studies comparing psychological interventions to wait-list.

Description of Studies

Studies Included in the Meta-Analysis

Table 2 provides information on selected characteristics of the 20 studies included in the meta-analysis. In summary, these studies included 33 comparisons reporting on symptom severity and 32 comparisons reporting on sexual satisfaction. The total sample size was 1,041 patients, with a range from 16 to 199 patients per study. All these studies were published between 1981 and 2009. Of the total number of studies, 8 were carried out in the USA, 5 in The Netherlands, 4 in Canada, 2 in Australia, and 1 in Germany. All studies were published in English. The sexual dysfunctions of patients included in the studies were Female Orgasmic Disorder ($n = 6$), Erectile Dysfunction ($n = 4$), Female Hypoactive Sexual

Table 2 Study characteristics of the 20 wait-list-controlled studies included in the meta-analysis

Study	Sample	Intervention and setting	Dose	Outcome measures	Methodological quality
Andersen (1981), USA	N = 30; Age: 19 to 42; Female orgasmic disorder	Psychological interventions: Author's notation (our classification) Setting	Frequency and length of sessions Total number of sessions and duration of treatment: <i>M ± SD</i>	(1) Symptom severity (2) Sexual satisfaction	(1) Adequate generation of allocation sequence; (2) Adequate analysis; (3) Use of treatment manuals; (4) High diagnostic quality; (5) High sample representativeness
Price (1981), USA	N = 21; Age: 45.4 (25 to 61); Erectile dysfunction	(1) SD; group (2) Directed masturbation (SST); group Structured sex therapy men only (ST); group	(1) and (2) Two 90-min sessions per week; Total 5 weeks One 120-min session per week; Total 8 sessions	(1) SAI (2) SII (1) – (2) GSTS	(1) n.r.; (2) n.r.; (3) n.r.; (4) n.r.; (5) n.r. (1) n.r.; (2) n.r.; (3) yes; (4) n.r.; (5) yes
Obler (1982), USA	N = 26; Age: - Female orgasmic disorder	(1) Integrated psychoanalytic behaviour modification technique (OP); individual (2) Cotherapist couples treatment (ST); couple	(1) Three 50-min sessions per week; Total 42 weeks (2) Total 16 weeks	(1) Success/experience ratio (2) –	(1) n.r.; (2) n.r.; (3) n.r.; (4) n.r.; (5) yes
Everaerd (1982), The Netherlands	N = 42; Age: - Female orgasmic disorder	(1) SD; couple (2) Adapted version of the Masters and Johnson method (SST); couple (3) SD, followed Masters and Johnson method (SD); couple	(1)–(3) two 60-min sessions per week; total 12 sessions	(1) SES-3 (2) MATE	(1) n.r.; (2) n.r.; (3) yes; (4) n.r.; (5) yes
Munjack (1984), USA	N = 16; Age: 47.5 (19 to 63); Erectile dysfunction	Rational emotive therapy (OP)	Two sessions per week; total 12 sessions for 6 weeks	(1) Intercourse: attempts/success ratio (2) –	(1) n.r.; (2) yes; (3) n.r.; (4) n.r.; (5) no
Becker (1984), USA	N = 54; Age: 29.6 (19 to 54); Mixed female sexual dysfunctions	Behaviorally oriented sexual dysfunction treatment (SD); mixed setting	Ten 60-min sessions	(1) SAI (2) PRAT	(1) n.r.; (2) n.r.; (3) n.r.; (4) n.r.; (5) yes
Spence (1985), Australia	N = 49; Age: 31.7 (22 to 51); Female orgasmic disorder	(1) Behavioral procedure (ST); group (2) Behavioral procedure (ST); individual	(1) and (2) Eight 90-min sessions; Total 4 weeks	(1) SAI (2) DAS	(1) n.r.; (2) n.r.; (3) yes; (4) n.r.; (5) yes
Kilmann (1986), USA	N = 55; Age: 51.0 (31 to 67); Female orgasmic disorder	(1) Communication skills training (MT); group (2) SST; group (3) First communication skills then sexual skills (MT); group (4) First sexual skills, then communication skills (SST); group (5) Attention-placebo (EI); group	(1) to (5) Eight 120-min sessions; Total 2 months	(1) and (2) SII	(1) n.r.; (2) n.r.; (3) yes; (4) yes; (5) no

Table 2 continued

Study	Sample	Intervention and setting	Dose	Outcome measures	Methodological quality
First author (publication year) Country	Sample size (N analyzed) Age: $M \pm SD$ (range) Primary diagnosis	Psychological interventions: Author's notation (our classification) Setting	Frequency and length of sessions Total number of sessions and duration of treatment: $M \pm SD$	(1) Symptom severity (2) Sexual satisfaction	(1) Adequate generation of allocation sequence; (2) Adequate analysis; (3) Use of treatment manuals; (4) High diagnostic quality; (5) High sample representativeness
Zimmer (1987), Germany	$N = 28$; Age: 29.0; Mixed female sexual dysfunctions	(1) Combination of sex therapy and marital therapy (ST); couple (2) Combination of sex therapy and sex therapy placebo (ST); couple	(1) and (2) Total 21 sessions for 3 months	(1) SII-6 (2) SII-9	(1) n.r.; (2) n.r.; (3) yes; (4) n.r.; (5) no
Kilmann (1987), USA	$N = 20$; Age: 32.6 (31 to 67); Erectile dysfunction	(1) Communication technique training (MT); group (2) Sexual technique training (ST); group (3) First communication technique training then sexual technique training (ST); group (4) Attention placebo (EI); group	(1)–(4) Two 120-min sessions per week; total 8 sessions	(1) Coital success: success/experience ratio (2) SII	(1) yes; (2) n.r.; (3) yes; (4) n.r.; (5) no
Trudel (1988), Canada	$N = 17$; Age: 18 to 50; Female orgasmic disorder	Bibliotherapy (SST); self-help	One 10-min session per week; total 15 sessions for 15 weeks	(1) SAI (2) SII	(1) n.r.; (2) n.r.; (3) n.r.; (4) n.r.; (5) yes
Hurlbert (1993), USA	$N = 56$; Age: 29.6 (25 to 37); Hypoactive sexual desire disorder	(1) Orgasm consistency training (woman-only) (SST); group (2) Orgasm consistency training (couples-only) (STT); group	(1) and (2) One 60-min session per week; Total 10 sessions	(1) HISD (2) ISS	(1) n.r.; (2) n.r.; (3) yes; (4) yes; (5) no
MacPhee (1995), Canada	$N = 49$; Age: 41.5 \pm 8.4; Hypoactive sexual desire disorder	Emotionally focussed therapy for couples (MT); couple	One session per week; total 10 sessions	(1) SDTSP (2) DAS	(1) n.r.; (2) n.r.; (3) n.r.; (4) yes; (5) no
Ravart (1996)/Ravart (1996, 2001), Canada	$N = 71$; Age: 37.38; Hypoactive sexual desire disorder	Cognitive-behavioral treatment (CBT); group	One 120-min session per week; total 12 sessions	(1) SAI (2) –	(1) n.r.; (2) n.r.; (3) n.r.; (4) yes; (5) no
Stravynski (1997), Canada	$N = 70$; Age: 37.40 \pm 9.24; Mixed male sexual dysfunctions	(1) Interpersonal difficulties-oriented therapy (OP); group (2) Sexual dysfunction-oriented therapy (SST); group (3) Sexual dysfunction-oriented therapy + interpersonal difficulties-oriented therapy (SST); group	(1)–(3) One 90-min session per week; Total 15 sessions	(1) – (2) DSFI	(1) n.r.; (2) yes; (3) yes; (4) yes; (5) no

