Journal of Consulting and Clinical Psychology

Effect of Cognitive-Behavioral Therapy for Anxiety Disorders on Quality of Life: A Meta-Analysis

Stefan G. Hofmann, Jade Q. Wu, and Hannah Boettcher

Online First Publication, January 20, 2014. doi: 10.1037/a0035491

Journal of Consulting and Clinical Psychology

0022-006X/14/$12.00 DOI: 10.1037/a0035491

Effect of Cognitive-Behavioral Therapy for Anxiety Disorders on Quality of Life: A Meta-Analysis

Stefan G. Hofmann, Jade Q. Wu, and Hannah Boettcher
Boston University

Objective: Although cognitive-behavioral therapy (CBT) is effective for treating anxiety disorders, little is known about its effect on quality of life. To conduct a meta-analysis of CBT for anxiety disorders on quality of life, we searched for relevant studies in PubMed, PsycINFO, and the Cochrane Library and conducted manual searches. ***Method:*** The search identified 44 studies that included 59 CBT trials, totaling 3,326 participants receiving CBT for anxiety disorders. We estimated the controlled and within-group random effects of the treatment changes on quality of life. ***Results:*** The pre-post within-group and controlled effect sizes were moderately strong (Hedges's $g = 0.54$ and Hedges's $g = 0.56$, respectively). Improvements were greater for physical and psychological domains of quality of life than for environmental and social domains. The overall effect sizes decreased with publication year and increased with treatment duration. Face-to-face treatments delivered individually and in groups produced significantly higher effect sizes than Internet-delivered treatments. ***Conclusion:*** CBT for anxiety disorders is moderately effective for improving quality of life, especially in physical and psychological domains. Internet-delivered treatments are less effective than face-to-face treatments in improving quality of life.

Keywords: quality of life, life satisfaction, anxiety disorders, cognitive-behavioral therapy

Anxiety disorders are the most prevalent psychiatric disorders, with a lifetime prevalence rate of 28.8% (Kessler et al., 2005). These disorders are associated with high personal and economic costs (DuPont et al., 1996) and low quality of life (Cramer, Torgersen, & Kringlen, 2005; Mendlowicz & Stein, 2000; Olatunji, Cisler, & Tolin, 2007; Rapaport, Clary, Fayyad, & Endicott, 2005). For example, it has been reported that those with obsessive-compulsive disorder (Koran, Thienemann, & Davenport 1996), panic disorder (Candilis et al., 1999; Rubin et al., 2000), and social anxiety disorder (Safren, Heimberg, Brown, & Holle, 1996–1997; Wittchen & Beloch, 1996) have substantially poorer quality of life than community samples. In some cases, anxiety disorders have an even greater impact on quality of life than chronic medical disorders (Sherbourne, Wells, & Judd, 1996; Spitzer et al., 1995).

Quality of life (QOL) is difficult to define. It includes subjective well-being, life satisfaction, perceptions of social relationships, physical health, economic status, and functioning in daily activities and work (Angermeyer & Kilian, 1997; Mendlowicz & Stein, 2000). Accordingly, the assessment of QOL typically includes subjective views of one's life circumstances, perceptions of mental and physical health, social and family relationships, and functioning at work and home (DuPont et al., 1996).

Cognitive-behavioral therapy (CBT) is an effective treatment for reducing symptoms of anxiety disorders (Hofmann & Smits, 2008). Although symptom reduction is an important goal of treatment, some authors have urged investigators to include QOL as another important indicator of treatment efficacy (Frisch, 1998; Gladis, Gosch, Dishuk, & Crits-Christoph, 1999). Our objective in this study was to conduct a quantitative review of the effect of CBT on QOL in patients with anxiety disorders. Although there are different emphases of the various cognitive and behavioral techniques for the range of anxiety disorders, one important commonality of these treatment protocols is the premise that cognitions causally influence fear and anxiety and that the dysfunctional beliefs and cognitive distortions contribute to the maintenance of anxiety disorder (Hofmann, Asmundson, & Beck, 2013). This premise is one of the defining features of a variety of treatment protocols including more traditional CBT protocols as well as more modern mindfulness-based cognitive therapy. At the same time, this core assumption is the primary distinguishing feature of other treatments, such as acceptance and commitment therapy and mindfulness-based stress reduction. Our review focuses only on CBT protocols that share the core premise of the centrality of maladaptive cognitions.

We examined controlled and within-group random effect sizes of changes in QOL during the course of CBT for specific phobias, panic disorder with and without agoraphobia, social anxiety disorder, generalized anxiety disorder, obsessive-compulsive disorder, and posttraumatic stress disorder. To examine whether study quality moderated the effect of CBT on QOL, we quantified study quality by using Effective Public Health Practice Project criteria (EPHPP; Thomas, Ciliska, Dobbins, & Micucci, 2004). The effects of study quality and publication year are two important reporting items identified by the PRISMA group (Moher, Liberati, Tetzlaff,

Stefan G. Hofmann, Jade Q. Wu, and Hannah Boettcher, Department of Psychology, Boston University.

Stefan G. Hofmann is supported by National Institute of Mental Health Grant R01AT007257.

Correspondence concerning this article should be addressed to Stefan G. Hofmann, Department of Psychology, Boston University, 648 Beacon Street, 6th Floor, Boston, MA 02115. E-mail: shofmann@bu.edu

& Altman, 2009). In a large-scale analysis of 2,400 patients, treatment length has been demonstrated to positively correlate with efficacy of CBT (Howard, Kopta, Krause, & Orlinsky, 1986). Furthermore, Internet-based delivery of CBT for anxiety disorders has proven to be promising but not uniformly efficacious across extant trials (Andersson, 2009). Therefore, we also examined whether treatment administration modality (individual face-to-face, group face-to-face, and Internet-delivered) moderated the effect of the treatment on quality of life.

Method

Searching

A search was conducted on February 19, 2013, in PubMed, PsycINFO, and the Cochrane Library for all available studies. The following three sets of search terms were used simultaneously: (a) *quality of life* or *quality-of-life;* (b) *cognitive-behavi** or *cognitive behavi** or *behavio*[u]ral therapy or *cognitive therapy*; and (c) *anxiety* or *anxious or panic* or *agoraphobia* or *social phobia* or *social anxiety* or *SAD* or *generalized anxiety* or *GAD* or *obsessive compulsive* or *obsessive-compulsive* or *OCD* or *specific phobia* or *simple phobia* or *post-traumatic stress* or *posttraumatic stress* or *PTSD* or *acute stress* or *ASD.* In addition, manual searches for potentially relevant studies were conducted via published papers' reference lists.

Selection

Studies were selected by two of the authors and three independent trained assessors. Studies were included in the present meta-analysis if (a) they included at least one treatment condition described as cognitive-behavioral intervention, and if this was the primary treatment (i.e., not an adjunct to a primarily pharmacological intervention); (b) they included a sample diagnosed with one or more anxiety disorders; (c) they included a sample of adults at or above the age of 18; (d) they included at least one measure of QOL at pre- and postintervention; and (e) they provided sufficient data for performing an effect sizes meta-analysis. In case of disagreement regarding a study's inclusion qualification between assessors, the authors discussed the case until consensus was reached.

Studies were excluded if (a) a full text or full English translation was unavailable; (b) the study was a qualitative study, a meta-analysis, or a review paper; (c) the anxiety disorder studied was secondary to another psychiatric condition or a nonpsychiatric medical condition (e.g., cancer patients with anxiety); and (d) the data reported in the study overlapped with those reported in another study considered for inclusion.

As for how we determined the primary anxiety disorder being evaluated in each study, we deferred to the original study's authors. That is, whichever disorder they specifically recruited (i.e., listed in their inclusion criteria) was the common principal diagnosis among all patients in their trial and, therefore, the principal disorder we considered the trial to evaluate. We took precautions to exclude studies in which anxiety disorders were secondary to nonanxiety and nonpsychiatric conditions.

