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Relationship Satisfaction as a Predictor of Treatment Response During Cognitive Behavioral Sex Therapy

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Abstract Although recent research suggests that individual cognitive behavioral therapy (CBT) may be an effective treatment for female sexual dysfunctions, we have little information regarding predictors of treatment response. The goal of the current study was to assess the degree to which pre-treatment relationship satisfaction predicted treatment response to cognitive behavioral sex therapy. Women with sexual dysfunction ($n = 31$, M age = 28 years, 77.4 % Caucasian) receiving cognitive-behavioral sex therapy with or without ginkgo biloba, as part of a wider randomized clinical trial, were assessed pre- and post-treatment using validated self-report measures of sexual satisfaction, sexual distress, sexual functioning, and relationship satisfaction. Pre-treatment relationship satisfaction predicted changes in sexual satisfaction and distress, but not sexual functioning. Women with higher relationship satisfaction at intake experienced larger gains in sexual satisfaction and distress over the course of treatment. Pre-treatment relationship satisfaction also moderated the association between changes in sexual functioning and changes in sexual distress, such that improved functioning was associated with decreased distress only for women entering therapy with high relationship satisfaction. These findings suggest that, for women with low relationship satisfaction before entering treatment, improvement in sexual functioning may not be enough to alleviate their sexual distress.

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Introduction

Approximately 58 % of women report impaired sexual functioning in one or more aspects of the sexual response cycle (i.e., sexual desire, arousal, and orgasm) in the past year (Hayes, Dennerstein, Bennet, & Fairley, 2008a). About one-third of these cases constitute diagnosable cases of sexual dysfunction, referred to here as Female Sexual Dysfunction (FSD) (Bancroft, Loftus, & Long, 2003). FSD often has devastating effects on personal and relationship well-being (e.g., conflict with partners, relationship dissolution) (Leiblum, 2007) and, thus, there is a pressing need to develop effective treatments and valid models of treatment response for these disorders.

One of the most promising methods of treatment, and one that has received some empirical support, is cognitive-behavioral therapy (CBT). CBT for impaired sexual desire, arousal, and orgasm is generally aimed at influencing maintaining factors of sexual dysfunction as outlined by Masters and Johnson's pioneering work on "spectatoring" (Masters & Johnson, 1970) and Barlow's (1986) model of sexual dysfunction. Both models focus on the importance of attention in either facilitating or hampering levels of sexual arousal (and, potentially, orgasm and desire). Specifically, focusing on positively-valenced sexual stimuli such as pleasurable physical sensations is thought to enhance arousal whereas focusing on non-sexual stimuli such as body-image or performance concerns is thought to impair sexual arousal. Additionally, high levels of anxiety are thought to impair sexual functioning, both by distracting attention away from positive sexual cues and, in some cases, by leading to defensive safety behaviors such as avoidance of sexual activity. Given these theorized maintaining

factors, the goals of CBT for female desire, arousal, and orgasm difficulties are to help the individual refocus her attention on pleasurable sexual stimuli and to reduce levels of anxiety surrounding sexual activity through a combination of sensate focus exercises, exposure work, and cognitive restructuring (Stinson, 2009).

Research has suggested that CBT can be effective in treating a wide range of female sexual dysfunctions including hypoactive sexual desire disorder (Hurlbert, 1993; Trudel et al., 2001), female sexual arousal disorder (McCabe, 2001), and female orgasmic disorder (Heiman & LoPiccolo, 1983). While published treatment outcome studies are generally limited by lack of control groups, recent studies have suggested that short-term CBT is superior to waitlist control (Jones & McCabe, 2011), and that related treatments such as mindfulness training are also potentially helpful (Brotto, Seal, & Rellini, 2012). Although even these more recent studies are limited by small sample sizes, we have some idea as to the rate of treatment efficacy of cognitive behavioral sex therapy. In some cases (e.g., primary anorgasmia or lifelong lack of orgasm), relatively high success rates of 85 % have been reported (McMullen & Rosen, 1979; Riley & Riley, 1978). However in the case of the most common sexual dysfunctions, hypoactive sexual desire disorder and female sexual arousal disorder, success rates are more modest, ranging from 40 to 60 % (e.g., McCabe, 2001; Stinson, 2009; Trudel et al., 2001).

Greater knowledge of predictors of treatment response could help therapists to predict which women will benefit most from CBT and, potentially, other psychotherapeutic interventions (Heiman, 2002). One early study using a form of Masters and Johnson's therapeutic techniques found that treatment response to couples sex therapy was poorer when the quality of the overall relationship was low at pre-treatment, when the male partner expressed low motivation at pre-treatment, and when the couple showed little engagement with homework assignments early in therapy (Hawton & Catalan, 1986). Unfortunately, these initial findings are limited by a number of factors including the (necessary) use an early form of sex therapy which has since been expanded, the fact that a significant portion of the treatment providers had non-psychology training backgrounds (including general medical practitioners and gynecologists), and that couples experiencing "severe marital problems" were excluded, reducing the range of relational variables. Additionally, these findings have generally not been replicated in a small number of more recent studies (Hawton, Catalan, & Fagg, 1991; ter Kuile et al., 2007, but see van Lankveld, Everaerd, & Grotjohann, 2001). The paucity of research on prognostic factors for cognitive behavioral sex therapy limits our ability to formulate comprehensive treatment models, plan targeted clinical trials, and engage in effective treatment matching. The current data analyses begin to address this gap in the literature by examining a potential predictor of treatment response to modern, individual-focused, cognitive-behavioral sex therapy: relationship satisfaction.