Table 2 continued

Study	Sample	Intervention and setting	Dose	Outcome measures	Methodological quality
First author (publication year) Country	Sample size (<i>N</i> analyzed) Age: <i>M</i> ± <i>SD</i> (range) Primary diagnosis	Psychological interventions: Author's notation (our classification) Setting	Frequency and length of sessions Total number of sessions and duration of treatment: <i>M</i> ± <i>SD</i>	(1) Symptom severity (2) Sexual satisfaction	(1) Adequate generation of allocation sequence; (2) Adequate analysis; (3) Use of treatment manuals; (4) High diagnostic quality; (5) High sample representativeness
van Lankveld (2001), The Netherlands	<i>N</i> = 199; Age: 37.5 ± 11.0; Mixed male and female sexual dysfunctions	Cognitive-behavioral bibliotherapy (ST); self-help	Total 10 weeks	(1) GRISS (2) MMQ	(1) yes; (2) n.r.; (3) yes; (4) yes; (5) no
van Lankveld (2006)/ter Kuile (2007), The Netherlands	<i>N</i> = 117; Age: 28.6 ± 6.9; Vaginismus	(1) Cognitive-behavioral group therapy (CBT); group (2) Cognitive-behavioral bibliotherapy (CBT); self-help	(1) 120-min sessions; total 10 sessions for 3 months (2) One biweekly 15-min session; total 6 sessions for 3 months	(1) PEQ (2) –	(1) yes; (2) no; (3) yes; (4) yes; (5) no
McCabe (2008), Australia	<i>N</i> = 31; Age: Erectile dysfunction	Internet-based psychological intervention "rekindle" (OP); self- help	Total 10 weeks	(1) IIEF (2) ISS	(1) n.r.; (2) n.r.; (3) yes; (4) n.r.; (5) no
van Lankveld (2009), The Netherlands	<i>N</i> = 37; Age: 45.5; Premature ejaculation	Internet-based brief sex therapy (ST); self-help	Total 3 months	(1) GRISS (2) IIEF	(1) n.r.; (2) n.r.; (3) n.r.; (4) n.r.; (5) no
van Lankveld (2009), The Netherlands	<i>N</i> = 53; Age: 45.5 ± 13.0; Erectile dysfunction	Internet-based brief sex therapy (ST); self-help	Total 3 months	(1) IIEF (2) IIEF	(1) n.r.; (2) n.r.; (3) n.r.; (4) n.r.; (5) no

Measures: *BSFI* Brief Sexual Function Inventory, *CIPE-5* Chinese Index of Sexual Function for Premature Ejaculation, *DAS* Dyadic Adjustment Scale, *DSFI* Derogatis Sexual Functioning Inventory, *GRISS* Golombok Rust Inventory of Sexual Satisfaction, *GSTS* Goals for Sex Therapy Scale for Males, *HISD* Hurlbert Index of Sexual Desire, *IIEF* International Index of Erectile Function, *ISS* Index of Sexual Satisfaction, *MATE* Marital Attitude Evaluation Scale, *MMQ* Maudsley Marital Questionnaire PEQ: Primary Endpoint Questionnaire, *PRAT* Partner Relationship Adjustment Test, *SAI* Arousalability Inventory, *SDTPSS* Sexual Desire Towards Partner Scale, *SES-3* Sexual Experience Scale, *SHF* Sexual History Form, *SHI* Sexual Interaction Inventory, *SIQ* Sexual Interest Questionnaire, *SIQQ* Sexual Life Quality Questionnaire, *SMAR* Self-rating scale of General Sexual/Marital Satisfaction, *Interventions*: *CBT* Cognitive-behavioral therapy, *EI* Educational intervention, *MT* Marital therapy, *OP* Other psychotherapy, *SD* Systematic desensitization, *SS7* Sexual skills training, *ST* Sex therapy (see Table 1), *Others* *M* mean, *SD* standard deviation, *n.r.* not reported

Table 3 Study characteristics of the 14 studies with direct ("head-to-head") comparisons of active interventions