If two articles reported data from the same trial, the article providing the most complete data was chosen. If multiple control groups were used alongside the target intervention group, the most active control group was chosen as the comparison condition (e.g., if both a stress management group and a waitlist control group were used, the data of the stress management group were chosen as the comparison to CBT).

Validity Assessment

Two trained independent assessors judged the quality of each trial using the following domains (Thomas et al., 2004): (a) selection bias; (b) study design (i.e., to what extent trials were randomized and/or controlled); (c) confounders; (d) blinding; (e) data collection methods (i.e., self report, assessment, physiological measures); (f) withdrawals and dropouts; (g) intervention integrity; (h) appropriateness of analysis to study question. For each domain, a score of "strong," "moderate," or "weak" was assigned according to quantitative standards issued by the Effective Public Health Practice Project (EPHPP); domain scores then were used to generate a global score for each trial that ranged from 1 to 3, with 1 being the best score (Thomas et al., 2004). For example, controlled trials in which assessors and participants were both blind to condition received a score of "strong" on the blinding domain, whereas trials in which neither assessors nor participants were blind to condition received a score of "weak" on the blinding domain. Then, following EPHPP guidelines, a global quality score was computed based on the number of domains with "weak" scores. The global score for each trial could range from 1 to 3, with 1 being the best score and reflecting no "weak" domain ratings; 2 reflecting one "weak" rating, and 3 reflecting two or more "weak" ratings (Thomas et al., 2004). Each study was independently judged by two assessors, who received extensive prior training supervised by the first author. After all studies were assessed, consensus was reached through discussion among assessors and the authors where there was disagreement.

In order to address potential publication bias, a fail-safe *N* (Rosenthal, 1991; Rosenthal & Rubin, 1988) was conducted. The fail-safe *N* represents the number of studies not included in the meta-analysis needed to nullify the effect size, and it must be greater than $5K + 10$ for the effect size to be considered robust. In addition, we constructed a funnel plot to assess publication bias, and further used the trim and fill method (Duval & Tweedie, 2000) to examine whether negative or positive trials are under- or over-represented. This method takes into account sample size of studies and can be used to recalculate the effect size estimate.

Data Extraction

For each selected study, we examined all of the reported measures assessing quality of life and anxiety symptoms. All identified quality of life measures had been previously psychometrically validated. We found no reason to exclude any quality of life measures, with one exception: We chose to exclude data from Marks's Quality of Life Scale (Marks, Dunn, & Woolcock, 1992), which assesses QOL specifically in individuals with asthma. Numerical data for QOL and anxiety measures were then extracted from the studies in order to compute pre- to posttreatment changes. One author (J. Q. W.) extracted data based on objective criteria (i.e., means and standard deviations, where available, of pre- and postassessment scores on measures of anxiety symptoms and quality of life. Then, another author (H. B.) cross-checked data from

20% of included studies, with 100% agreement. Data on pre- and posttreatment measures were extracted for CBT treatment conditions, as well as control groups (i.e., participants who did not receive any treatment, such as in a waitlist control condition) and active comparison groups (i.e., participants who received clinical care that was not CBT, such as enhanced usual care or stress management training). In cases in which relevant data were not reported in the published study, the corresponding authors were contacted and asked to supply the required data.

Study Characteristics

Information about participant characteristics, study design, details of intervention, outcome measures used, and other study characteristics was extracted.

Quantitative Data Synthesis

We used Hedges's g and its 95% confidence interval as an indicator of effect size for QOL outcomes and anxiety symptom outcomes (Hedges & Olkin, 1985). Hedges's g is a version of Cohen's d that takes into account bias from small sample size (Hedges & Olkin, 1985). Within-group effect size were calculated with the following formula: $d = \left(\frac{\bar{Y}_1 - \bar{Y}_2}{S_{Difference}}\right)\sqrt{2(1-r)}$, where $\bar{Y}_1$ is the pretreatment sample mean, $\bar{Y}_2$ is the posttreatment sample mean, $S_{Difference}$ is the standard deviation of the difference, and r is the correlation between pretreatment and posttreatment scores. Hedges's g can be computed by multiplying d by correction factor $J(df) = 1 - \frac{3}{4df - 1}$, where df is the degrees of freedom to estimate the within-group standard deviation.

The controlled effect sizes were computed with the following formula:

$$g = \frac{\bar{\Delta}_{CBT} - \bar{\Delta}_{CONT}}{\sqrt{\frac{(n_{CBT} - 1)SD^2_{CONT} + (n_{CONT} - 1)SD^2_{CBT}}{(n_{total} - 2)}}} \times \left(1 - \frac{3}{4(n_{CBT} + n_{CONT}) - 9}\right),$$

where Δ is the mean pre- to posttreatment change, SD is the standard deviation of posttreatment scores, n is the sample size, and $CONT$ refers to the control condition.

Pre-post measure correlations were needed in order to calculate the effect sizes. If these correlations were not provided in published reports, we followed recommendations by Rosenthal (1991) to assume a conservative estimation of $r = .7$. Further, because studies included in this meta-analysis were not functionally identical, we calculated the QOL effect size estimates with the random-effects model rather than the fixed-effects model (Hedges & Vevea, 1998; Moses, Mosteller, & Buehler, 2002).

Following Cohen (1988), we interpret effects as small (0.2), medium (0.5), or large (0.8). In trials where there were multiple measures of QOL, we averaged effect size estimates across these measures for each trial. Differences in outcome between subsets of trials were evaluated with Cochran's Q test of heterogeneity.

Moderator Analyses

We examined whether the QOL effect sizes varied as a function of study characteristics (study year, treatment length, study quality, treatment modality), or clinical characteristics (diagnostic category, anxiety symptom improvement). For categorical moderators, we computed separate QOL effect sizes for each group. For continuous moderators, we used meta-regression analyses to compute unstandardized regression coefficients. All analyses were conducted with the program Comprehensive Meta-Analysis, Version 2 (Borenstein, Hedges, Higgins, & Rothstein, 2005).

Results

Trial Flow

Our study selection process is shown in Figure 1. Of 858 hits identified for potential inclusion through database and manual searches (the oldest of which was published in 1985), 52 published articles met all inclusion criteria. Of these articles, 14 did not report adequate data for our analysis needs in their published version, so corresponding authors for each were contacted for additional data. Six of these authors were able to provide the necessary data, resulting in a final count of 44 studies included in the present meta-analysis. Across all 44 publications, we identified 59 independent trials. These trials included data for 3,326 patients. The targeted disorders included social anxiety disorder (18), panic disorder (18), posttraumatic stress disorder (5), generalized anxiety disorder (8), obsessive-compulsive disorder (7), mixed anxiety disorders (2), and specific phobia (1).

Study Characteristics

We used the EPHPP rating system (Thomas et al., 2004) to evaluate the quality of the studies. As shown in Table 1, the scores ranged from 1 to 3 with a median of 1 ($M = 1.51$, $SD = 0.66$). The intercoder agreement was 93% after the first round of assessments, after which 100% consensus was reached through discussion between the assessors and the authors. Details of study characteristics are shown in Table 1. The table further depicts the type of the disorder that was targeted, the number of participants included in each trial, the percent of female participants per trial, the mean age of participants, the type of comorbid diagnoses, information on concurrent medication use, details on the CBT intervention, number of treatment sessions, time duration of each treatment session, details about the comparison conditions, and measures of quality of life and anxiety.

