



# Efficacy of cognitive behavioral therapy for chronic fatigue syndrome: A meta-analysis

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## Abstract

A meta-analysis of the efficacy of cognitive behavioral therapy (CBT) in treating chronic fatigue included 15 effect sizes for between-group outcome comparisons. Across analyses, which included a total of 1371 participants, there was a significant difference,  $d=0.48$ , in post-treatment fatigue between participants receiving CBT and those in control conditions. Results indicate that CBT for chronic fatigue syndrome tends to be moderately efficacious. Dropout rates in CBT varied from 0–42%, with a mean of 16%. In the five studies that reported the number of CBT clients who were no longer in the clinical range with regard to fatigue at the latest follow-up, the percentage varied from 33% to 73% of those assigned to CBT, with a mean of 50%. Moderator results suggest directions for future investigations.

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*Keywords:* Chronic fatigue syndrome; Treatment; Efficacy; Meta-analysis

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Chronic fatigue syndrome (CFS), as defined by an international panel of experts and the U. S. Centers for Disease Control (CDC), involves unexplained fatigue that lasts at least six months and is accompanied by four or more of the following symptoms: unrefreshing sleep, lengthy malaise after exertion, impairment of concentration or short-term memory, sore throat, tender lymph nodes, multijoint pain, and headaches (Fakuda et al., 1994). These criteria are often called the CDC 1994 criteria. There are alternative diagnostic criteria called the Oxford criteria that require both mental and physical fatigue and that do not require physical symptoms (Cairns & Hotopf, 2005). The term myalgic encephalomyelitis is sometimes used to describe the same disorder as chronic fatigue syndrome (Prins, van der Meer, & Bleijenberg, 2006). Chronic fatigue is a less well defined term that requires medically unexplained fatigue over a period of at least three or four months (e.g., Huibers et al., 2004; Ridsdale et al., 2001).

Individuals who have CFS tend to be markedly disabled. Many are unable to work or go to school, to do house chores, or to socialize (Duff, 2003). Because the disorder is often considered dubious by friends and family members, individuals with the syndrome may receive little social support (Duff, 2003). Most adults diagnosed with CFS tend to continue to have fatigue problems for at least the next few years; only about 5–10% experience a return to normal functioning during this time (Cairns & Hotopf, 2005; Joyce, Hotopf, & Wessely, 1997).

Prevalence of CFS among adults has varied in community samples from 0.2% to 2.2%, the wide range perhaps reflecting different criteria and assessment methods (Lindal, Stefansson, & Bermann, 2006; Ranjith, 2005). A study of a community sample of children found a prevalence rate of 0.06% (Taylor et al., 2003), and a study of a community sample of adolescents pointed to a prevalence rate of between 0.1 and 0.5% (Rimes et al., 2007).

Most studies of the efficacy of treatment for CFS have used the CDC 1994 or the Oxford criteria for diagnosis. Studies typically have assessed level of fatigue with either the 11-item self-report Chalder Fatigue Questionnaire (Chalder et al., 1993) or the fatigue subscale of the Checklist Individual Strength (CIS; Vercoulen, Alberts, & Bleijenberg, 1999), a Dutch scale. Assessment of the effects of chronic fatigue has often involved a disability scale, such as the self-report Medical Outcomes Survey Short Form-36 (Stewart, Hays, & Ware, 1988), which contains eight subscales, including most relevantly the physical functioning subscale. Objective measures used in some studies include absenteeism from work or school, exertion tests, and tests of cognitive functioning such as attention, reaction time, and short-term memory.