When referring to "treatment response" in sex therapy, researchers must take into account the various targets of CBT for sexual desire, arousal, and orgasm difficulties: (1) to improve sexual functioning, (2) to increase sexual satisfaction, and (3) to reduce or eliminate sexual distress. Although past research has often focused on sexual functioning alone (Laumann, Paik, & Rosen, 1999), or used these three terms interchangeably (e.g., Snyder & Berg, 1983), an accumulation of recent evidence has highlighted the distinction between all three factors (Ferenidou et al., 2008; Stephenson & Meston, 2010b). Female sexual functioning (Rosen et al., 2000) is generally understood to include multiple components including a woman's level of sexual desire, her sexual arousal (both subjective and physiological), ease of reaching orgasm, and, in some instances, the presence or absence of pain during or following sexual activity (although there is controversy surrounding the inclusion of sexual pain under this umbrella term, Binik, Meana, Berkley, & Khalife, 1999). Alternatively, sexual satisfaction has been defined as the individual's subjective evaluation of the positive and negative aspects of one's sex life, and his/her subsequent affective response to this evaluation (Lawrence & Byers, 1992), while sexual distress is generally understood as worry, frustration, and anxiety regarding sexual activity (Stephenson & Meston, 2010a).

In addition to the conceptual independence of these constructs (e.g., having an orgasm is not necessarily analogous to being satisfied with one's sex life), recent research has shown empirically that, although related, these factors may be distinct. A number of studies have identified moderators of the association between sexual functioning and sexual distress, showing that the two are strongly related in some cases and weakly related in others (e.g., Hayes et al., 2008b; Stephenson & Meston, 2010b). For example, one study by Rosen et al. (2009) highlights the distinction between sexual functioning and sexual distress by showing that low sexual desire is less likely to be associated with distress in older women as compared to younger women. Similarly, Stephenson, Hughan, and Meston (2012) have shown that sexual functioning and sexual distress are more weakly related for women with a history of childhood sexual abuse. Another recent study examined the distinction between sexual satisfaction and sexual distress showing that sexual satisfaction may be more strongly tied to relationship satisfaction than sexual distress and that sexual satisfaction and sexual distress may be differentially distributed in the population, with low satisfaction being more common than high levels of distress (Stephenson & Meston, 2010a). The relative independence of these three factors highlights the need for research to examine these treatment outcomes separately and gives rise to additional important questions: how are changes in sexual functioning over the course of treatment associated with changes in sexual satisfaction and sexual distress and do pre-treatment variables moderate this association?

Based on the limited evidence available, the pre-treatment factor we examined in the current study was relationship satisfaction (Hawton & Catalan, 1986). Although clearly closely related, there is relatively little research on the overlap between sex ther-

apy and the relational context (Harvey, Wenzel, & Sprecher, 2004). For example, although many sex therapy techniques are inherently coupled activities (e.g., sensate focus), little guidance is given in sex therapy protocols regarding how to address relational conflict if and when it occurs. Additionally, most validated methods of couples counseling typically briefly mention sexual issues, but often view them as specific cases of wider issues with intimacy in the relationship (e.g., Gottman, 1993), providing no specialized interventions for sexual problems. Both view-points are valid in that coupled sexual activity is typically strongly shaped by the wider dynamics in the relationship; however, much of an individual's sexual experiences are the product of his/her individual sexual history, beliefs, desires, and fears, which can exist relatively independently of any single relationship (e.g., Barlow, 1986). The current study attempts to bridge these two areas by examining how the relational context entering treatment shapes an individual's responses to sex therapy.

The question of how the relational context influences the efficacy of sex therapy is of central importance given that, while much of the work in individual sex therapy involves exploring one's own beliefs and anxieties related to sexual activity, the results of this exploration are typically played out in the context of some form of coupled sexual activity. Indeed, experts in the field of sexuality have suggested that a majority of sexual difficulties are best understood as normal responses within the context of malfunctioning relationships, rather than as individual psychopathologies (Bancroft et al., 2003). As such, the overall state of the relationship may be key in predicting individual outcomes. Low relationship satisfaction may hamper the therapeutic process in a number of ways including decreasing treatment compliance and/or creating negative expectancies entering treatment. As such, our prediction was that low pre-treatment levels of relationship satisfaction would impair the treatment effectiveness of individual CBT for sexual dysfunction.

It is also possible that, in the presence of wider relational problems, inducing changes in sexual functioning may do little to alleviate the core pathology of the sexual dysfunction, resulting in little improvement in sexual satisfaction or alleviation of sexual distress. Indeed, inducing changes in a dissatisfied couple's sexual script may result in increased conflict and distress, even in the presence of improvements in sexual functioning. As such, it is feasible that individuals reporting low relationship satisfaction at intake would show a weaker association between changes in sexual functioning and changes in sexual satisfaction/distress.