Participant/Patient Characteristics

Participants in the analyzed trials included both males and females (with the exception of Schnurr et al., 2003, which used an all-male veteran sample), with most samples averaging ages in the mid-30s to mid-40s (except for trials that specifically examined anxiety in elderly populations in their 60s and beyond). All but three studies (Mörtberg, Clark, & Bejerot, 2011; Schneier et al., 2010, 2012) included participants on stable psychotropic medications, including those indicated for anxiety disorders. Among the most common medications used by participants during the course of

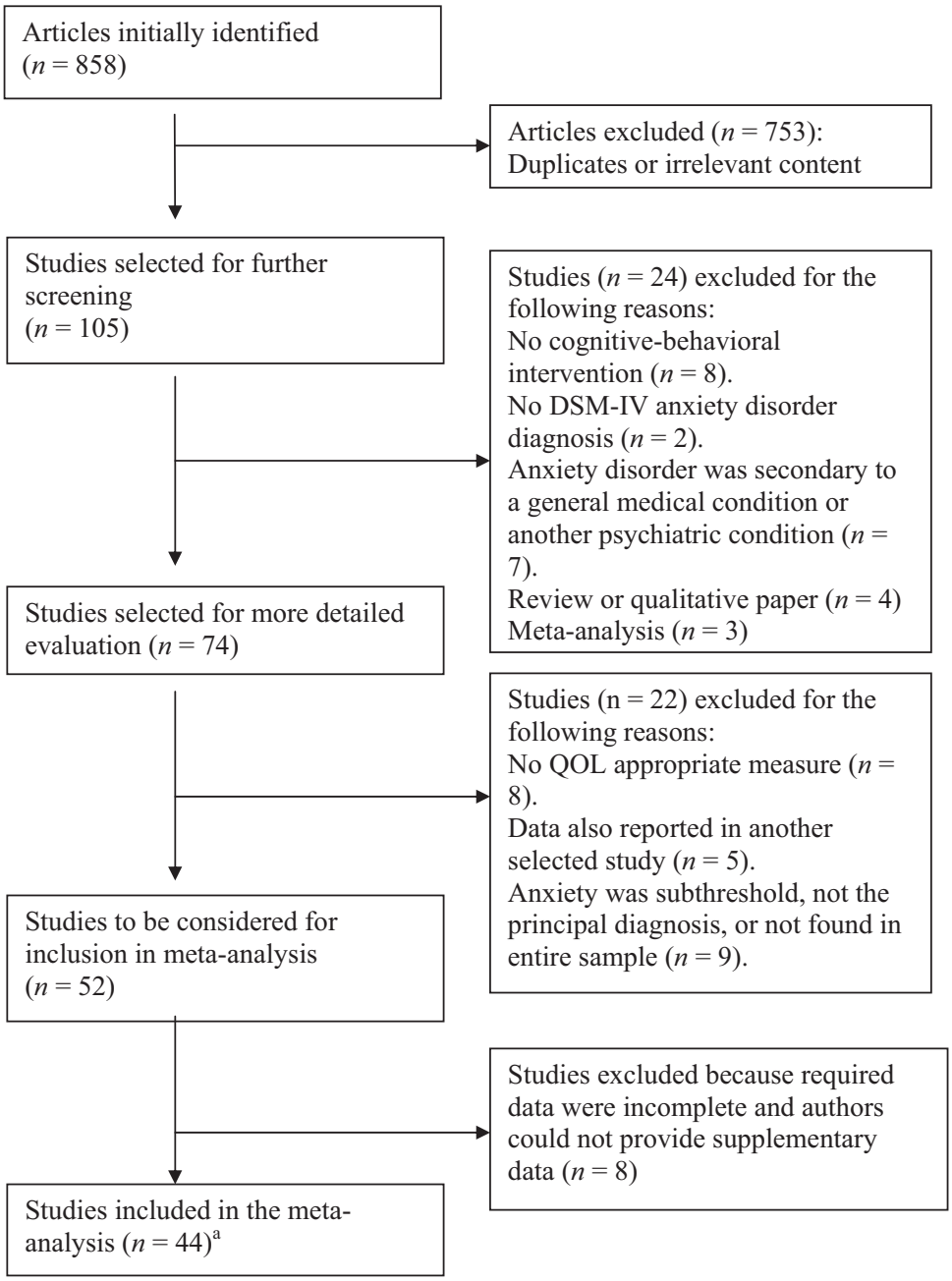

Figure 1. Flow diagram of study selection process. Across the 44 published papers selected for analysis, there were 59 distinct CBT trials. DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.); QOL = quality of life; CBT = cognitive-behavioral therapy.

treatments were selective serotonin reuptake inhibitors and, less frequently, other antidepressants and benzodiazepines. All but one trial (Arch, Eifert, Davies, & Viladarga, 2012) excluded participants with psychosis, substance use/dependence, and bipolar disorder.

QOL Measure Characteristics

We extracted data from all QOL measures relevant to general physical and psychological health, as well as quality of social and environmental/role functioning. The two most frequently used scales were the Quality of Life Inventory (QOLI; Frisch, Cornell, Villanueva, & Retzlaff, 1992) and the World Health Organization Quality of Life Assessment (WHOQOL-BREF; WHOQOL Group, 1998). The QOLI is a 32-item scale that measures quality of life broadly, in domains such as love, work, recreation, self-esteem, and surroundings. It has been shown to be sensitive to treatment-related change (Frisch, Clark, et al., 2005). The WHOQOL-BREF is a 26-item questionnaire measuring a similar range of domains. It is used in a wide range of nonpsychiatric medical settings (WHOQOL Group, 1998).

Table 1
Study Characteristics

Study	Study quality	Disorder	Total *N*	% female	Age, *M* (*SD*)[b]	Comorbid diagnoses	Medication	CBT intervention	No. of treatment sessions or modules	Time per session (min.)	Comparison condition(s)	QOL measures	Anxiety measures
Agdal et al. (2012)	2	Specific phobia (intra-oral injection)	49	78.2	35.5 (12.2)	Unknown	Unknown	CBT, brief CBT	5, 1	180, 60	None	QOLI	IPS-A, DAS
Andersson et al. (2006)	1	SAD	64	56.3	36.4 (9.4)	Comorbid diagnoses: 12.5%	Allowed stable. Any: 21.9%	Internet-delivered self-help	n/a	n/a	Waitlist	QOLI	LSAS, SPS, SIAS, BAI
Arch et al. (2012)	1	Mixed anxiety disorders	128	52.3	37.9 (11.7)	Comorbid anxiety: 33.1%, comorbid MDD: 23.6%	Allowed stable. Any: 48.0%	CBT	12	60	Acceptance and commitment therapy	QOLI	ADIS-IV, ASI
Carlbring et al. (2005)	1	PD	49	71.0	35.0 (7.7)	Comorbid agoraphobia: 51%, comorbid other anxiety: 49%, comorbid MDD: 6%	Allowed stable; Antidepressants; 36.7%, anxiolytics: 14.3%	ICBT, live CBT	10 modules	60	None	QOLI	BAI
Carlbring, Bohman, et al. (2006)	1	PD	60	60	36.7	Excluded comorbidities in need of treatment	Allowed. Any: 54%	Internet-delivered self-help	10 modules	n/a	Waitlist	QOLI	BAI
Carlbring, Furmark, et al. (2006)	2	SAD	26	69.2	33.5 (9.3)	Comorbidities allowed but unknown	Allowed stable. Any: 30.7%, antidepressants: 11.5%	Internet-delivered self-help	9 modules	n/a	None	QOLI	LSAS, SPS, SIAS, BAI
Carlbring et al. (2011)	1	Any *DSM–IV* anxiety disorder	54	76	38.8 (10.7)	Comorbid diagnoses: 50%	Allowed stable. Any: 33%	ICBT	6–10 modules	n/a	Attention control (online discussion group)	QOLI	BAI
Cordioli et al. (2003)	1	OCD	47	51.1	36.5 (12.8)	Comorbidities allowed but unknown	Allowed stable; 44.7% using anti-obsessionals	CBGT	12	120	Waitlist	WHOQOL-BREF	Y-BOCS, HAM-A
Craigie et al. (2008)	2	GAD	23	74	43.4 (13.1)	Allowed. Any: 78%, MDD current/ remission:69%, other anxiety: 26%	Allowed stable; 35% using antidepressants or anxiolytics	MBCT	9	120	None	Q-LES-Q	DASS, BAI
Diefenbach et al. (2007)	2	OCD	70	Unknown	36.8 (11.2)	Comorbidities allowed but unknown	Allowed stable; 80% using anti-obsessionals	CBT	15	Unknown	None	SDS	Y-BOCS
Eng et al. (2001)	3	SAD	25	40	35.8 (11.7)	Unknown	Unknown	CBGT	12	Unknown	None	QOLI	SIAS, SPS, LSAS
Eng et al. (2005)	3	SAD	40	42	34.4 (14.9)	Comorbidities allowed but unknown	Unknown	CBGT	12	120	None	QOLI	SIAS, SPS, BFNE
Furmark et al. (2009), Trial 1	1	SAD	120	67.5	36.1	Comorbidities allowed but unknown	Allowed stable; 6.6% using	ICBT, bibliotherapy	9 modules	n/a	Waitlist	QOLI	LSAS-SR, SPS, SIAS, SPSQ, BAI
Furmark et al. (2009), Trial 2	1	SAD	115	67.8	34.7	Comorbidities allowed but unknown	Allowed stable; 14% using	ICBT, bibliotherapy + discussion group	9 modules	n/a	Waitlist, Internet-delivered applied relaxation	QOLI	LSAS-SR, SPS, SIAS, SPSQ, BAI