Many treatments have been suggested for CFS, including pharmacological, immunological, nutritional, massage treatments, and phase based interventions, which include cognitive, person-centered, narrative-based, and psychodynamic elements (Jason, Fennell, & Taylor, 2003). However, treatment most reported in published outcome studies is cognitive behavioral therapy (Jason et al., 2003; Rimes & Chalder, 2005), always with the therapist encouraging gradual increases in activity, a type of desensitization to exertion. Some researchers describe the prompting of gradual increases in activity as graded exercise therapy (Prins et al., 2006). This behavioral treatment element is often combined with one or more of the following other cognitive behavioral elements: (a) setting measurable goals, such as returning to work full time or doing grocery shopping; (b) providing clients with a psychobiological explanation of fatigue, in which an organism may trigger fatigue but psychological factors keep the fatigue going; (c) guiding clients to change self-defeating cognitions, such as that “I should be able to do this” and “I can’t do anything”; and (d) helping clients maintain an accurate awareness of their present limits in exerting themselves (Bleijenberg, Prins, & Bazelmans, 2003).

Chambers, Bagnall, Hempel, and Forbes (2006), Rimes and Chalder (2005), and Whiting et al. (2001) completed the most recent reviews of CFS treatment efficacy, including between 5 and 10 randomized clinical trials of cognitive behavioral treatments, as well as some non-randomized trials. All three reviews concluded that cognitive behavioral treatments, including encouragement of gradual increases in activity, produced promising results. Because the reviews did not meta-analyze the findings, they could not quantify the overall effect size or examine possible moderators. Cho, Hotopf, and Wessely (2005) used meta-analysis to examine the placebo effect in treatment of CFS and found that the placebo response across studies was less than for some other medical disorders and was lower for psychological interventions than for drug treatment.

The purpose of the present meta-analysis was to determine the efficacy of cognitive behavioral treatment for chronic fatigue and to search for moderators of effect size. Potential moderators that could have implications for treatment of the disorder include the specific type of CBT provided, the amount of treatment, the types of outcome variables, and the length of follow-up.

## 1. Materials and methods

### 1.1. Literature search and inclusion criteria

We entered the search terms “CFS or chronic fatigue” and “treatment or therapy or randomized controlled trial or RCT” into the PsycINFO and PubMed databases, from their beginning through June, 2007. We obtained articles that were potentially relevant to the meta-analysis and checked them for citations to other potentially relevant articles. We also contacted or attempted to contact the corresponding authors of each relevant article we found and asked whether the person knew of other relevant articles not yet published. When an article provided insufficient information to determine an effect size or to enter data for a moderator analysis, we wrote to the corresponding author asking for the needed information.

The search yielded 13 studies that met our inclusion criteria, which were that the study included random assignment of participants with chronic fatigue or CFS to either (a) a treatment with a cognitive and/or behavioral emphasis or (b) a control condition, such as being on a waiting list, treatment as usual, or some treatment not expected to be helpful, such as stretching.

One study was excluded because we were unable to obtain the information necessary to determine an effect size (Lloyd et al., 1993). Two studies were excluded because they did not use random assignment (Ridsdale, Darbishire, & Seed, 2004; Whitehead & Champion, 2002); another study was excluded because some members of the experimental group received pharmacological and psychodynamic treatment as well as behavioral treatment (Thomas, Sadler, & Smith, 2006). Two studies had separately published reports of long-term follow-up results. One, a five-year follow-up by Deale, Husain, Chalder, and Wessely (2001), we did not use for our analyses because a substantial number of participants received treatment after the study treatment. The other study, by Powell, Bentall, Nye, and Edwards (2004) we did not use for our analysis because the control group received the experimental treatment before the follow-up. We did not use for any purposes separately published analyses of the cost-effectiveness of CBT (McCrone, Ridsdale, Darishire, & Seed, 2004; Severens, Prins, Wilt, van der Meer, & Bleijenberg, 2004) relating to two of the studies we included in the meta-analysis.