In summary, the current analyses focused on predicting changes in sexual function, satisfaction and distress in response to cognitive behavioral sex therapy. To address these questions, we utilized data from a larger study that focused on the additive effect of Gingko Biloba extract and CBT (Meston, Rellini, & Telch, 2008).[1] The current analyses overlap minimally with this initial study, which focused primarily on the potential effectiveness of Ginkgo biloba in increasing sexual arousal. In the present study we utilized only those participants who underwent CBT as part of the original trial (some of whom also received Ginkgo biloba). The CBT treatment utilized in the study focused on identifying dysfunctional thoughts affecting attention towards sexual stimuli during sexual activities, thereby negatively impacting sexual arousal through distraction. For the current analyses, we expected pre-treatment levels of relationship satisfaction to positively predict improvements in sexual functioning, satisfaction, and distress. Our second hypothesis was that pre-treatment levels of relationship satisfaction would moderate the association between improvements in sexual functioning and sexual satisfaction/sexual distress. Specifically, we expected that women entering treatment with low levels of relationship satisfaction would experience smaller gains in sexual satisfaction/distress in response to improvements in sexual functioning, as compared to women with greater levels of relationship satisfaction.

Method

Participants

As outlined above, we utilized data from a previous clinical trial of the efficacy of CBT alone and with Ginkgo biloba (CBT + Ginkgo) in treating female sexual dysfunction (Meston et al., 2008). For this trial, participants were women recruited from the community ($N = 99$). All women met DSM-IV-TR criteria for a diagnosis for hypoactive sexual desire disorder, female sexual arousal disorder, and/or female orgasmic disorder at pre-treatment assessment and expressed interest in receiving psychotherapy to improve their sexual functioning. Eligibility criteria included age 18–65, current involvement in a heterosexual relationship, using a medically accepted form of birth control, and willingness to engage in at least two sexual encounters per week during the course of the study.[2] Participants were excluded if they used aspirin or other blood thinning pharmaceutical agents during the course of the study, if they reported amenorrhea, were pregnant, breastfeeding or less than 1 year post-partum, reported

[1] Gingko biloba extract was included in this initial study because of its hypothesized beneficial effects on peripheral circulation, which may facilitate genital engorgement during sexual activities. Analyses of the effects of Ginkgo biloba extract on vaginal engorgement in this initial study did not provide evidence that this herbal extract positively affected sexual responses (Meston et al., 2008). As such, we did not examine the effect of Ginkgo biloba in the current analyses.

[2] This criterion may have created a bias in the selection of participants since women who were affected by their sexual dysfunction to the point of not wanting to engage in sexual activities may have decided not to participate in the study. However, in order to gather an accurate assessment of difficulties becoming sexually aroused, it is essential for the participant to have at least attempted sexual activities and thus this criterion is essential for the accurate assessment of efficacy, although, undoubtedly, it introduces a limitation to studies in this area.

a bleeding disorder, had a history of major pelvic surgery, diabetes, neurological impairments, hypertension, heart problems, drug, alcohol, or substance abuse within the previous 6 months. Participants were also excluded if they were receiving a psychological intervention that focused on sexuality issues, if they met criteria for a sexual pain disorder or if they posed a current, serious suicidal or homicidal risk. Participants currently taking anticoagulants, antihypertensives or beta blockers were excluded from the study.

Participants were randomly assigned to one of four conditions: CBT, Ginkgo, CBT + Ginkgo, and placebo. The original target was to assign 20 participants per condition but recruitment was discontinued early due to funding problems. In the current study we utilized data from 31 women; 13 women in the CBT + Ginkgo condition, and 18 women from the CBT condition.

Participants were mostly Caucasian (77.4 %) and 28 years old on average ($SD = 8.42$; range, 18–53). Fifty-five percent of participants had completed some college, with 35 % holding bachelors or advanced degrees. Six women were diagnosed with female orgasmic disorder, of these, 3 also met criteria for hypoactive sexual desire disorder. The remaining 25 women were diagnosed with both female sexual arousal disorder and hypoactive sexual desire disorder. Twelve women were married, with the remaining in non-marital sexually active romantic relationships. Relationship length was broken down into the following categories: 0–6 months ($N = 4$), 6–12 months ($N = 3$), 1–2 years ($N = 7$), 3–5 years ($N = 10$), 5–10 years ($N = 6$), and greater than 10 years ($N = 3$). Based on results from a MANOVA, there were no significant differences in age or relationship length between the CBT and the CBT + Ginkgo groups, $F < 1$. Also, we found no differences in relationship type or educational background (Chi-square analyses were non-significant).