(*table continues*)

Table 1 (*continued*)

Study	Study quality	Disorder	Total *N*	% female	Age, *M* (*SD*)[b]	Comorbid diagnoses	Medication	CBT intervention	No. of treatment sessions or modules	Time per session (min.)	Comparison condition(s)	QOL measures	Anxiety measures
Gilliam et al. (2011)	2	OCD (hoarding)	35	85.7	55.1 (10.6)	Allowed. Any: 82%, MDD: 61%, SAD: 30%, GAD: 15%, OCD: 15%, ADHD: 12%	Allowed stable. Any: 74%, SSRI: 50%, atypical antidepressant: 35%, stimulants: 24%, benzodiazepine: 18%	CBGT	16–20	90	None	SDS	ADL-H, SIR
Hedman et al. (2011)[a]	1	SAD	126	35.7	35.3	Comorbidities allowed but unknown	Allowed stable. SSRI: 19.8%, SNRI: 4.8%	Internet CBT; CBGT	15 modules	75	None	EQ-5D	LSAS
Kiropoulos et al. (2008)	1	PD	86	72	39.0 (11.1)	Allowed. Any: 71.4%, MDE: 11%, dysthymia: 5%, SAD: 16%, GAD: 17%, SP: 11%, PTSD: 3%, hypochondriasis: 9%, alcohol abuse: 2%	Allowed stable. Any: 48.2%	ICBT, CBT	6 modules or 12 sessions	60	None	WHOQOL-BREF	PDSS, ASP
Klein et al. (2009)	1	PTSD	16	82.40%	39.5 (10.7)	Allowed. Any: 50.9%, GAD: 16%, depression: 12%, SAD: 9%, specific phobia: 5%, OCD: 2%, dysthymia: 2%, alcohol dependency: 2%	Allowed. Any: 38.6%	ICBT	10 modules	n/a	None	WHOQOL-BREF	PDSS, DASS
Klein et al. (2010)	2	PTSD	22	77.3	43	Allowed. Total unknown. Panic: 27%, MDE/SAD/SP: 23%, dysthymia/GAD: 18%, substance/OCD: 14%	Allowed stable but unknown.	ICBT	10 modules	n/a	None	WHOQOL-BREF	DASS
Koszycki et al. (2007)	1	SAD	52	52.8	38.4	Allowed. Any: 19%, GAD: 11%, depression: 7%, dysthymia: 6%	Allowed. Any: 28.3%	CBGT	12	150	Mindfulness-based stress reduction	QOLI	LSAS, SIAS, SPS
Ledley et al. (2009)	1	SAD	38	57.9	34.87	Allowed. 1 additional: 31.58%, 2 additional: 10.5%, dysthymia: 18.4%, GAD: 15.8%, MDD: 13.2%, SP: 7.9%	Allowed stable. Any: 26.3% paroxetine: 10.5% citalopram: 5.3% buproprion: 2.6% nefazadone: 2.6% clonazepam: 2.6% imipramine: 2.6% 21.1%	CBT	16	60	Delayed treatment	SDS, QOLI	LSAS, SIAS, SPS

(*table continues*)

Table 1 (*continued*)

Study	Study quality	Disorder	Total *N*	% female	Age, *M* (*SD*)[b]	Comorbid diagnoses	Medication	CBT intervention	No. of treatment sessions or modules	Time per session (min.)	Comparison condition(s)	QOL measures	Anxiety measures
Marchand et al. (2009)	1	PD	111	79	38.94	Comorbid anxiety disorders (30%) or MDD (8%)	Allowed stable. Anxiolytic or antidepressant: 62%	Brief CBT, CBT, CBGT	7, 14	60	Waitlist[c]	QLSI	MI, ASI
Mörtberg et al. (2011)	1	SAD	67	62	38.5	Allowed. MDD: 27%, PD: 7%, Anx NOS: 6%, ED: 5%, substance abuse: 4%, dysthymia: 3%, GAD: 3%	No medication allowed.	Intensive CGBT, CBT	16	Unknown	None	SDS	LSAS, SPS, SIAS, FNA
Paunovic & Ost (2001)	1	PTSD	16	18.8	37.9	Unknown	Allowed stable. Any: 75%, antidepressants: 31.3%, benzodiazepine: 12.5%, antidepressants and benzodiazepines: 18.8%, neuroleptics: 6.3%, muscle relaxants: 6.3%	CBT	16–20	60–120	None	QOLI	BAI, STAI-T, STAI-S
Paxling et al. (2011)	1	GAD	82	79.8	39.3	Allowed. MDD: 22.5%	Allowed stable. Any: 37.1%	ICBT	8 modules	n/a	Waitlist	QOLI	PSWQ, BAI, GAD questio-nnaire
Pier et al. (2008)	1	PD	65	38.5	37.9	Unknown	Allowed stable. Antidepressant: 36.9%, benzodiazepine: 9.2%	ICBT	6 modules	n/a	None	WHOQOL-BREF	PDSS, ASP, DASS
Rufer et al. (2010)	2	PD	55	62	40	Allowed. Any: 40%, MDD: 28%, OCD: 7.3%, dysthymia: 5.5%, SAD: 3.6%, AN: 1.8%, alcohol abuse: 1.8%, GAD: 1.8%.	Allowed. Any: 35%	CBGT	5	150	None	SF-36	PAS
Schneier et al. (2010)	2	GAD	24	45.8	41	Unknown	No medication allowed (with the exception of zolpidem for insomnia); 29.2% started escitalopram as part of the study	CBT	12–14	90–120	CBT + escitalopram[a]	Q-LES-Q	HARS, PSWQ, GAD severity scale

(*table continues*)

Table 1 (*continued*)

Study	Study quality	Disorder	Total *N*	% female	Age, *M* (*SD*)[b]	Comorbid diagnoses	Medication	CBT intervention	No. of treatment sessions or modules	Time per session (min.)	Comparison condition(s)	QOL measures	Anxiety measures
Schneier et al. (2012)	2	PTSD	37	54	50.27	Allowed. Axis I: 70.3% Axis II: 16.2%	No psychotropic medication allowed 2–4 weeks prior to study (with the exception of zolpidem for insomnia); 51.4% assigned to the paroxetine condition	CBT	10	90	CBT + paroxetine[a]	Q-LES-Q	CAPS
Schnurr et al. (2003)	1	PTSD	325	0	50.7	Unknown	Allowed stable but unknown.	Trauma-focused CBGT	30	90	Present-centered therapy	SF-36	CAPS, PCL
Shandley et al. (2008)	2	PD	96	79.2	40.9	Allowed. GAD: 22.9% MDD: 22.9% SAD: 20.8% SP:18.8% Dysthymia: 13.5% PTSD: 7.3% Hypochondriasis: 6.3% OCD: 4.2% Alcohol dependence: 3.1% Substance abuse: 1%	Allowed stable. SSRI: 15.6% Benzodiazepine: 13.5% SNRI: 7.3% SSRI + benzodiazepine: 6.3% Tricyclic antidepressant: 3.1% Tricyclic antidepressant + SSRI: 1% SSRI + SNRI: 1% Benzodiazepine + SSRI + antipsychotic: 1% SSRI + antipsychotic: 1% RIMA + benzodiazepine: 1% Anticonvulsant + benzodiazepine + antipsychotic: 1% Total: 52.1%	ICBT + psychologist, ICBT + general practitioner	5 modules	n/a	None	WHOQOL-BREF	ASP, PDSS, DASS
Simpson et al. (2008)	1	OCD	108	43	39.2	Allowed. MDD: 25%, other anxiety disorder: 30%	Allowed. SRIs were prescribed to all participants. Other: 37%	EX/RP	17	90–120	Stress management training	Q-LES-Q	HAM-A, Y-BOCS