Study	Sample	Intervention and setting	Dose	Outcome measures	Methodological quality	Effect size ^a
First author (publication year) Country	Sample size (N analyzed) Age: $M \pm SD$ (range) Primary diagnosis	Psychological interventions: Author's notation (our classification) Setting	Frequency and length of sessions Total number of sessions and duration of treatment: $M \pm SD$	(1) Symptom severity (2) Sexual satisfaction	(1) Adequate generation of allocation sequence; (2) Adequate analysis; (3) Use of treatment manuals; (4) High diagnostic quality; (5) High sample representativeness	Comparison (1) Symptom severity (2) Sexual satisfaction <i>d</i> (95 % CI)
Everaerd (1981), The Netherlands	N=42; Age: Female orgasmic disorder	(1) Communication therapy (MT); couple (2) Sex therapy (ST); couple	(1) Two 60-min sessions per week; total 16.8 \pm 7.6 sessions (2) Two 60-min sessions per week; total 15.1 \pm 5.8 sessions	(1) SES-3 (2) MATE	(1) n.r.; (2) n.r.; (3) yes; (4) n.r.; (5) no	Communication therapy versus Sex therapy (1) -0.53 (-1.15 to 0.09) (2) 0.33 (-0.28 to 0.94)
Dodge (1982), USA	N= 13; Age: - Female orgasmic disorder	(1) Directed masturbation (SST); self-help (2) 40 pages text on human sexuality (EI)	(1) and (2) 30-min sessions; total 3 sessions for 7 weeks	(1) SII-6 (2) SII-9	(1) n.r.; (2) n.r.; (3) n.r.; (4) n.r.; (5) no	Directed masturbation versus text (1) 2.29 (0.89 to 3.69) (2) 1.14 (-0.04 to 2.31)
Hartman (1983), Canada	N= 12; Age: 34.9 (26 to 46); Mixed sexual dysfunctions	(1) Directive sex therapy (ST); group (2) Behavioral MT; group	(1) and (2) One 90-min session per week; Total 5 sessions	(1) - (2) SII-6	(1) n.r.; (2) n.r.; (3) n.r.; (4) n.r.; (5) no	Sex therapy versus Marital therapy (1) - (2) 14.02 (8.30 to 19.75)
Hurlbert (1993), USA	N= 39; Age: 31.3 \pm 5 (28 to 38); Hypoactive sexual desire disorder	(1) Standard treatment clinic model (CBT); couple (2) Orgasm consistency training and standard treatment clinic model (CBT); couple	(1) Total 8 sessions (2) 120-min sessions; total 8.3 sessions	(1) HISD (2) ISS	(1) n.r.; (2) n.r.; (3) n.r.; (4) yes; (5) no	Standard treatment clinic model versus Orgasm consistency training and standard treatment model (1) -0.69 (-1.41 to 0.02) (2) 0.79 (0.07 to 1.51)
Schnyder (1998), Switzerland	N= 44; Age: 28 (19 to 55); Vaginismus	(1) Desensitization in vivo (SD); individual (2) Desensitization in vitro (SD); individual	(1) and (2) One biweekly session; total 6 \pm 3.6 sessions	(1) Number of patients able to have intercourse without pain (2) -	(1) no; (2) n.r.; (3) n.r.; (4) yes; (5) yes	Desensitization in vivo versus Desensitization in vitro (1) 0 (-0.60 to 0.60) (2) -
Banner (2001), USA	N= 50; Age: 56.83 (31 to 73); Erectile dysfunction	(1) Sildenafil (2) Integrative treatment protocol (sex therapy and sildenafil) (ST); couple	One session per week; Total 4 weeks	(1) IIEF-1 (2) IIEF-5	(1) n.r.; (2) n.r.; (3) yes; (4) n.r.; (5) no	Sildenafil versus Integrative treatment protocol: (1) -0.14 (-0.68 to 0.40) (2) -0.56 (-1.11 to -0.01)
Bergeron (2001), Canada	N= 56; Age: 26.8 \pm 5.4 (18 to 50); Dyspareunia	(1) Electromyographic biofeedback (OP); individual (2) CBT; group	(1) 45-min sessions, (2) 120-min sessions; total 12 weeks	(1) Pain intensity during intercourse (2) SHF	(1) n.r.; (2) n.r.; (3) yes; (4) yes; (5) no	Electromyographic biofeedback versus CBT (1) 0.25 (-0.28 to 0.78) (2) 0.19 (-0.33 to 0.72)
Al-Sughayir (2005), Saudi Arabia	N= 31; Age: 23 \pm 6.8 (17 to 40); Vaginismus	(1) Hypnotherapy (OP); individual (2) Behavioral therapy (ST); couple	(1) and (2) One 45- to 60-min session per week	(1) - (2) BSFI	(1) no; (2) n.r.; (3) n.r.; (4) yes; (5) no	Hypnotherapy versus behavioral therapy: (1) - (2) 1.24 (0.47 to 2.01)

Desire Disorder ($n = 3$), Mixed Female Sexual Dysfunctions ($n = 2$), Vaginismus, Premature Ejaculation, mixed male sexual dysfunctions, and mixed male and female sexual dysfunctions ($n = 1$, respectively). The age of the patients ranged from 19 to 67 years. According to our classification of psychological interventions, sexual skills training was implemented in 11 treatment conditions, sex therapy in 9 treatment conditions, systematic desensitization and marital therapy in 4 treatment conditions, cognitive-behavioral therapy in 3 treatment conditions, educational interventions in 2 treatment conditions, and other kinds of psychological interventions in 4 treatment conditions. Interventions were either conducted in a group setting ($n = 17$), in a couple setting ($n = 7$), in a self-help setting ($n = 6$), or in an individual setting ($n = 3$). Regarding methodological quality, eleven studies reported the use of treatment manuals in treatment implementation. Diagnostic quality was high in 7 studies and 6 studies had high sample representativeness. Adequate generation of allocation sequence was reported in 3 studies, and analyses according to an intention-to-treat principle were reported in 2 studies. None of the studies reported high quality regarding all five quality indicators. However, two studies reported high quality regarding the two quality indicators that provide a higher level of internal validity of the study (adequate generation of allocation sequence and adequate analyses).