Procedure

Advertisements for the study were posted in public, free newspapers from August 2002 to December 2003. The advertisements indicated that the Female Sexual Psychophysiological Laboratory at the local university was testing a new psychotherapy for sexual difficulties and all women in a committed relationship and between ages 18 and 65 were encouraged to call for a confidential assessment of their eligibility. After a brief telephone interview, eligible participants were invited to an individual laboratory assessment session (pre-treatment). Both pre- and the post-treatment assessment visits were coordinated and completed by a trained research assistant and the therapist was not present at these meetings. Upon arrival, participants reviewed and signed the consent form and then completed a series of questionnaires on sexual function and medical history to further assess eligibility criteria. A semi-structured clinical interview was conducted to assess sexual dysfunction. A clinical psychologist who was an expert in sexual dysfunction (A.R.) conducted the interviews based on DSM-IV-TR criteria. Sexual distress was assessed by asking participants whether they were bothered by their sexual difficulties and whether they would want to receive treatment for their condition. Positive answers to both of these questions were interpreted as a sign that the participant was experiencing distress to the point of seeking treatment. At the end of assessment, participants who qualified were randomly assigned to one of the four treatment conditions using a randomization key.

The randomization key was known only to the corresponding author. The study coordinator was aware of whether the participant was taking a pill or not, and whether the patient was receiving CBT, but was not aware of the nature of the pill (Ginkgo or placebo). The therapist only knew whether the patient was receiving therapy. The patient knew whether she was in the CBT group but did not know whether she was taking the Ginkgo or the placebo pill. All concerns about the pill taken by the patient were directed to the study coordinator. The blind was lifted only after the patient completed the post-treatment assessment.

The CBT consisted of 8 weekly sessions of individual therapy and focused on increasing awareness of physiological sensations during states of sexual arousal and reducing negative affect in anticipation of sexual experiences. A treatment manual was used to standardize the treatment. Techniques used in the manual included cognitive restructuring and systematic exposure to reduce anxiety provoking thoughts that emerged during sexual arousal, decreasing distraction during sexual activities, and increasing focus on pleasant sensations. Additionally, a version of Progressive Muscle Relaxation (PMR) was utilized which was modified to include the contraction and relaxation of the perineum muscles, which can be useful if utilized during vaginal penetration to help women to focus on the sensations in their vagina. Participants were asked to complete a number of exercises at home to practice the skills learned in session. These home exercises were generally performed alone. Examples included PMR using an audiotape and "mirror exercises" wherein women stood naked in front of a mirror and were instructed (again, through an audiotape) to focus on various parts of their bodies, recording positive and negative thoughts regarding body image and their own sexuality. These thoughts were then discussed in subsequent therapy sessions. Additional information regarding treatment components can be obtained from the corresponding author (see also Meston et al., 2008).

The same therapist completed all therapy sessions which were held in a private therapy room in the Department of Psychology of the University where the study was conducted. The therapist was a Ph.D.-level clinical psychology student with over 2,000 training hours in CBT and was supervised during weekly meetings by a licensed psychotherapist with extensive experience in conducting randomized clinical trials (Dr. Michael Telch). Sessions were videotaped and 20 % were randomly checked by a trained research assistant for manual adherence using a treatment adherence form developed specifically for this project. A copy of the manual and the adherence form can be obtained from the corresponding author.

The post-treatment assessment was scheduled for the week following the last psychotherapy session. During this session, participants completed all questionnaires administered during the pre-treatment assessment (see "Measures" section below). Participants received $100 for participating in the pre- and post-treatment assessments. Because the current study is focusing exclusively on the predictors of treatment response to CBT, and because we found no differences between the CBT and CBT + Ginkgo condition, we refer readers to the original study (Meston et al., 2008) for additional information on Ginkgo biloba.

Measures

Means and SDs for all study variables can be found in Table 1. Sexual functioning was measured using the Female Sexual Functioning Index (FSFI) (Rosen et al., 2000), a validated questionnaire comprising 19 items subdivided into 6 factors: Desire, Sexual Arousal, Lubrication, Orgasm, Pain and Sexual Satisfaction. The FSFI has demonstrated good internal reliability ($r = 0.89$–0.97), test–retest reliabilities over a 2 week period ($\alpha = 0.79$–0.88), and divergent validity with scales measuring relationship adjustment. A scaled score below 26.5 is considered a clinical level of sexual dysfunction (Weigel, Meston, & Rosen, 2005). The average scaled FSFI score at pre-treatment in the current sample was 20.02 ($SD = 6.59$), with 83.9 % of participants scoring below 26.5. We utilized a sum of the Desire, Sexual Arousal, Lubrication, Orgasm, and Pain subscales as a measure of sexual functioning (FSFI-Function) with higher scores indicating better levels of sexual functioning (higher desire, higher arousal, greater ease of reaching orgasm, and lower levels of sexual pain). When the full FSFI is used, subscale scores are typically multiplied by scaling terms to standardize the range of each subscale and to assure that some aspects of sexual functioning are not weighted more heavily than others. The analyses reported below were conducted using unscaled scores. However, we re-ran all analyses using scaled scores and found no substantive differences in results. Coefficient alpha in the current study was .94. Change scores in FSFI-Function were computed by subtracting pre-treatment from post-treatment scores (FSFI-Function-Change). The Sexual Satisfaction factor was an independent outcome variable (FSFI-Satisfaction) with higher scores indicating greater satisfaction with one's sex life. Coefficient alpha in the current sample was .83.