(*table continues*)

Table 1 (*continued*)

Study	Study quality	Disorder	Total *N*	% female	Age, *M* (*SD*)[b]	Comorbid diagnoses	Medication	CBT intervention	No. of treatment sessions or modules	Time per session (min.)	Comparison condition(s)	QOL measures	Anxiety measures
Simpson et al. (2010)	1	OCD	30	47	39.9	Allowed. Any: 50%	Allowed stable. SRI: 37% SRI + other: 13% Other: 3%	EX/RP, EX/RP + MI	18	90	None	Q-LES-Q	Y-BOCS
Sousa et al. (2006)	1	OCD	56	76.8	38.5 (11.8)	No comorbidities	Allowed but unknown	CBGT	12	120	Sertraline (100 mg/day)[a]	WHOQOL-BREF	BAI, Y-BOCS
Stanley et al. (2009)	1	GAD	134	78.4	66.9	Allowed. Any: 40.3%, MDD: 44.8%	Allowed. Anxiolytic: 17%, antidepressant: 31%	CBT	10	Unknown	Enhanced usual care	SF-12	GADSS, PSWQ, HAM-A, BAI
Stanley, Beck, et al. (2003)	2	GAD	80	75	66.2	Allowed. MDD: 28%, SAD: 22%, SP: 19%, affective NOS: 9%, PD: 7%, dysthymia: 5%	No medication allowed.	CBT	15	Unknown	Minimal contact control	QOLI, LSIZ	PSWQ, WS, STAI, HAM-A
Stanley, Hopko, et al. (2003)	1	GAD	134	83.3	70.6	Allowed. MDD: 42%, SP: 17%, SAD: 8%	Unknown	CBT	10	Unknown	Enhanced usual care	QOLI, SF-36	GAD severity, PSWQ, BAI
Telch et al. (1995)	1	PD	156	68.3	34.8	MDD: 25.4%, SP: 21.8%, SAD: 17.3%, GAD: 10.9%, dysthymia: 7.3%	Allowed stable but unknown.	CBGT	12	Unknown	Waitlist	SAS, SDS	TPARF, SPRAS
Tillfors et al. (2008)	2	SAD	37	81.1	31.4	Unknown	Allowed stable but unknown.	Internet-based self-help, exposure	9 modules	135	None	QOLI	SPSQ, LSAS-SR, SPS, SIAS, BAI
van Apeldoorn et al. (2010)	3	PD	83	54.7	37.5	Allowed. Any: 50%	Unknown	CBT	21	50	SSRI[a], CBT + SSRI[a]	RAND-36	HAM-A, PAI
Wagner et al. (2012)	3	PTSD	15	86.7	29.3	Allowed. MDD: 93%, anxiety: 93%	Unknown	ICBT	10 essays	n/a	None	EUROHIS-QOL	PDS, HCSL -25
Watanabe et al. (2010)	2	SAD	40	56.25	34.2	Allowed. Mood: 41.7%, anxiety: 10.4%	Allowed. Benzodiazepine: 25%, antidepressant: 50%	CBGT	10–20	2	None	SF-36	SPS, SIAS
Wetherell et al. (2003)	1	GAD	75	80	67.1	Allowed. Any: 52%, SP: 20%, depressive disorders: 19%, SAD: 15%, PD: 8%, PTSD: 7%, OCD: 5%, hypochondriasis: 1%	Allowed stable. Any: 40% Type antidepressant: 23%, benzodiazepine: 15%, buspirone: 4%	CBGT	12	Unknown	Discussion group, waitlist	RAND-36	PSWQ, HAM-A, BAI

Table 1 (*continued*)

Study	Study quality	Disorder	Total *N*	% female	Age, *M* (*SD*)[b]	Comorbid diagnoses	Medication	CBT intervention	No. of treatment sessions or modules	Time per session (min.)	Comparison condition(s)	QOL measures	Anxiety measures
Wetherell et al. (2009)	2	GAD	15	83.9	72.2	Allowed. MDD: 13%, PD: 13%, dysthymia: 6.5%, agoraphobia: 3.2%, SAD: 3.2%, SP: 3.2%	Allowed stable. Any: 51.6%	CBT	12	Unknown	Community treatment	SF-36	HAM-A, PSWQ

Note. Definitions of abbreviations are listed below. *Disorders:* ADHD = attention-deficit/hyperactivity disorder; AN = anorexia nervosal; Anx NOS = anxiety disorder not otherwise specified; GAD = generalized anxiety disorder; MDD = major depressive disorder; MDE = major depressive episode; OCD = obsessive compulsive disorder; PD = panic disorder; PTSD = posttraumatic stress disorder; SAD = social anxiety disorder; SP = specific phobia. *CBT interventions:* CBGT = cognitive-behavioral group therapy; CBT = cognitive-behavioral therapy; ICBT = Internet cognitive-behavioral therapy; EX/RP = exposure and response prevention; MI = motivational interviewing; MBCT = mindfulness-based cognitive therapy; PE = prolonged exposure. *Quality of life (QOL) measures:* EQ-5D = EuroQol; LSIZ = Life Satisfaction Index-Z; Q-LES-Q = Quality of Life Enjoyment and Satisfaction Questionnaire; QLSI = Quality of Life Satisfaction Inventory; QOLI = Quality of Life Inventory; RAND-36 = Medical Outcomes Study short form self-report health survey; SAS = Social Adjustment Scale; SDS = Sheehan Disability Scale; SF-12 = Medical Outcomes Study (MOS) 12-item short-form health survey; SF-36 = MOS 36-item short-form health survey; WHOQOL-BREF = World Health Organization Quality of Life Assessment. *Anxiety measures:* ADIS-IV = Anxiety Disorders Interview Schedule–IV; ADL-H = Activities of Daily Life for Hoarding; ASI = Anxiety Sensitivity Index; ASP = Anxiety Sensitivity Profile; BAI = Beck Anxiety Index; BFNE = Brief Fear of Negative Evaluation Scale; CAPS = Clinician-Administered PTSD Scale; DAS = Dental Anxiety Scale; DASS = Depression Anxiety Stress Scales; FNA = functional nonadjustment; FQ = Fear Questionnaire; GADSS = Generalized Anxiety Disorder Questionnaire Short Form; HAM-A = Hamilton Rating Scale for Anxiety; HARS = Hamilton Anxiety Rating Scale; HCSL-25 = Hopkins Symptoms Checklist; IPS-A = Injection Phobia Scale–Anxiety; LSAS = Liebowitz Social Anxiety Scale; LSAS-SR = Liebowitz Social Anxiety Scale–Self Report; MI = Mobility Inventory for Agoraphobia; PAI = Panic Appraisal Inventory; PAS = Panic and Agoraphobia Scale; PCL = PTSD Checklist; PDSS = Panic Disorder Severity Scale; PSWQ = Penn State Worry Questionnaire; SIAS = Social Interaction Anxiety Scale; SIR = Social Impact Ratings; SPRAS = Sheehan Patient Rated Anxiety Scale; SPS = Social Phobia Scale; SPSQ = Social Phobia Screening Questionnaire; SSAI = Spielberger State Anxiety Inventory; STAI = Spielberger Trait Anxiety Inventory; STAI-S = STAI-state scale; STAI-T = STAI trait scale; TPARF = Texas Panic Attack Record Form; WS = Worry Scale; Y-BOCS = Yale-Brown Obsessive Compulsive Scale. *Others:* RIMA = reversible inhibitor of monoamine oxidase A; SNRI = serotonin-norepinephrine reuptake inhibitor; SSRI = selective serotonin reuptake inhibitor.