### 1.2. Coding studies

We coded studies by variables that were of potential importance as moderators. These variables included: (1) type of fatigue disorder (CFS or mixed sample containing some individuals with CFS and some individuals with chronic fatigue); (2) diagnostic criteria used (Oxford, Centers for Disease Control 1994, or other); (4) treatment format (individual or group); (5) hours of treatment; (6) number of treatment sessions; (7) presence or absence of cognitive treatment; (8) comparison condition (waitlist, treatment as usual, or simple advice versus a credible comparison treatment such as relaxation training); (9) months of follow-up; (10) type of outcome measure (fatigue self-rating, functional impairment self-rating, objective functioning, interview based functioning, and self-rating of improvement); (11) type of fatigue assessed (mental fatigue, physical fatigue, or combined mental and physical fatigue); and (12) methodological quality of the study. While gender of participants was another variable of interest, it could not be checked for a moderator effect because all studies in the analysis reported combined gender results. There was only one study that evaluated group CBT (O’Dowd, Gladwell, Rogers, Hollinghurst, & Gregory, 2006), so we could not compare group and individual CBT. Further, there was only one study that exclusively included adolescents (Stulemeijer, de Jong, Fiselier, Hoogveld, & Bleijenberg, 2005), so we could not compare effect sizes for adolescents and adults. Another variable of interest was the presence or absence of prompting gradual increases in activity; however, every study included this element.

Outcome variables coded were limited to those that constituted measures of chronic fatigue, including self-report measures of physical and mental fatigue; subjective and objective measures of impairment of everyday functioning, including attendance at school or work; and impairment of cognitive functioning, assessed by memory, reaction time, and attention tasks. We did not include measures of depression and anxiety.

We rated methodological quality using the 12-item rating scale of Burke, Arkowitz, and Menchola (2003), which includes items such as whether objective outcome measures were used in the study and whether blinded raters were used for assessment; the scale had an inter-rater Spearman–Brown reliability of 0.86 in a meta-analysis of the efficacy of motivational interviewing.

We entered the following information for use in the meta-analysis: (1) number of participants in the treatment condition, the control condition, and overall; and (2) type of data used to calculate the effect size (e.g., means and standard deviations). We also recorded dropout percentage in the CBT group as a descriptive variable of importance in itself.

Two of us coded each study independently. In some instances, the coding of a variable by the two was not in agreement. When this occurred, the two coders reached consensus through discussion.

Table 1  
Description of treatment and effect sizes

Author	<i>n</i>		CBT dropout percentage	Treatment		Comparison condition	Months follow-up	Hours	Sessions	Sample type	<i>d</i>	95% <i>CI</i>	
	Treatment	Control		Type	Format							Lower	Upper
Chalder, Wallace, and Wessely (1997) <sup>a</sup>	70	80	16	2	Individual	0	3	0.2	1	0	0.23	-0.09	0.55
Deale, Chalder, Marks, and Wessely (1997) <sup>b</sup>	27	26	10	2	Individual	1	6	15.0	13	1	1.41	0.81	2.01
Fulcher and White (1997) <sup>b</sup>	33	33	12	1	Individual	1	3	.	12	1	0.46	-0.03	0.95
Huibers et al. (2004) <sup>c</sup>	71	75	33	2	Individual	0	12	3.0	5	0	-0.04	-0.36	0.29
Moss-Morris, Sharon, Tobin, and Baldi (2005) <sup>d</sup>	22	21	12	1	Individual	0	3	.	12	1	0.45	-0.15	1.06
O'Dowd et al. (2006) <sup>d</sup>	52	50	17	2	Group	1	12	16.0	8	0	0.72	0.32	1.12
O'Dowd et al. (2006) <sup>d</sup>	52	51	17	2	Group	0	12	16.0	8	0	0.72	0.32	1.12
Powell, Bentall, Nye, and Edwards (2001) <sup>b</sup>	38 <sup>f</sup>	34	.	1	Individual	0	12	10.0	9	1	1.67	1.13	2.21
Prins et al. (2001) <sup>c</sup>	92	90	10	2	Individual	1	14	16.0	16	1	0.44	0.14	0.73
Prins et al. (2001) <sup>c</sup>	92	88	10	2	Individual	0	14	16.0	16	1	0.38	0.08	0.67
Ridsdale et al. (2001) <sup>d</sup>	80	80	17	2	Individual	0	6	6.0	6	0	-0.06	-0.37	0.25
Sharpe et al. (1996) <sup>b</sup>	30	30	0	2	Individual	0	12	16.0	16	1	0.54	0.03	1.06
Stulemeijer et al. (2005) <sup>d</sup>	35	34	17	2	Individual	0	5	10.0	10	1	0.31	-0.16	0.79
Wallman, Morton, Goodman, Grove, and Guilfoyle (2004) <sup>d</sup>	32	29	0	1	Individual	1	4	3.0	3	1	0.29	-0.21	0.80
Wearden et al. (1998) <sup>b,g</sup>	33	35	42	1	Individual	0	6.5	8.0	8	1	0.17	-0.30	0.65