Studies Included in the Systematic Review

Table 3 provides information about 14 studies without a wait-list, which were included in the systematic review only. In summary, these studies included 12 comparisons reporting on symptom severity and 12 comparisons reporting on sexual satisfaction. The sample size ranged from 12 to 248 patients per study. The studies

were published between 1981 and 2009. Four of the studies were carried out in China, 4 in the USA, 3 in Canada, and 1 each in The Netherlands, Saudi Arabia, and Switzerland. Ten of the studies were published in English and 4 in Chinese. The sexual dysfunctions of patients included Premature Ejaculation ($n = 4$), Erectile Dysfunction ($n = 2$), Female Orgasmic Disorder ($n = 2$), Dyspareunia, Female Hypoactive Sexual Desire Disorder, mixed male and female sexual dysfunctions, mixed male sexual dysfunctions, and vaginismus ($n = 1$, respectively). The age of the patients ranged from 17 to 73 years. A combination of psychological treatment and medication was used in 6 treatment conditions, medication alone in 6 treatment conditions, cognitive-behavioral therapy, sexual skills training and sex therapy each in 3 treatment conditions, marital therapy, other psychotherapy and systematic desensitization each in 2 treatment conditions, and an educational intervention in 1 treatment condition. Of the psychological interventions, 10 were conducted in a couple setting, 4 each in a group setting and in an individual setting, and 1 in a self-help setting. Regarding methodological quality, diagnostic quality was high in 6 studies. Five studies reported analyses according to an intention-to-treat principle. Sample representativeness was high in 4 studies. No study reported the use of treatment manuals in treatment implementation or adequate generation of allocation sequence. None of the studies reported high quality regarding at least the two quality indicators that provide a higher level of internal validity of the study (adequate generation of allocation sequence and adequate analyses).

Overall Efficacy of Psychological Interventions

Psychological interventions were superior to wait-list in improving symptom severity with a significant effect size of 0.58 (95 % CI: 0.40 to 0.77; $n = 33$). Between-study heterogeneity was low

Table 4 Results from meta-analyses of 20 studies comparing psychological interventions with wait-list stratified by the type of sexual dysfunction

	<i>n</i>	<i>d</i>	95 % CI	<i>p</i>	<i>I</i> ² (%)
<i>Symptom severity</i>					
Erectile dysfunction	7	0.53	−0.08 to 1.14	.078	0.00
Female hypoactive sexual desire disorder	4	0.91	0.38 to 1.45	.012	0.00
Female orgasmic disorder	15	0.46	0.07 to 0.86	.024	0.00
Mixed sexual dysfunctions	4	0.37	−0.06 to 0.82	.072	19.22
Premature ejaculation	1	0.08	−0.57 to 0.73	–	–
Vaginismus	2	0.86	0.39 to 1.33	.174	0.00
<i>Sexual satisfaction</i>					
Erectile dysfunction	7	0.38	−0.17 to 0.94	.143	0.00
Female hypoactive sexual desire disorder	4	0.51	−0.18 to 1.20	.100	33.73
Female orgasmic disorder	13	0.46	0.02 to 0.90	.042	0.00
Mixed sexual dysfunctions	7	0.66	0.04 to 1.28	.041	49.95
Premature ejaculation	1	0.66	−0.01 to 1.33	–	–
Vaginismus	0	–	–	–	–

n number of comparisons, *d* standardized mean difference, *CI* confidence interval, *p* level of significance of effect size from stratified meta-analyses, *I*² variability between studies