Sexual distress was measured using the average of the Personal Distress and Interpersonal Distress subscales of the Sexual Satisfaction Scale-Women (SSS-W) (Meston & Trapnell, 2005). In the original validation study, internal consistency coefficients for each domain of the SSS-W were in the acceptable range for a combined sample of women with and without sexual dysfunction ($\alpha \geq .72$). Across a one-month interval, test–retest reliability was moderate for women with sexual dysfunction, $r = .62$–$.79$, and control women, $r = .58$–$.79$. Scores for the SSS-W are calculated such that higher scores indicate greater well-being (lower levels of sexually-related distress). Coefficient alpha in the current study was .86. In the initial validation study of the SSS-W, women diagnosed with sexual dysfunction reported a mean relational distress of 18.9 ($SD = 1.36$) and a mean personal distress of 15.8 ($SD = 1.36$). In the current study, participants reported a distress score of 16.94 (averaging the two distress scales) at pre-treatment, falling within clinical norms.

Relationship satisfaction at pre-treatment was measured with the Satisfaction subscale of the Dyadic Adjustment Scale (DAS) (Spanier, 1976). The DAS comprises 32 items, 10 of which constitute the Satisfaction factor. The DAS has been widely used and has shown convergent validity with the evaluation of trained therapists. We chose to use the Satisfaction subscale of the DAS due to its conceptual clarity and lack of overlap with sexual behaviors. For example, the full scale includes an item specifically assessing how often the couple disagrees over sexual relations, which would overlap with our outcome of relational sexual distress. Additionally, "relational adjustment," as measured by the DAS as a whole, is a qualitatively different construct from global relationship satisfaction, as has been noted by a number of experts in the field of relational research (e.g., Eddy, Heyman, & Weiss, 1991; Ward,

Table 1 Descriptive statistics and Pearson correlations for study variables

Variable	1	2	3	4	5	6	7	*M*	*SD*
1. SSS-Distress-Pre	1	.33	.51**	−.21	.74**	−.01	−.03	16.94	5.20
2. SSS-Distress-Post		1	.25	.36	.18	.48**	.45*	21.65	5.07
3. FSFI-Satisfaction-Pre			1	.46*	.60**	−.13	.57**	8.87	3.18
4. FSFI-Satisfaction-Post				1	−.01	.35	.79**	11.45	2.34
5. FSFI-Function-Pre					1	.20	.07	46.35	13.77
6. FSFI-Function-Post						1	.30	59.19	10.78
7. DAS-Pre							1	35.25	6.40

FSFI-Function Sexual Desire, Arousal, Lubrication, Pain domains of the FSFI (Possible range = 16–80), *FSFI-Satisfaction* satisfaction (Possible range = 3–15), *SSS-Distress* Sexual distress (Possible range = 6–30). *DAS-Pre* Relationship satisfaction (Possible range = 0–50), *Pre* pre treatment, *Post* post treatment

* $p < .05$, ** $p < .01$

Lundberg, Zabriskie, & Berrett, 2009). In the original validation study of the DAS, the mean score for the satisfaction subscale was 35 ($SD = 11.8$). Because level of relational functioning was not an inclusion criterion in this study, it is unsurprising that our sample reported a similar mean (35.10) Additionally, the range (17–42) and variability ($SD = 6.2$) in the current sample suggest that participants exhibited diverse levels of relationship satisfaction. Coefficient alpha for the subscale in the current study was .98.

Results

Treatment Outcome

We used an alpha level of .05 to assess significance for all analyses. To assess whether clinical outcomes changed over the course of treatment, we performed a series of repeated measures ANOVAs including treatment group (CBT vs. CBT + Ginkgo) as a between subjects variable. Sexual functioning, $F(1, 19) = 15.36$, $p < .001$; eta squared = .45, Distress, $F(1, 24) = 21.12$, $p < .001$; eta squared = .46, and Satisfaction, $F(1, 19) = 20.98$, $p < .001$; eta squared = .53[3] all showed significant improvements over the course of treatment. There were no significant differences between the CBT and the CBT + Ginkgo group (for details on treatment efficacy, see Meston et al., 2008). Given the lack of significant differences between CBT and CBT + Ginkgo conditions, the groups were collapsed for all subsequent analyses.

Predictors of Change in Sexual Functioning, Sexual Satisfaction, and Sexual Distress

Correlations between study variables are shown in Table 1. To assess whether pre-treatment levels of relationship satisfaction (DAS-Pre) predicted changes in sexual functioning, we performed a multiple linear regression with FSFI-Function-Post regressed on DAS-Pre, while controlling for FSFI-Function-Pre. DAS-Pre was not a significant predictor of changes in FSFI-Function, $F(2, 15) = 1.15$ (Table 2). We performed similar regressions with FSFI-Satisfaction and SSS-Distress as outcomes. DAS-Pre was a significant predictor of changes in FSFI-Satisfaction, $F(2, 15) = 14.35$, $p < .001$, $R^2 = .66$, semi partial coefficient squared = .50, and SSS-Distress, $F(2, 20) = 6.32$, $p < .01$; $R^2 = .39$, semi partial coefficient squared = .31 (Table 2).