Note. Treatment type 1 = Activity with no cognitive treatment, 2 = Activity with cognitive treatment; Comparison condition 0 = wait list or treatment as usual or obvious simple advice, 1 = some credible comparison treatment such as relax plus stretch or client centered; Sample type 0 = chronic fatigue, 1 = chronic fatigue syndrome.

<sup>a</sup> Diagnostic criteria: Chalder.

<sup>b</sup> Diagnostic criteria: Oxford.

<sup>c</sup> Diagnostic criteria: CIS.

<sup>d</sup> Diagnostic criteria: Centers for Disease Control 1994.

<sup>e</sup> Diagnostic criteria: Centers for Disease Control 1994, without requiring medical symptoms, so excluded from moderator analysis of type of diagnostic criteria.

<sup>f</sup> Maximum intervention CBT used for meta-analysis.

<sup>g</sup> For our analysis, we compared drug treatment plus CBT to drug treatment without CBT.

Table 2

Meta-analysis summary statistics employing a mixed effects model (Method of Moments Random Effects) analysis

Source	$N_d$	$N_{\text{participants}}$	$d$ ( $CI_{-95\%}$ , $CI_{+95\%}$ )	$z$	$p$	Homogeneity analysis	Fail-safe $N^a$
Analyses per comparison	15	1371	0.48 (0.27, 0.69)	4.47	<0.001	$Q(14)=55.28, p<0.001$	57

Note. A significant  $Q$  value indicates that homogeneity should be rejected (i.e., effect sizes are heterogeneous). Participants were only included once each for multiple analyses from the same study.

<sup>a</sup> Reports the number of studies with  $d=0.00$  needed to reduce the mean  $d$  to the  $d$  criterion value (0.10).

### 1.3. Statistical analyses

Two studies in the analysis included two comparison groups, such as a relaxation or stretching treatment group in addition to a waitlist control group. For these studies, effect sizes associated with both comparisons were included in the analysis. Several studies provided outcome data for more than one time period following treatment completion. We used the longest follow-up period.

Separate mean effect sizes were calculated for each category of outcome variable (e.g., fatigue self-rating) and for each type of outcome variable (mental, physical, and mixed mental and physical). Studies generally included multiple outcome measures. For all analyses except those that compared different categories or types of outcome variables, we used the mean effect size of all the relevant outcome variables of the study. For analyses comparing different categories or types of outcome variables, we used the outcome variable as the unit of analysis.

Biased mean-difference effect sizes ( $g$ ) were calculated based on means and standard deviations (Hedges & Olkin, 1985; Lipsey & Wilson 2001a; Wolf, 1986). In accordance with the recommendations of Hedges and Olkin (1985),  $g$  was adjusted for sample size producing an unbiased effect size ( $d$ ). Inverse variance weighting ( $w$ ) following equations recommended by Lipsey and Wilson (2001b) was employed to compute descriptive and inferential statistics. Homogeneity analysis was performed using the  $Q$  statistic (Lipsey & Wilson, 2001b). The effect sizes for the outcome variables across all studies were examined for univariate outliers (criterion  $z=3.30, p=0.001$ ). We identified two outcome-variable effect sizes (each a reaction time measure) in the study of O'Dowd et al. (2006) as univariate outliers and Winsorized them (i.e., reduced them to the closest non-outlier value for the outcome variables in that study).