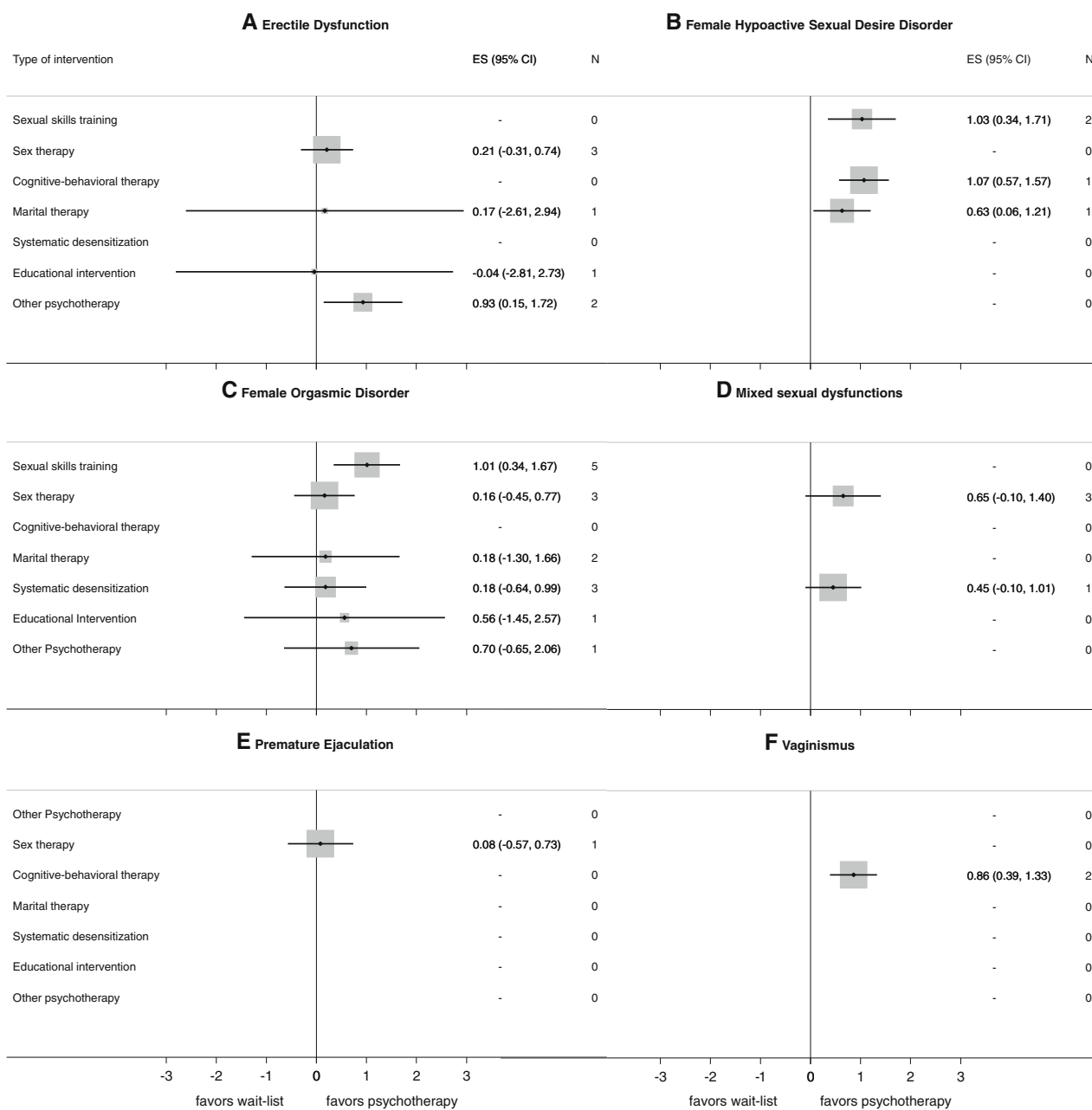


Fig. 2 Efficacy of psychological interventions on symptom severity: Results of meta-analyses stratified according to different types of sexual dysfunction. *N* refers to number of comparisons included in the meta-analyses, *ES* pooled standardized mean difference, *CI* confidence interval

($I^2 = 0.0\%$). Psychological interventions were also superior to wait-list in improving sexual satisfaction with a significant effect size of 0.47 (95% CI: 0.27 to 0.68; $n = 32$). Again between-study heterogeneity was low ($I^2 = 0.7\%$).

Efficacy of Psychological Interventions According to the Type of Sexual Dysfunction

We performed stratified analyses for different sexual dysfunctions in order to investigate whether the evidence differs

for different types of sexual dysfunction. Table 4 shows results for reductions in symptom severity and improvement of sexual satisfaction from these analyses. Psychological interventions have large effects on symptom severity in women with Hypoactive Sexual Desire Disorder ($d = 0.91$; 95% CI: 0.38 to 1.45; $p = .012$; $n = 4$; $I^2 = 0.0\%$) and medium effects in women with Orgasmic Disorder ($d = 0.46$; 95% CI: 0.07 to 0.86; $p = .024$; $n = 15$; $I^2 = 0.0\%$). No evidence was found for the efficacy of psychological interventions on symptom severity in patients suffering from Erectile Dysfunction, Mixed Sexual

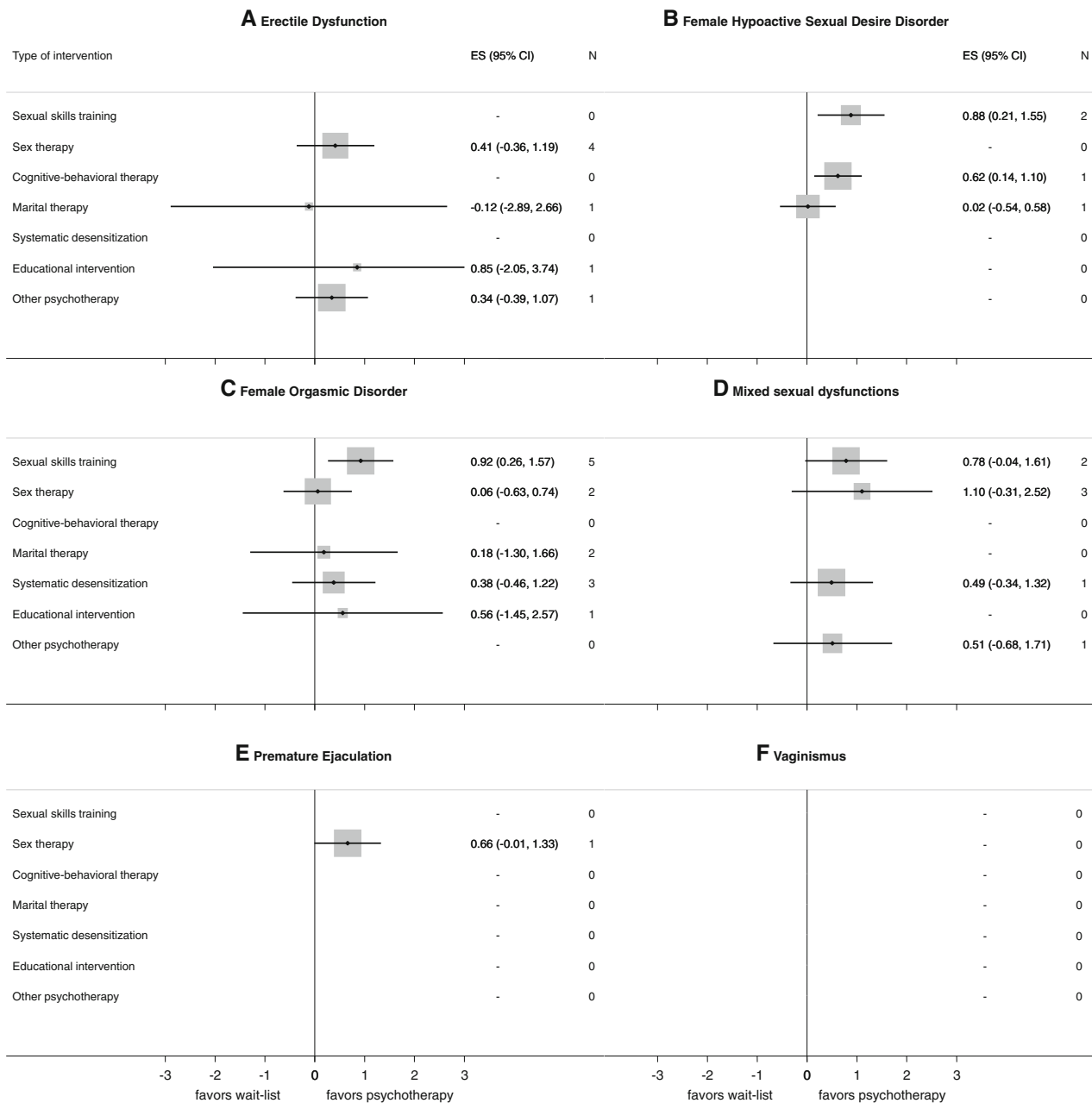


Fig. 3 Efficacy of psychological interventions on sexual satisfaction: Results of meta-analyses stratified according to different types of sexual dysfunction. *N* refers to number of comparisons included in the meta-analyses, *ES* pooled standardized mean difference, *CI* confidence interval