Moderators of Changes in Satisfaction/Distress

We assessed the moderating effect of DAS-Pre on the association between changes in sexual functioning and sexual satisfaction/distress utilizing two linear regressions, one for satisfaction and one for distress. Models included the dependent variable (either FSFI-Satisfaction-Post or SSS-Distress-Post) regressed on the independent variable (FSFI-Function-Change), the moderator (DAS-Pre), the interaction between the independent variable and moderator, and the control variable (either FSFI-Satisfaction-Pre or SSS-Distress-Pre) (see Table 3 for full models). The independent variable, the moderator, and the interaction variables were centered for these analyses.

Table 2 Results for linear regressions testing relationship satisfaction (DAS-Pre) as predictors of changes in sexual function (FSFI-Function-Post), sexual satisfaction (FSFI-Satisfaction-Post) and sexual distress (SSS-Distress-Post)

Outcome predictors	β	B	SE	$S\text{-}R^2$	F	R^2
Outcome: FSFI-Function-Post					1.15	.13
FSFI-Function-Pre	.21	.20	.23	.05		
DAS-Pre	.33	.30	.22	.11		
Outcome: FSFI-Satisfaction-Post					14.35***	.66
FSFI-Satisfaction-Pre	.19	.21	.19	.07		
DAS-Pre	.70	.70	.18	.50***		
Outcome: SSS-Distress-Post					6.32**	.39
SSS-Distress-Pre	.44	.45	.18	.23*		
DAS-Pre	.53	.53	.18	.31**		

$S\text{-}R^2$ semi partial coefficient squared, *FSFI-Function* Sexual Desire, Arousal, Lubrication, Pain domains of the FSFI, *FSFI-Satisfaction* Sexual satisfaction, *SSS-Distress* Sexual distress, *BSI* Psychopathology, *DAS-Pre* Relationship satisfaction, *Pre* pre treatment, *Post* post treatment

* $p < .05$, ** $p < .01$, *** $p < .001$

The overall model testing relationship satisfaction as a moderator of the association between changes in sexual functioning and changes in sexual satisfaction was significant, $F(4, 13) = 8.58$, $p < .01$, $R^2 = .73$; however, the interaction term was non-significant (see Table 3). The overall model testing relationship satisfaction as a moderator of the association between changes in sexual functioning and changes in sexual distress was also significant, $F(4, 13) = 5.33$, $p < .01$, $R^2 = .62$. Additionally, the interaction term (FSFI-Function-Change X DAS-Pre) was a significant predictor of SSS-Distress-Post (semi partial coefficient squared = .14) (Table 3, Fig. 1). Inspection of simple slopes computed for DAS-Pre ($M \pm 1\ SD = 28.85$ and 41.65) showed that, when DAS-Pre was high, improvements in sexual function (FSFI-Function-Change) were associated with improvements (decreases) in sexual distress levels, $t = 3.29$, $p < .01$. However, when DAS-Pre was low, changes in sexual functioning (FSFI-Function Change) were associated with worsening (increasing) levels of sexual distress, $t = -2.67$, $p < .05$.

Because of our relatively small sample size, we used the Akaike information Criterion (AIC) as a secondary analysis in each of our regression models. Specifically, we calculated AIC values for unfitted models (with the outcome regressed on a constant only) and for additional models incorporating each of

[3] Eta square values of .4 and higher indicate a large effect size.

Table 3 Testing DAS-Pre as a moderator of the association between changes in sexual functioning (FSFI-Function-Change: independent variable) and changes in either sexual satisfaction (FSFI-Satisfaction-Post: Dependent variable 1) or sexual distress (SSS-Distress-Post: Dependent variable 2)

Outcome Predictor	β	B	SE	$S\text{-}R^2$	F	R^2
Outcome: FSFI-Satisfaction-Post					8.58**	.73
FSFI-Satisfaction-Pre	0.43	0.46	0.28	.18		
DAS-Pre	0.54	0.55	0.27	.24*		
FSFI-Function-Change	1.41	1.48	1.29	.09		
FSFI-Function-Change X DAS-Pre	−1.12	−1.20	1.37	.06		
Outcome: SSS-Distress-Post					5.33**	.62
SSS-Distress-Pre	0.49	0.42	0.19	.26*		
DAS-Pre	0.24	0.18	0.16	.10		
FSFI-Function-Change	−3.78	−3.06	1.16	.35*		
FSFI-Function-Change X DAS-Pre	4.35	3.58	1.20	.14*		

Change difference scores post–pre, *DAS-Pre* Relationship satisfaction, *FSFI-Function* Sexual Desire, Arousal, Lubrication, Pain domains of the FSFI, *FSFI-Satisfaction* Sexual satisfaction, *Post* post treatment, *Pre* pre treatment, *S-R* semi partial coefficient, *SSS-Distress* Sexual distress