## 2. Results

The analyses included a total of 13 studies, 15 analyses (because two studies each had two comparison groups), and 1,371 participants. Table 1 describes each study, including CBT dropout rate, and reports the effect size for each analysis included in the meta-analysis. The mean CBT dropout rate was 12%. Table 2 shows that across analyses there was a significant difference,  $d=0.48$ , between CBT and control groups; fatigue levels of CBT groups were on average lower by almost half a standard deviation compared with the control groups at the latest post-treatment assessment. According to a fail-safe analysis shown in Table 2, 57 similar studies finding no effect would be needed to reduce the overall effect size to a meaningless low level.

Eight of the 13 treatment studies reported percentages of CBT clients who achieved clinically significant improvement. Five of these studies reported specifically the number of CBT clients who were in the normal range on fatigue at the latest follow-up. We

Table 3

Moderator analysis for types of fatigue assessed, mixed effects model (Method of Moments Random Effects) analysis,  $N=62$ 

Source	Physical	Mental	Mixed physical and mental
$d$	0.81	0.20	0.52
$CI_{-95\%}$	0.50	-0.20	0.34
$CI_{+95\%}$	1.11	0.59	0.69
$z$	5.21	0.98	5.76
$p_d$	<0.001	0.325	<0.001
$n_d$	14	8	40
$Q_{\text{within}}$	20.81	0.27	53.64
$df_Q$	13	7	39
$p_Q$	0.077	1.000	0.059

Note.  $Q_{\text{between}}(2)=5.90, p=0.052$ .

Table 4

Moderator analysis for fatigue assessment by type of outcome measure, mixed effects model (Method of Moments Random Effects) analysis, N=62

Source	Fatigue self-rating	Functional impairment self-rating	Objective functioning	Interview based functioning	Self rating of improvement
<i>d</i>	0.54	0.45	0.52	0.87	0.58
<i>CI</i> <sub>-95%</sub>	0.26	0.12	0.28	0.30	0.14
<i>CI</i> <sub>+95%</sub>	0.81	0.78	0.76	1.44	1.01
<i>z</i>	3.76	2.69	4.20	3.00	2.60
<i>p</i> <sub><i>d</i></sub>	<0.001	0.007	<0.001	0.003	.009
<i>n</i> <sub><i>d</i></sub>	17	12	22	4	7
<i>Q</i> <sub>within</sub>	12.92	9.07	43.80	1.11	8.60
<i>df</i> <sub><i>Q</i></sub>	16	11	21	3	6
<i>p</i> <sub><i>Q</i></sub>	0.679	0.615	0.003	0.775	.197

Note. *Q*<sub>between</sub> (4)=1.62, *p*=0.806.

converted these numbers into percentage of clients assigned to CBT who were in the normal range at the latest follow-up. This is a more conservative statistic than number of completers who were in that range. Huibers et al. (2004) did not report numbers but did report 33% moved into the normal range; O'Dowd et al. (2006) had 18 of 52 (35%); Chalder et al. (1997) had 33 of 70 (53%); Stulemeijer et al. (2005) had 21 of 36 (58%); and Sharpe et al. (1996) had 22 of 30 (73%). The unweighted average across these five studies was 50%. Three other studies reported the number of CBT clients who showed a large improvement at the time of the latest follow-up or were in or near the normal range. Prins et al. (2001) reported 28 of 92 (30%); Deale et al. (1997) 19 of 30 (63%); and Powell et al. (2001) 26 of 38 (68%). The unweighted average across these three studies was 54%.

Table 3 shows that there was a trend towards a significant difference between levels of fatigue type, with physical fatigue having a large effect size in terms of Cohen's (1988) standards, while the effect size for mental fatigue was small, and the mixed physical and mental fatigue effect size was moderate.

Table 4 shows no significant differences in effect size for objective versus other types of fatigue assessment. The objective measures of functioning had roughly the same effect size as interview ratings of functioning, and self-ratings of fatigue, functional impairment, and improvement.