[a] Comparison groups involving pharmacological treatment data were not used to calculate controlled effect size estimates, as they constitute active treatments instead of an appropriate control condition for CBT; instead, these studies were treated as within-group in statistical analyses. [b] In cases where separate standard deviations were not provided for multiple groups, we report the mean age only across all groups. [c] For this study, data for the waitlist control group were unavailable. Thus, although the study was controlled, we used only data from the active condition in our uncontrolled effect size analysis.

The WHOQOL-BREF was the only QOL outcome measure for which separate domain means were reported. These domains were (a) physical (i.e., energy/fatigue, pain/discomfort, sleep/rest); (b) psychological (i.e., emotions, self esteem, cognition, bodily image/appearance); (c) social (i.e., personal relationships, social support, sexual activity); and (d) environment (i.e., finances, safety/security, freedom, access to educational and health resources, participation in recreation, physical environment, transport).

Other QOL measures used in the studies included the Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q; Endicott, Nee, Harrison, & Blumenthal, 1993), Life Satisfaction Index (LSIZ; Wood, Wylie, & Sheafor, 1969), Sheehan Disability Scale (SDS; Sheehan et al., 1998), EuroQol (EQ-5D; EuroQol-Group, 1990), Medical Outcomes Study (MOS) 12-item and 36-item short-form health surveys (SF-12, SF-36; Jenkinson et al., 1997; Ware & Sherbourne, 1992), Quality of Life Systemic Inventory (QLSI; Duquette, Dupuis, & Perrault, 1994), Social Adjustment Scale (SAS; Weissman & Bothwell, 1976), EuroHis-QOL (Schmidt, Muhlan, & Power, 2006), and the Medical Outcomes Study short form self-report health survey (RAND-36; RAND Health Sciences Program, 1992). All of these QOL measures are self-report instruments that have been validated in clinical populations with good psychometric properties.

Quantitative Data Synthesis

Pre-post within-group effect sizes for all QOL measures. The random effects meta-analysis yielded an overall QOL effect size of Hedges's $g = 0.54$ (95% CI [0.45, 0.63], $z = 11.26$, $p < .0001$). With an alpha level of .01, the fail-safe N for measures of QOL was 5,062 ($z = 24.00$), indicating that 5,062 studies with effect sizes of zero would be needed to nullify these results. Because this N is greater than $5k + 10$ (where k is the number of trials in the analysis), the above effect size is considered statistically robust.

We further examined the funnel plot to assess publication bias (see Figure 2). In the absence of publication bias, the studies should be distributed symmetrically, with larger studies appearing toward the top of the graph and clustered around the mean effect size and smaller studies toward the bottom. Using the trim and fill method (Duval & Tweedie, 2000), we determined that 0 studies would have to fall to the left of the mean (i.e., have an effect size smaller than the mean) and 7 studies would have to fall to the right of the mean (i.e., have an effect size larger than the mean) to make the plot symmetrical, suggesting that our computed effect size is a conservative estimate. A random-effects model for the new imputed mean effect sizes revealed a Hedges's $g = 0.60$, 95% CI [0.51, 0.70].

Pre-post controlled effect sizes for all QOL measures. Twenty-one of the trials included a control or comparison group. Of these, 13 used active comparison groups, including mindfulness-based stress reduction (1), stress management training (1), applied relaxation (1), minimal contact control (1), enhanced usual care (2), community treatment as usual (1), present-centered therapy (2), discussion group (2), and acceptance and commitment therapy (1). The remaining controlled studies used waitlist or delayed treatment control conditions (8).

The 21 controlled trials together yielded a QOL controlled effect size of Hedges's $g = 0.56$ (95% CI [0.32, 0.80], $z = 4.54$, $p < .0001$; see Table 2). With an alpha level of .01, the fail-safe N for measures of QOL was 338 ($z = 10.65$), indicating that 338 studies with an effect size of zero would be necessary to nullify the controlled effect size results. The trim and fill method determined that 0 studies would have to fall to the left of the mean and 6 studies would have to fall to the right of the mean effect size to make the plot symmetrical, suggesting that our computed effect size is a conservative estimate. A random-effects model for the new imputed mean controlled effect sizes revealed a Hedges's $g = 0.75$, 95% CI [0.53, 1.00].

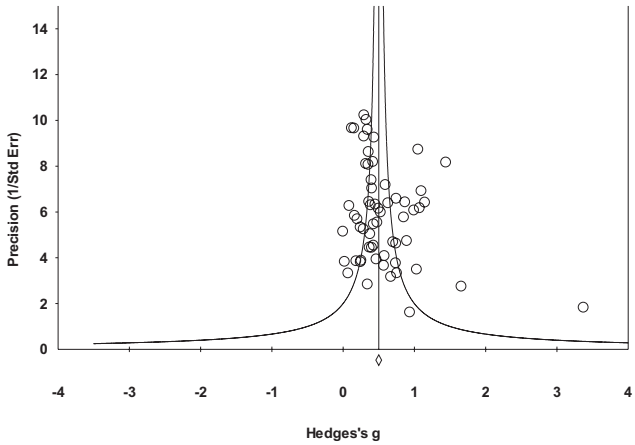

Figure 2. Funnel plot of precision by Hedges's g for quality of life measures in the pooled meta-analysis. Std Err = standard error.

To address clinical heterogeneity due to the range of different control/comparison conditions used, we also performed a Cochran's Q test to compare the effect sizes for trials that used waitlist control conditions (Hedges's $g = 0.78$, 95% CI [0.40, 1.15], $p < .0001$), with trials that used active comparison conditions (Hedges's $g = 0.43$, 95% CI [0.10, 0.75], $p = .01$). This comparison revealed no significant difference ($\chi^2_{\text{Interaction}} = 1.88$, $p > .1$).

Pre-post effect sizes for the Quality of Life Inventory. The QOLI (Frisch et al., 1992) was the most common outcome measure for quality of life in our reviewed studies ($n = 24$). Its purpose is to measure, broadly, general quality of life in a range of domains. The QOLI is a widely used instrument for measuring QOL in medical and psychiatric research. To ensure that there is no systematic difference between measures of QOL in our meta-analysis, we conducted a Cochran's Q test to compare the effect size for studies using the QOLI versus those using other measures. The test of heterogeneity revealed no difference between these subgroups of studies ($\chi^2_{\text{Interaction}} = 0.76$, $p = .38$). Those using QOLI yielded a pre-post effect size of Hedges's $g = 0.48$ (95% CI [0.44, 0.63], $z = 5.97$, $p < .0001$), whereas the other studies yielded a Hedges's $g = 0.57$ (95% CI [0.45, 0.69], $z = 9.46$, $p < .0001$).