* $p < .05$, ** $p < .01$, *** $p < .001$

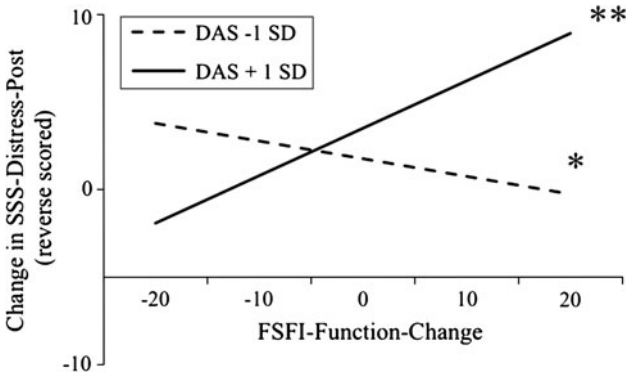

Fig. 1 Interaction between pre-treatment relationship satisfaction and treatment-induced changes in sexual functioning predicting sexual distress at post-treatment while controlling for sexual distress at pre-treatment. Lines represent simple slopes for women with high relationship satisfaction (scoring 1 *SD* above the mean, solid line) and women with low relationship satisfaction (scoring 1 *SD* below the mean, segmented line). While for women with high relationship satisfaction, improvements in sexual function (FSFI-Function-Change) were associated with improvements in distress (Change in SSS-Distress-Post, reversed scored), $t = 3.29$; for women with low relationship satisfaction, improvements in sexual functioning (FSFI-Function Change) were associated with worsening levels of distress (Change in SSS-Distress-Post, reversed scored), $t = -2.67$

our predictors in turn from lowest order to highest order. In each case additional predictors resulted in lower AIC values, objectively showing that additional predictors improved model fit and were not extraneously labeled as significant predictors in our initial analyses.[4]

Discussion

Our results suggest that, as hypothesized, relationship satisfaction at intake was associated with larger improvements in sexual satisfaction and decreases in distress levels over the course of individual CBT focused on sexual function. However, baseline relationship satisfaction did not predict changes in sexual functioning. These findings indicate that, while women entering individual sex therapy with relationship dissatisfaction can improve their sexual functioning, these improvements may not lead as readily to increased subjective well-being in the form of increased sexual satisfaction or decreased distress regarding their sexual difficulties. Analyses exploring the interaction between sexual function and sexual distress supported this interpretation, showing that changes in functioning were associated with positive changes in distress (improved functioning associated with decreased distress) only for women entering therapy with high relationship satisfaction. For women entering therapy with low relationship satisfaction, improved sexual functioning was actually associated with *increased* distress levels.

These results extend our knowledge regarding CBT, and FSD, in a number of ways. First, they speak to the general effectiveness of CBT in improving levels of sexual functioning despite pre-existing difficulties with relational discord. In other words, the treatment met its goal of improving levels of sexual desire, arousal, and orgasm even in the context of dissatisfying relationships. This efficacy is in line with Barlow's (1986) conceptualization of difficulties with sexual function being maintained largely by intrapersonal factors. The relational context, on the other hand, played a greater role in determining whether these improvements in sexual functioning actually translated into improvements in subjective well-being. These results may begin to explain the inconsistent findings in past studies regarding the prognostic value of overall relationship quality (e.g., Hawton & Catalan, 1986; ter Kuile et al., 2007) for sex therapy outcomes. When assessing the outcome of treatment for sexual dysfunction, researchers often focus on sexual functioning only, or combine measures of sexual functioning, sexual satisfaction, and

[4] For example, in our most complex model (wherein interaction term FSFI-Function-Change X DAS-Pre was a significant predictor of SSS-Distress-Post while controlling for SSS-Distress-Pre), we conducted four regressions, adding one predictor for each new model and assessing the AIC of the model. Specifically, we computed a model with SSS-Distress-Post regressed on SSS-Distress-Pre only (AIC = 75.76), then added FSFI-Function-Change as an additional predictor (AIC = 54.35), then added DAS-Pre (AIC = 44.89), before finally adding the FSFI-Function-Change X DAS-Pre interaction (AIC = 37.49). In each case, the additional predictor added explanatory power to the model, even after penalizing for the increased number of coefficients in the model.

sexual distress into a single outcome. As shown in previous research (e.g., Ferenidou et al., 2008; Oberg & Fugl-Meyer, 2005; Rosen et al., 2009; Stephenson & Meston, 2010a) and the current study, these outcomes are often distinct can change differentially as result of therapy. As such, failing to effectively identify, assess, and analyze these distinct outcomes may mask important findings.

The current findings also have a number of potential clinical implications. Specifically, they confirm that sex therapy which does not explicitly include the partner can effectively improve levels of sexual functioning. This efficacy is important given the fact that it is often difficult or impossible to directly include the partner in treatment. For example, the partner may be unavailable for scheduling due to a busy work schedule. However, in the context of wider relational difficulties, it may be necessary to include additional relational-focused interventions to maximize the positive outcomes of the therapy. This selective necessity of a relational focus highlights the importance of setting treatment goals early in treatment. Specifically, treatment providers should discuss with clients whether changes in their sexual functioning would truly increase their quality of life, or whether they would still be troubled by other relational problems.