Table 5 shows the impact of several potential moderators. The results indicate that treatment including only the prompting of gradual increases in physical activity had a nonsignificantly higher effect size than treatment that also included cognitive components. Analyses with credible control groups had nonsignificantly higher effects sizes than analyses with control groups of treatment as usual, waiting list, or simple advice. Studies that included only participants with CFS showed a nonsignificantly higher effect size than studies with mixed CFS and other fatigue participants. Studies that used the Oxford diagnostic criteria had a trend towards significantly higher effect sizes than studies that used the CDC 1994 criteria.

Table 5

Moderator analysis for effect sizes by treatment features and diagnosis, mixed effects model (Method of Moments Random Effects) analysis

Factor	Homogeneity analysis			<i>d</i> ( <i>CI</i> <sub>-95%</sub> , <i>CI</i> <sub>+95%</sub> )	<i>Q</i> <sub>within</sub>	<i>df</i>	<i>p</i>	<i>d</i> ( <i>CI</i> <sub>-95%</sub> , <i>CI</i> <sub>+95%</sub> )	<i>Q</i> <sub>within</sub>	<i>df</i>	<i>p</i>
	<i>Q</i> <sub>between</sub>	<i>df</i>	<i>p</i>								
Treatment type	0.53	1	0.466	Activity with no cognitive treatment 0.60 (0.21, 0.99)	7.39	4	0.117	Activity plus cognitive treatment 0.43 (0.18, 0.68)	8.86	9	.450
Treatment format	0.83	1	0.361	Individual 0.44 (0.22, 0.66)	16.52	12	0.169	Group 0.72 (0.16, 1.27)	0.00	1	.992
Comparison group	1.00	1	0.318	Waiting list or tx as usual or simple advice 0.41 (0.15, 0.66)	12.10	9	0.208	Credible comparison (e.g., relax, stretch or client cent) 0.63 (0.27, 1.00)	3.87	4	0.424
Sample type	1.75	1	0.186	Not all chronic fatigue 0.30 (-0.04, 0.63)	3.96	4	0.412	All chronic fatigue 0.59 (0.33, 0.85)	11.87	9	0.221
Diagnostic criteria	2.13	1	0.145	CDC 0.40 (0.02, 0.78)	2.11	5	0.834	Oxford 0.83 (0.40, 1.26)	6.89	4	0.142

Note. CDC=Centers for Disease Control, 1994.

Table 6  
Correlation matrix by treatment and study features ( $N$  from 13 to 15)

Source	2	3	4	5
1. $d$	0.47	0.30	0.22	0.17
2. Hours of treatment		0.85**	0.66*	0.84**
3. Number of sessions		–	0.41	0.52*
4. Months follow-up			–	0.79**
5. Quality of study				–

Note. Coding: hours of treatment ranged from 0.2 to 16; numbers of sessions ranged from 1 to 16; months of follow-up ranged from 3 to 14.  
\* $p < 0.05$ . \*\* $p < 0.01$ .

Table 6 shows the correlations between effect size and four possible interval-level moderators: number of hours of treatment, number of sessions, months of follow-up, and quality of study. All four correlations were nonsignificant, but there was a trend in the direction of number of hours of treatment being positively associated with larger effect sizes.

In addition to searching for moderators, as planned, we noticed that two studies showed essentially 0 effect size for CBT (Huibers et al., 2004; Ridsdale et al., 2001). All the other studies showed positive effects for CBT.

### 3. Discussion

This meta-analysis included 13 studies and a total  $N$  of 1371 individuals with CFS or a similar disorder. Across a total of 15 group comparisons, the mean effect size for CBT was  $d = 0.48$ , nearly a medium effect size by the standards suggested by Cohen (1988). These treatments, although all cognitive behavioral, varied widely in intensity and specific therapeutic methods. The present meta-analytic findings quantify and support the reviews that have concluded that CBT has produced promising results when applied to chronic fatigue syndrome (Chambers et al., 2006; Rimes & Chalder, 2005; Whiting et al., 2001).