Pre-post effect sizes for distinct quality of life domains. Among the studies we reviewed, the World Health Organization Quality of Life Assessment (WHOQOL-BREF; WHOQOL Group, 1998) was the only measure with which authors consistently provided data for different domains of QOL ($n = 10$). The Cochran's Q test revealed that there is a significant difference among

Table 2
Hedges's g for Pre-Post QOL Effect Sizes for Each Trial

Disorder	Study name	Hedges's *g* [95% CI]	*Z*	*p*
Generalized anxiety disorder	Craigie et al. (2008)	0.53 [0.20, 0.86]	3.16	.002
	Paxling et al. (2011)	0.43 [−0.01, 0.86]	1.94	.052
	Schneier et al. (2010)	0.39 [0.07, 0.70]	2.44	.015
	Stanley et al. (2009)	0.20 [−0.14, 0.55]	1.14	.253
	Stanley, Beck, et al. (2003)	0.58 [0.10, 1.06]	2.37	.018
	Stanley, Hopko, et al. (2003)	0.94 [−0.28, 2.15]	1.51	.130
	Wetherell et al. (2003)	0.67 [0.05, 1.29]	2.13	.033
	Wetherell et al. (2009)	0.35 [−.035, 1.04]	0.98	.328
	Subtotal (generalized anxiety disorder)	0.43 [0.28, 0.58]	5.53	.000
Injection phobia	Agdal et al. (2012)	0.16 [−0.05, 0.36]	1.50	.133
Mixed anxiety disorder	Arch et al. (2012)	0.00 [−3.81, 3.81]	0.00	1.000
	Carlbring et al. (2011)	0.57 [−0.04, 1.11]	2.09	.037
Obsessive compulsive disorder (OCD)	Cordioli et al. (2003)	0.76 [0.17, 1.35]	2.51	.012
	Diefenbach et al. (2007)	1.05 [0.83, 1.28]	9.19	.000
	Simpson et al. (2008)	0.38 [−0.01, 0.77]	1.91	.055
	Simpson et al. (2010), EX/RP	0.70 [0.28, 1.12]	3.29	.001
	Simpson et al. (2010), EX/RP+MI	0.74 [0.32, 1.17]	3.44	.001
	Sousa et al. (2006)	0.63 [0.33, 0.94]	4.04	.000
OCD (Hoarding)	Gilliam et al. (2011)	1.10 [0.81, 1.38]	7.60	.000
	Subtotal (OCD)	0.80 [0.59, 1.00]	7.57	.000
Panic disorder	Carlbring et al. (2005), Internet CBT	0.36 [0.06, 0.67]	2.35	.019
	Carlbring et al. (2005), live CBT	0.50 [0.18, 0.82]	3.06	.002
	Carlbring, Bohman, et al. (2006)	0.74 [0.22, 1.26]	2.78	.005
	Kiropoulos et al. (2008), Internet CBT	0.32 [0.08, 0.56]	2.61	.009
	Kiropoulos et al. (2008), live CBT	0.36 [0.13, 0.59]	3.09	.002
	Klein et al. (2009), ICBT + frequent contact	0.29 [−0.08, 0.66]	1.51	.130
	Klein et al. (2009), ICBT + infrequent contact	0.25 [−0.12, 0.61]	1.31	.191
	Marchand et al. (2009), CBGT	1.08 [0.76, 1.39]	6.63	.000
	Marchand et al. (2009), CBT	0.87 [0.57, 1.18]	5.59	.000
	Marchand et al. (2009), CBT brief	0.75 [0.45, 1.05]	4.92	.000
	Pier et al. (2008), ICBT + GP	0.40 [0.13, 0.66]	2.95	.003
	Pier et al. (2008), ICBT + psychologist	0.40 [0.13, 0.68]	2.85	.004
	Rufer et al. (2010)	0.12 [−0.08, 0.33]	1.18	.239
	Shandley et al. (2008), ICBT + GP	0.29 [0.08, 0.50]	2.73	.006
	Shandley et al. (2008), ICBT + psychologist	0.42 [0.18, 0.66]	3.45	.001
	Telch et al. (1995)	0.89 [0.48, 1.31]	4.24	.000
	van Apeldoorn et al. (2010)	0.44 [0.23, 0.65]	4.04	.000
	Subtotal (panic disorder)	0.46 [0.34, 0.57]	7.62	.000
Posttraumatic stress disorder (PTSD)	Klein et al. (2010)	0.09 [−0.23, 0.40]	0.548	.584
	Paunovic & Ost (2001), CBT	1.03 [0.47, 1.60]	3.61	.000
	Paunovic & Ost (2001), exposure	1.66 [0.95, 2.38]	4.56	.000
	Schneier et al. (2012)	0.43 [0.07, 0.79]	2.35	.019
	Schnurr et al. (2003)	1.44 [1.20, 1.68]	11.77	.000
	Wagner et al. (2012)	1.15 [0.84, 1.45]	7.36	.000
	Subtotal (PTSD)	0.98 [0.56, 1.41]	4.51	.000
Social anxiety disorder	Andersson et al. (2006)	0.47 [−0.03, 0.97]	1.84	.066
	Carlbring, Furmark, et al., (2006)	0.85 [0.51, 1.19]	4.92	.000
	Eng et al. (2001)	0.45 [0.14, 0.76]	2.86	.004
	Eng et al. (2005)	0.36 [0.11, 0.60]	2.87	.004
	Furmark et al. (2009), Trial 1, bibliotherapy	0.40 [−0.04, 0.84]	1.79	.074
	Furmark et al. (2009), Trial 1, ICBT	0.37 [−0.07, 0.81]	1.65	.099
	Furmark et al. (2009), Trial 2, bibliotherapy	0.18 [−0.32, 0.69]	0.71	.476
	Furmark et al. (2009), Trial 2, bibliotherapy + discussion	0.25 [−0.27, 0.76]	0.94	.349
	Furmark et al. (2009), Trial 2, ICBT	0.02 [−0.49, 0.54]	0.09	.929
	Hedman et al. (2011), Internet CBT	0.30 [0.10, .049]	3.03	.002
	Hedman et al. (2011), live CBGT	0.33 [0.13, 0.52]	3.27	.001
	Koszycki et al. (2007)	0.07 [−0.52, 0.66]	0.24	.810
	Ledley et al. (2009)	3.38 [2.30, 4.45]	6.15	.000
	Mörtberg et al. (2011), individual CT	1.00 [0.67, 1.32]	6.04	.000
	Mörtberg et al. (2011), intensive group CT	0.60 [0.32, 0.87]	4.27	.000
	Tillfors et al. (2008), ICBT	0.48 [0.13, 0.83]	2.65	.008
	Tillfors et al. (2008), ICBT + EX	0.16 [−0.17, 0.50]	0.96	.339
	Watanabe et al. (2010)	0.34 [0.14, 0.55]	3.30	.001
	Subtotal (social anxiety disorder)	0.46 [0.31, 0.61]	5.53	.000
All disorders		0.56 [0.44, 0.63]	11.28	.000

Note. CI = confidence interval; CBT = cognitive-behavioral therapy; ICBT = Internet cognitive-behavioral therapy; EX = exposure; RP = response prevention; MI = motivational interviewing; CBGT = cognitive-behavioral group therapy.

effect sizes in these domains ($\chi^2_{Interaction} = 16.65$, $p < .001$). Specifically, improvement in QOL in the physical domain (Hedges's $g = 0.42$, 95% CI [0.30, 0.53], $z = 6.94$, $p < .0001$) and the psychological domain (Hedges's $g = 0.45$, 95% CI [0.36, 0.54], $z = 9.83$, $p < .0001$) was greater than that in the environmental (Hedges's $g = 0.25$, 95% CI [0.16, 0.33], $z = 5.67$, $p < .0001$) and social domains (Hedges's $g = 0.24$, 95% CI [0.15, 0.32], $z = 5.37$, $p < .0001$).

Pre-post effect sizes for anxiety symptoms. The pre-post within-group random effect size on anxiety symptoms was Hedges's $g = 0.95$ (95% CI [0.80, 1.10], $z = 12.90$, $p < .0001$). With an alpha level of .01, the fail-safe *N* for measures of anxiety was 9,343 ($z = 33.40$). The trim and fill funnel plot determined that 0 studies would have to fall to the left of the mean effect size and 1 study would have to fall to the right of the mean effect size to make the plot symmetric. A random-effects model was assumed for new imputed mean effect sizes of change in anxiety symptoms: Hedges's $g = 0.96$, 95% CI [0.82, 1.10].