Dysfunctions, Premature Ejaculation, or Vaginismus. The two latter results are based on one study each. Regarding sexual satisfaction psychological interventions have medium effects in women with Orgasmic Disorder ($d = 0.46$; 95 % CI: 0.02 to 0.90; $p = .042$; $n = 13$; $I^2 = 0.0\%$) and medium effects in patients with mixed sexual dysfunctions ($d = 0.66$; 95 % CI: 0.04 to 1.28; $p = .041$; $n = 7$; $I^2 = 49.95\%$). Studies showed no statistically significant evidence that psychological interventions are

effective in improving sexual satisfaction of patients with Erectile Dysfunction, Premature Ejaculation, or Female Hypoactive Sexual Desire Disorder. At the time of this review, no study investigated the effect of psychological interventions on sexual satisfaction in patients with vaginismus.

Figures 2 and 3 show results of the specific psychological interventions compared with wait-list for each single sexual dysfunction.

Table 5 Results from meta-analyses of 20 studies comparing psychological interventions with wait-list stratified by methodological quality

	<i>n</i>	<i>d</i>	95 % CI	<i>p</i>	<i>t</i>	<i>p</i> for interaction
Symptom severity						
Adequate generation of allocation sequence						
Yes	7	0.54	0.05 to 1.03	.035	−0.38	.707
No/unclear	26	0.61	0.39 to 0.82	<.001		
Adequate analyses						
Yes	3	0.58	−0.39 to 1.57	.124	−0.23	.818
No/unclear	30	0.60	0.39 to 0.81	<.001		
Adequate use of treatment manuals						
Yes	22	0.53	0.29 to 0.77	<.001	−0.38	.710
No/unclear	11	0.63	0.29 to 0.98	.002		
High diagnostic quality						
Yes	12	0.69	0.39 to 1.00	<.001	1.06	.298
No/unclear	21	0.46	0.22 to 0.70	.001		
High sample representativeness						
Yes	21	0.55	0.29 to 0.82	<.001	−0.33	.742
No/unclear	12	0.64	0.33 to 0.95	.001		
Sexual satisfaction						
Adequate generation of allocation sequence						
Yes	5	0.09	−0.30 to 0.48	.557	−2.30	.028
No/unclear	27	0.54	0.33 to 0.74	<.001		
Adequate analyses						
Yes	1	0.10	−0.34 to 0.77	–	−2.12	.043
No/unclear	31	0.52	0.33 to 0.72	<.001		
Adequate use of treatment manuals						
Yes	23	0.46	0.17 to 0.75	.003	−0.31	.758
No/unclear	9	0.50	0.18 to 0.81	.007		
High diagnostic quality						
Yes	13	0.40	0.09 to 0.70	.015	−0.79	.437
No/unclear	19	0.54	0.26 to 0.83	.001		
High sample representativeness						
Yes	22	0.39	0.11 to 0.66	.008	−0.82	.417
No/unclear	10	0.62	0.24 to 1.00	.005		

n number of comparisons, *d* standardized mean difference, *CI* confidence interval, *p* level of significance of effect size from stratified meta-analyses, *p* for interaction: level of significance from meta-regression

Efficacy of Psychological Interventions in Different Treatment Settings

We performed analyses stratified for different treatment settings in order to investigate whether intervention effects depended on the setting in which interventions were implemented. Results showed that psychological interventions are superior to wait-list in improving symptom severity if conducted in a couple setting ($d = 0.62$; 95 % CI: 0.11 to 1.14; $p = .025$; $n = 7$; $I^2 = 0.0\%$), a group setting ($d = 0.81$; 95 % CI: 0.50 to 1.12; $p < .001$; $n = 16$; $I^2 = 0.0\%$), or in a self-help setting ($d = 0.37$; 95 % CI: 0.03 to 0.72; $p = .040$; $n = 6$; $I^2 = 38.57\%$). Limited evidence was found for psychological interventions being superior to wait-list if conducted in an individual

setting ($d = 0.32$; 95 % CI: −4.73 to 5.37; $p > .05$; $n = 2$; $I^2 = 0.0\%$). Regarding improvements in sexual satisfaction, psychological interventions were superior to wait-list only if conducted in a group setting ($d = 0.68$; 95 % CI: 0.40 to 0.97; $p < .001$; $n = 19$; $I^2 = 0.0\%$), but not if conducted in a couple or self-help setting (all $p > .05$). No studies investigated the effect of psychological interventions on sexual satisfaction in an individual setting.

Efficacy of Psychological Interventions According to Methodological Quality

Table 5 presents results of analyses stratified according to six predefined methodological quality indicators. Estimates varied

to some extent on the indicators of methodological quality, but tests for interaction were all non-significant for symptom severity (all p for interaction $>.05$). For sexual satisfaction, however, treatment benefits were significantly lower in studies with adequate generation of allocation sequence and adequate analyses (p for interaction = .028 and .043 respectively). The funnel plot with symptom severity as outcome showed close to symmetrical results, and the results of the Egger test for publication bias were not significant ($p >.05$). For sexual satisfaction the funnel plot indicated a trend for asymmetry suggesting larger treatment effects in smaller studies, but the regression test was not statistically significant ($p >.05$; see Fig. 4, Appendix).