The meta-analytic effect size found for cognitive behavioral treatments of CFS and related fatigue disorders is very close to the effect size ( $d = 0.47$ ) found by Lipsey and Wilson (1993) across 302 treatment-efficacy studies including a wide variety of disorders and treatment types. Hence, one can conclude that CBT for chronic fatigue disorders has about the same efficacy as diverse psychological treatments for a variety of psychological disorders. This similarity might be relevant to whether the next Diagnostic and Statistical Manual, DSM-V, includes CFS as a diagnosis.

The present meta-analytic results do not indicate, however, that CBT helped every client cease to meet diagnostic criteria. Percentage of clients assigned to CBT who were in the normal range at the latest follow-up varied from 33% to 73% in the five studies that reported the relevant data. The mean was 50%. These results are similar to those of Knopp, Bleijenberg, Gielissen, van der Meer, and White (2007), who found that of 96 CFS clients who completed CBT in an uncontrolled study, 48% had levels of fatigue similar to healthy individuals at the latest assessment. If all the 112 clients assigned to CBT in the Knoop study were included, the numbers would be 46 of 112 (41%). The present results, in combination with those of Knopp et al. (2007), suggest that CBT tends to have substantial positive effects on chronic fatigue syndrome and similar disorders, but that considerable room for improvement in outcomes exists.

Effect sizes across studies were heterogeneous, suggesting unknown factors that determine to some the extent of the efficacy of the treatments. Hence, as is usually the case with meta-analyses, the results cannot perfectly predict how the studied treatments will affect a particular client (Fava, 2006; Sensky, 2005; Wise, 2006).

Mean (unweighted) dropout rate of the CBT group in the 13 studies was 16%, with a wide range of 0–42%. The mean of 16% is similar to a 17% dropout rate reported for 432 clients receiving CBT for anxiety disorders (Hunt & Andrews, 1992). Hence, it seems that dropout with chronic fatigue clients is not unusually high, although for clinical purposes, it is certainly better to have dropout near the lower end of the 0–42% range.

Two studies showed essentially 0 effect size for CBT (Huibers et al., 2004; Ridsdale et al., 2001). The finding of Ridsdale and colleagues seems due to the use of a bona fide treatment, client-centered therapy, as a comparison condition. The finding of Huibers and colleagues may have to do, as the researchers concluded, with the nature of the therapy providers in that study, who were general practitioner medical doctors given 10 h of training in the treatment methods, and regular supervision. Alternatively, lack of an effect in that study may have been due to something about the participants, who were all on sick leave from work. The one study that involved treatment of only adolescents

(Stulemeijer et al., 2005) showed a positive effect size ( $d=0.31$ ), so there appears to be no reason to think that CBT is ineffective for adolescents.

The moderator search produced only some nonsignificant trends. For instance, there was a nonsignificant trend towards studies that used the Oxford diagnostic criteria having a larger effect size than studies that used the CDC 1994 diagnostic criteria. If this difference continues to be found in future studies, one might wonder whether clients with the medical-problem criteria required only for the CDC standards are harder to treat and perhaps different in other important ways as well.

There was a nonsignificant trend for studies that included only individuals diagnosed with CFS to have larger effect sizes than studies that set a slightly lower standard for inclusion (e.g., four months of unexplained fatigue). The results suggest that fatigue that has lasted longer is *not* harder to treat.

The type of control group used in a treatment study was not significantly associated with effect size. The highest level of control groups, including credible treatment such as supervised stretching and client centered treatment, had a slightly *higher* effect size than the lowest level of control groups, including no treatment or treatment as usual. The finding that effect size does not vary significantly with type of control group is consistent with the conclusion of a recent meta-analysis that little of the effect of CBT for chronic fatigue syndrome is due to placebo (Cho et al., 2005). However, meta-analyses of psychological treatment in general indicate that tested treatments tend to have somewhat larger effect sizes when compared to lower levels of control groups than when compared to credible control treatments (Grissom, 1996; Lipsey & Wilson, 1993).