More generally, the current findings speak to the complex association between relationship satisfaction and sexuality. Satisfaction with the overall relationship has figured centrally in many theories of relational dynamics and has been shown to be related to sexual satisfaction in a number of studies (e.g., Byers, 2005). The current findings further our knowledge of this relationship, suggesting that a woman's evaluation of the wider relationship may strongly influence her levels of sexual satisfaction and distress and that this influence may override the effect of improvements in sexual functioning. Weiss (1980) first coined the term "sentiment override" to refer to the phenomenon of one's global evaluation of one's relationship predicting a majority of the variance in more specific aspects of the relationship (communication, sexuality, etc.). More recent conceptualizations (e.g., Gottman, 1993) suggest that negative sentiment override can cause relational partners to interpret neutral, or even positive, interactions with their partner as negative. Indeed, research has shown that sentiment override shapes both pre-interaction expectations and later evaluation of these interactions (Fincham, Garnier, Gano-Philips, & Osborne, 1985). It is quite probable that sentiment override may affect sexual interactions as well. In regards to the current findings, it is possible that women experiencing negative sentiment override as a result of low relationship satisfaction entered treatment with negative expectations regarding the potential for therapy to change their sexual interactions with their partners for the better. These negative expectations may have decreased treatment compliance and decreased the degree to which the partner was included in integrating changes into the couple's sexual repertoire. Additionally, even if these women attempted to make changes to the sexual interactions in their relationships, they may have interpreted positive or neutral sexual events with their partners as negative, keeping their levels of distress high despite objective improvements in sexual functioning.

An alternative, and potentially complimentary explanation, for our findings is that, in focusing primarily on improving levels of sexual functioning, individual cognitive behavioral sex therapy generally does not address the mechanisms through which sexual functioning may affect levels of subjective well-being. One particularly important mechanism may be the reaction of the partner. For example, it is possible that a sexual symptom such as low desire may be distressing to a woman primarily because it elicits a negative emotional response from her partner. In the case of an unsatisfying overall relationship, the negative partner response would likely remain even in the context of improved sexual functioning.

Additionally, if a symptom such as low sexual desire or arousal has prevented a couple from engaging in frequent sexual activity for an extended period, improved functioning and resumption of sexual activities may raise a host of previously dormant issues in the relationship. In such cases, it would not be surprising if, as in the current findings, improved sexual functioning actually led to increased levels of distress regarding sex. Indeed, a recent clinical trial found that undergoing CBT for vaginismus was associated with improvements in sexual functioning, but a worsening in martial satisfaction (van Lankveld et al., 2006). Further research on the mechanisms through which changes in sexual functioning affect subjective well-being and relational dynamics will be necessary to determine which, if any, of these explanations may be true.

Given our relatively small sample size and the use of subscales in some analyses, we should stress that caution must be exercised in generalizing these findings and in interpreting our null effects. Additionally, it is possible that sexual functioning may improve with CBT more quickly than do sexual satisfaction and distress, pointing to the need for more long-term follow-up data. Also worth noting is that we included only women who completed psychotherapy. As such, we cannot definitively say that we were assessing treatment-induced changes in sexual outcomes in that some of these changes may have been naturally occurring or part of a placebo response. Future research utilizing larger groups of patients and control groups will allow us to test the more complex models necessary to confirm that the current findings apply specifically to treatment-induced changes of sexual factors. Additionally, given that the treatment evaluated was individually-based, these findings cannot be extended to couples-based sex therapy.

A number of the characteristics of our sample also limit the generalizability of the results. First, all participants were in relationships and, as such, these findings do not apply to single women seeking treatment for sexual dysfunction. Second, because all women were required to be sexually active, the findings may not apply to women whose sexual dysfunction prevents sexual activity. Third, participants in the study varied in the type and length of their relationship. Future studies should consider these variables as

potential predictors of treatment outcome (e.g., are people in longer or committed relationships more or less likely to benefit from individual sex therapy?). Fourth, our sample did not include women with sexual pain diagnoses. Because the causes and treatment of these conditions differ in many important ways from other types of sexual dysfunction (e.g., Rosenbaum, 2005), our findings may not apply to dyspareunia or vaginismus. Fifth, our sample included women with a number of diagnoses including hypoactive desire and arousal. It is undoubtedly important for future research to disentangle any potential differences in the treatment of these dysfunctions. However, the high rates of co-morbidity between low desire and arousal, as well as the fact that many women have difficulty differentiating between these two constructs (Brotto, Bitzer, Laan, Leiblum, & Luria, 2010, but see DeRogatis, Clayton, Rosen, Sand, & Pyke, 2011), suggest that research based on samples with only one diagnosis may not only be unrealistic but also poorly generalizable. Lastly, we were unable to measure a number of proposed mechanisms of the current effects (e.g., treatment compliance and expectancies). Future research that incorporates the assessment of these factors would help shed light on *why* certain factors predict treatment response to sex therapy.

Despite these limitations, the current study has provided preliminary answers to a number of questions regarding the use of cognitive behavioral psychotherapy for treating FSD. Particularly noteworthy are the findings indicating that whether or not patients experience improvements in subjective measures of sexual satisfaction and distress may depend on the state of their relationship when beginning therapy. In other words, pre-existing (and possibly causative) relational problems may not prevent sex therapy from inducing improvements in sexual functioning, but relational problems may prevent these improvements in sexual functioning from leading to significant improvements in personal well-being, the ultimate goal of any mental health treatment.

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