Results of Studies Included in the Systematic Review

The effect sizes of studies with head-to-head comparisons of different active interventions as well as comparisons of a combination of psychological treatment with medication and medication only can be found in Table 4. Regarding symptom severity, two forms of sexual skills training were found to be equally effective treatments for Premature Ejaculation ($d = -0.02$). Combinations of psychological treatment and medication were more effective than medication alone ($d = 0.53$ to 1.94). For Erectile Dysfunction, one study found a combination of psychological treatment with medication to be more effective than medication alone ($d = 0.14$), whereas another study found the opposite effect ($d = -0.20$). For Female Orgasmic Disorder, one study found sex therapy to be more effective than marital therapy ($d = -0.53$) and one study found sexual skills training to be superior to an educational intervention ($d = 2.29$). For female hypoactive sexual desire disorder, a combination of cognitive-behavioral therapy and sexual skills training was superior to a standard cognitive-behavioral therapy ($d = 0.69$). One study found systematic desensitization “in vivo” to be equally effective as systematic desensitization “in vitro” for women with vaginismus ($d = 0$). For dyspareunia, electromyographic biofeedback was found to be superior to cognitive-behavioral therapy ($d = 0.25$). In a sample of men with mixed sexual dysfunctions, a combination of psychological treatment and medication was superior to medication alone ($d = 0.69$).

Regarding sexual satisfaction, the effect was higher in one form of sexual skills training than another in a sample of men with premature ejaculation ($d = 0.17$). Combinations of psychological treatment with medication were more effective than medication alone ($d = 0.15$ to 1.11). For Erectile Dysfunction, combinations of psychological treatment with medication were equally or more effective than medication alone ($d = 0$ to 0.56). For female orgasmic disorder, marital therapy was superior to sex therapy ($d = 0.33$) and sexual skills training was superior to an educational intervention ($d = 1.14$). For female hypoactive sexual desire disorder, a standard cognitive-behavioral therapy was superior to a

combination of cbt and Sexual skills training ($d = 0.79$). For Vaginismus, sex therapy was more effective than hypnotherapy ($d = 1.24$). For Dyspareunia, electromyographic biofeedback was found to be superior to cognitive-behavioral therapy ($d = 0.19$). For mixed male and female sexual dysfunctions, marital therapy was more effective than sex therapy ($d = 14.02$). In a sample of men with mixed sexual dysfunctions, a combination of psychological treatment and medication was superior to medication alone ($d = 0.69$).

Discussion

This meta-analysis found evidence that psychological interventions are effective in improving both symptom severity and sexual satisfaction in patients with certain types of sexual dysfunction (i.e., Female Orgasmic Disorder and Female Hypoactive Sexual Desire Disorder). However, no clear evidence from RCTs was found for other sexual dysfunctions, namely, Erectile Dysfunction, Premature Ejaculation, Vaginismus, and mixed sexual dysfunctions. The studies included in our meta-analysis varied considerably in their methodological quality, outcome measures, and quality of reporting. Low methodological quality may lead to an overestimation of the efficacy of psychological interventions (Cuijpers, van Straten, Bohlmeijer, Hollon, & Andersson, 2010). This was the case for sexual satisfaction in the present meta-analysis, but not for symptom severity. However, finding inconsistent associations between methodological quality and outcome may be due to the overall low study quality with only two of the included studies fulfilling at least the two indicators of high internal validity of the study (adequate analyses and adequate generation of allocation sequence).

The majority of the included studies were published in the 1980s, and there was a decline in publications between 1990 and 1999. After 2000, a new increase in publications of treatment studies was observed. Female Orgasmic Disorder, Erectile Dysfunction, Female Hypoactive Sexual Desire Disorder, and Premature Ejaculation were the sexual dysfunctions most often studied. Few studies dealt with Vaginismus and Dyspareunia. Male Hypoactive Sexual Desire Disorder, Sexual Aversion Disorder, Female Sexual Arousal Disorder, Male Dyspareunia, and Male Orgasmic Disorder were never investigated. Sex therapy and sexual skills training were the most frequently studied interventions over the years. The lack of treatment efficacy studies for particular types of sexual dysfunction and the pronounced use of particular intervention strategies (e.g., sex therapy) have already been reported earlier in other reviews (Heiman & Meston, 1997; McGuire & Hawton, 2003; O’Donohue, Swingen, Dopke, & Regev, 1999) and according to our results the situation has not changed much.

The evidence for the efficacy of psychological interventions differed across the target sexual dysfunctions. Significant

effects on symptom severity were found for patients with Female Hypoactive Sexual Desire Disorder and Female Orgasmic Disorder. For all other sexual dysfunctions, no statistically significant effect was shown. These findings are mostly in line with the results of Heiman and Meston (1997), who also concluded that “well-established” treatments existed for lifelong Female Orgasmic Disorder. The present study additionally showed that well-established psychological interventions exist for Female Hypoactive Sexual Desire Disorder. In contrast with the study by Heiman and Meston (1997), we did not find evidence for well-established treatments for Erectile Dysfunction. However, different inclusion criteria may explain the diverging results: Heiman and Meston included single-case and uncontrolled studies in their narrative review whereas we meta-analyzed only RCTs.

Non-significant treatment effects of psychological interventions for particular types of sexual dysfunction in the presented meta-analyses must be interpreted with caution. Low numbers of studies and small sample sizes lead to increased uncertainty and reduce the power to detect even moderate to large treatment effects (e.g., symptom severity in Vaginismus with $d = 0.86$, 95 % CI: -2.19 to 3.90 and sexual satisfaction in Female Hypoactive Sexual Desire disorder with $d = 0.50$, 95 % CI: -0.94 to 1.93).

Strengths and Limitations

This study had several strengths. A comprehensive literature search with no restrictions regarding language and culture made it unlikely that we missed relevant studies; using double extraction ensured data quality; and the analyses of potential clinical and methodological moderators enabled us to identify effect modifiers. This study is the first comprehensive synopsis of outcome studies in sexual dysfunction treatment research since the publication of Heiman and Meston’s (1997) review and thus provides an overview of the current research landscape. However, some limitations of our study must be considered. Firstly, our meta-analysis included only studies that compared a psychological intervention against wait-list. We decided not to conduct a meta-analysis including studies comparing two different psychological interventions against each other, as the number of available studies comparing the same intervention in one specific dysfunction was too small. Thus, the comparative efficacy of different psychological interventions could not be examined in the present study. However, we have given a review of the comparative studies available. Secondly, the present meta-analysis was limited to post-treatment effects. Due to limited data reported in the primary studies included in our meta-analysis, the long-term effects of psychological interventions on sexual dysfunction were not investigated. Thirdly, the included studies had rather low methodological quality, which limits definite conclusions about treatment efficacy. Finally, the generalizability of our res-

ults may be limited. On the one hand, participants of the RCTs included in our review and meta-analysis do not necessarily represent a clinical population. We did not require the primary studies to have adhered to DSM- or ICD-criteria during study inclusion, rather patients’ self-report of the particular symptoms was sufficient for study inclusion. However, our meta-regression including diagnostic quality as a predictor of effect size did not reveal significant differences between the effects of studies that adhered to diagnostic criteria during study inclusion and studies that did not do so. On the other hand, the generalization of our results to populations outside North America, Australia, and Europe might be limited, since no studies from other countries were eligible. Our findings might also not generalize to clinical populations with primarily somatic problems, which can be associated with sexual dysfunction (e.g., diabetes, vulvodynia), as these were not included in our meta-analysis. Finally, generalization of our conclusions to more recent research may be limited, as we did not include studies published after 2009.