A comparison in the present meta-analysis of treatments with and without cognitive elements provided no significant evidence that including cognitive components led to a greater effect. In fact, a trend occurred in favor of not including cognitive components. Similarly, a fatigue-treatment study by Ridsdale, Darbishire, and Seed (2004) compared graded exercise therapy with graded exercise therapy plus cognitive and sleep interventions and found no significant difference in effects. The finding of no significant difference between different types of treatment may relate to the meta-analytic finding of Wampold et al. (1997) that different bona fide treatments tend to have about the same effect. At any rate, there presently appears to be no empirical basis for including cognitive components in treatment of fatigue disorders. Because all the treatments studied in the present meta-analysis included prompting of gradual increases in activity, the meta-analysis could not assess whether the activity components added potency to the treatment.

In the present meta-analysis, hours of treatment ranged from 0.2 to 16. There was a substantial but nonsignificant association ( $r=0.47$ ) between number of treatment hours and effect size. The nonsignificant association between number of sessions and effect size was smaller (0.22) than for number of treatment hours, but in the same direction. This trend is consistent with findings across types of therapy and types of psychological problem that clients tend to continue to improve from session to session, with sharp increases over the first 10 sessions (Lambert & Ogles, 2004).

Positive effects of treatment of chronic fatigue disorders varied widely with regard to whether the fatigue was mental ( $d=0.20$ ) or physical ( $d=0.81$ ). The larger effect size for physical fatigue might be due to the inclusion in each experimental treatment of prompting gradual increases in physical activity. While many of the study reports mentioned a focus on increasing physical activity, no study report mentioned any emphasis on increasing mental activity. One must wonder whether more prompting of gradual increases in mental activities might lead to greater reductions in mental fatigue. Possible engaging activities that are mostly mental might include reading, solving anagrams and crossword puzzles, and playing cards, board games, and computer games.

Effects of treatment did not vary significantly between objective and subjective measures. That finding may suggest that treatment benefits extend about equally to subjective reports and to observable behavior, such as cognitive test performance and work and school attendance.

The one study (O'Dowd et al., 2006) that tested group CBT produced an effect size similar to those of the other studies. Equivalence between individual and group treatment is commonly found in psychotherapy research (McRoberts, Burlingame, & Hoag, 1998).

The overall methodological quality of a study was not significantly related to effect size ( $r=0.17$ ). One aspect of methodological quality, length of follow-up, also was not significantly associated with effect size, but there was a slight trend in favor of longer follow-up being associated with a *larger* effect size. This trend, if supported by more studies, would suggest that improvement is maintained over time and would be consistent with those of meta-analyses of many treatment types for various problems (Lambert & Ogles, 2004).

Conclusions that can be drawn from the moderator analyses are limited because the analyses included a relatively low number of studies, which created low power for identifying significant differences. Hence, the finding of no

significant differences between two levels of a possible moderator might be due to low power rather than the absence of a difference. Conclusions are also limited because group differences are quasi-analytic; the lack of random assignment to different levels of the moderator makes causal interpretations inappropriate. Hence, the moderator results serve best as sources of hypotheses for future experimental research.

Future research on treatment of CFS and similar disorders might examine, with experimental methods where possible, (1) whether the number of hours of CBT affects outcome; (2) whether prompting gradual increases in mental activity leads to greater effects on mental fatigue than current CBT methods; (3) what methods reduce dropout in CBT; (4) how to increase the percentage of CFS clients who move into and stay in the normal range with regard to fatigue; and (5) whether there are important differences between individuals who meet the CDC 1994 (Fakuda et al., 1994) criteria for CFS and those who meet the Oxford criteria (see Cairns & Hotopf, 2005). Researchers who study the efficacy of treatment for CFS could aid future meta-analyses by providing detailed information about the treatment (e.g., number of sessions); by providing an effect size, preferably Cohen's *d*, for each outcome variable, whether significant or not; and by specifying the number of clients in each treatment group who at the latest assessment are in the normal range with regard to fatigue.

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<sup>1</sup> References marked with an asterisk indicate studies included in the meta-analysis.

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