Recommendations for Future Research

Future research should establish effective psychological interventions for sexual dysfunctions given that this field is characterized by an overall lack of randomized controlled studies. In order to avoid therapeutic malpractice, the publication of negative results of specific interventions would also be helpful. In the case of sexual dysfunctions with established psychological interventions (i.e., Female Hypoactive Sexual Desire Disorder and Female Orgasmic Disorder), future studies should investigate the comparative efficacy of different types of psychological interventions head-to-head. Varying the type of intervention may help to identify more effective and more efficient interventions (i.e., in length, content) as well as elaborate the specific ingredients needed for success (i.e., one goal could be to make treatments more accessible to patients). It is important that future studies adhere to established methodological standards since the methodological quality of most studies was low. The small sample size in many studies limits the power to detect a significant intervention effect, and may lead to a misclassification of interventions as being ineffective. Future studies should thoroughly estimate the expected intervention effect and adjust the necessary sample size accordingly. In addition, a more detailed description of the sample and implemented intervention is necessary in order to facilitate the dissemination of knowledge of psychological interventions into clinical practice.

Clinical Implications

Psychological interventions can be recommended as effective treatment options for particular types of sexual dysfunction. They have been shown to improve both symptom severity and sexual satisfaction compared to wait-list control. The treatment setting had a differential effect on the intervention outcome:

treatment implemented in a group setting led to an improvement in both symptom severity and sexual satisfaction. A couple or self-help setting led to an improvement in symptom severity, but not in sexual satisfaction, which is contrary to other study results (Kröger, 2007). From a clinical perspective, interventions in a group setting might be the treatment of choice, since this setting has been shown to be effective and cost-effectiveness might be better, compared to other settings.

Conclusion

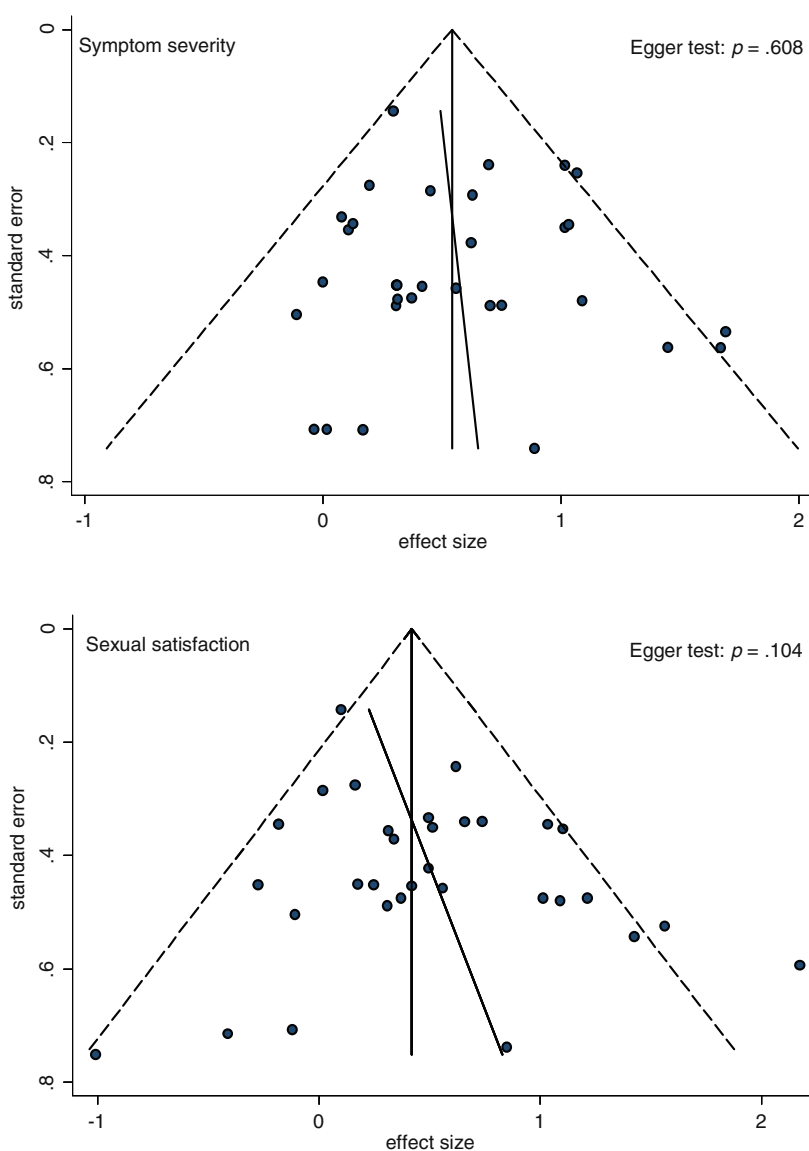
To date, there is evidence that psychological interventions are effective in the treatment of sexual dysfunction. Yet, there are

still many gaps in research that need to be filled, concerning topics such as the efficacy of specific interventions for specific sexual dysfunctions, the comparative efficacy of different interventions, and the underpinning of the effects by methodologically sound studies with larger sample sizes.

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Appendix

Fig. 4 Funnel plots of symptom severity and sexual satisfaction from studies of psychological interventions for sexual dysfunction



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