The controlled effect size of anxiety symptoms was Hedges's $g = 0.69$ (95% CI [0.42, 0.97], $z = 4.94$, $p < .0001$). With an alpha level of .01, the fail-safe *N* for measures of anxiety was a robust 307 ($z = 10.41$). Using the trim and fill method of the funnel plot, we determined that 0 studies would have to fall to the right of the mean effect size and 1 study would have to fall to the left of the mean effect size to make the plot symmetric. This was associated with new imputed controlled effect sizes of Hedges's $g = 0.70$, 95% CI [0.44, 0.96].

Moderator analyses. There was a significant difference among pre-post QOL effect sizes for different disorders ($\chi^2_{Interaction} = 29.11$, $p < .05$). The diagnosis-specific effect sizes ranged from medium to large. The largest effect size was found for posttraumatic stress disorder (Hedges's $g = 1.12$, 95% CI [0.70, 1.53], $z = 5.28$, $p < .0001$), followed by obsessive-compulsive disorder (Hedges's $g = 0.80$, 95% CI [0.59, 1.00], $z = 7.57$, $p < .0001$), panic disorder (Hedges's $g = 0.46$, 95% CI [0.34, 0.57], $z = 7.62$, $p < .0001$), social anxiety disorder (Hedges's $g = 0.46$, 95% CI [0.31, 0.61], $z = 5.95$, $p < .0001$), and generalized anxiety disorder (Hedges's $g = 0.43$, 95% CI [0.28, 0.58], $z = 5.53$, $p < .0001$). There was not enough power to compute effect sizes for trials with mixed anxiety diagnosis samples and for specific phobias.

Of the 59 clinical trials, 22 provided individual CBT delivered face to face, 14 provided group CBT delivered face to face, and 23 delivered CBT through the Internet. We compared effect sizes for QOL outcome across these three CBT delivery modalities and found that there was a conventionally significant difference between effect sizes ($\chi^2_{Interaction} = 6.28$, $p < .05$). In particular, both face-to-face individual CBT (Hedges's $g = 0.61$, 95% CI [0.44, 0.78]) and face-to-face group CBT (Hedges's $g = 0.65$, 95% CI [0.42, 0.88]) yielded higher effect sizes than Internet-delivered CBT (Hedges's $g = 0.41$, 95% CI [0.31, 0.51]). Because the trials that delivered Internet-based treatment comprised primarily social anxiety disorder (SAD; $n = 10$) and panic disorder (PD; $n = 10$) samples, there was a potential disorder type confound for the above results. However, for SAD and PD trials, effect sizes in face-to-face trials were significantly higher than those in Internet-delivered trials ($\chi^2_{Interaction} = 5.40$, $p < .05$), suggesting that the difference between treatment modalities is not only an artifact of systematic properties of SAD and PD.

Study quality, as assessed by EPHPP scoring, did not moderate improvement in quality of life ($B = 0.01$, $SE = 0.01$, $p > .3$). However, QOL improvement in face-to-face CBT trials was moderated by the length of the intervention ($B = 0.04$, $SE = 0.01$, $p < .001$), with longer treatments being associated with larger effect sizes. Effect sizes were moderated by publication year ($B = -0.04$, $SE = 0.01$, $p < .05$), indicating that the effect size decreased linearly with time. Improvement in QOL was also significantly moderated by improvement in anxiety symptoms ($B = 0.24$, $SE = 0.03$, $p < .0001$), indicating that larger improvements in anxiety symptoms predicted greater improvement in quality of life. Furthermore, quality of life effect sizes were moderated by publication year ($B = -0.04$, $SE = 0.01$, $p < .05$), indicating that the effect size decreased linearly with time. These meta-regression slopes remained significant when removing an outlier (Ledley et al., 2009). The decrease in effect size across time was not accounted for by diminishing study quality, as study quality did not vary as a function of time. Similarly, average publication year did not differ among disorder categories. Later publication year was moderately associated with smaller sample size (Pearson's $r = -.25$) and fewer CBT modules or sessions (Pearson's $r = -.17$), which may explain the smaller effect sizes found in more recent studies.

Discussion

CBT is an effective treatment for anxiety disorders. We observed, as expected and consistent with a previous meta-analysis (Hofmann & Smits, 2008), that CBT had a large effect on reducing anxiety symptoms (Hedges's $g = 0.93$). However, its effect on patients' quality of life has not yet been examined. To examine the effect of CBT for anxiety disorders on quality of life, we conducted a meta-analytic review. We identified 44 studies that included 59 CBT trials, totaling 3,326 participants.

Our study found solid evidence for the beneficial effect of CBT on quality of life. The pre-post overall and controlled effect sizes of CBT on quality of life were moderately strong. The fail-safe *N* analyses clearly exceeded the critical number (Rosenthal, 1991) for both the within-group and the controlled effect sizes for the QOL measures. The trim and fill method suggested that observed effect sizes were a conservative estimate and that the estimated controlled effect size was Hedges's $g = 0.75$. It should be noted that we observed little difference in various analyses (within-group vs. controlled effect size). This, again, suggests that our effect size estimate was relatively robust.

Among those studies that allowed for a subanalysis by quality of life domains (i.e., physical, psychological, social, and environment domains), we observed that improvements were greater for physical and psychological domains than for environmental and social domains. However, the relatively small sample size for this subanalysis warrants caution in generalizing our findings.

The effect sizes for CBT delivered face to face, whether individually (22 trials; Hedges's $g = 0.61$) or in groups (14 trials; Hedges's $g = 0.65$) were significantly higher than for Internet-delivered treatments (23 trials; Hedges's $g = 0.41$). This points to the limitation of Internet-based treatments and highlights the importance of face-to-face interventions. Furthermore, we observed that the effect sizes increased with treatment duration for face-to-face treatments, suggesting there might be a limit of how brief a

treatment should be. Although anxiety symptoms might respond within only a few sessions (Otto et al., 2012), longer treatments seem to be necessary in order to noticeably improve the patient's quality of life. Thus, our data suggest that Internet-based CBT is less effective than face-to-face treatment and that shorter therapy is less effective than longer treatment for improving quality of life. However, it remains to be seen whether these differences are also clinically meaningful. In order to answer this important question, future studies will need to provide a more in-depth analysis of the quality of life construct, which will necessitate new and improved ways to quantify this construct that go beyond self-report measures.

The moderation analyses further revealed that more recently published studies showed smaller effect sizes than did older studies. The trend of diminishing effect sizes over time has been discussed elsewhere and described as the *decline effect* and the *cosmic habituation* effect (Lehrer, 2010; Schooler, 2011). It is unlikely that this effect is due to differences in study quality, because we specifically examined the quality of the trials and we did not observe that quality of the trial moderated the treatment effect. It is possible that earlier CBT protocols targeted a broader area of the patient's life and thereby enhanced quality of life in general, whereas newer protocols are more symptom focused.

The largest within-group pre-post CBT effect size in quality of life improvement was found for posttraumatic stress disorder (Hedges's $g = 1.12$), followed by obsessive-compulsive disorder (Hedges's $g = 0.80$), panic disorder (Hedges's $g = 0.46$), social anxiety disorder (Hedges's $g = 0.46$), and generalized anxiety disorder (Hedges's $g = 0.43$). It should be noted that a direct comparison between the effects of CBT for anxiety disorders on quality of life is problematic because of differences in comorbidities and differences in disease characteristics. For example, anxiety disorders differ in age of onset, and it is possible that individuals who have experienced a very early onset of the disorder define the impact of the symptoms on quality of life differently than a person who initially had a high quality of life, which then radically changed after the onset of the disorder (Rapaport et al., 2005).

In general, the results are consistent with the notion that CBT improves quality of life. Although the effect size estimates were robust, the number of rigorous studies available to us was modest. Moreover, quality of life benefits associated with efficacious treatments may not be unique to CBT. We recommend that future studies conduct systematic quantitative reviews to determine whether other active interventions offer similar improvements.

With regard to the study limitations, it could be argued that it is inappropriate to pool studies that show a high degree of heterogeneity. However, as displayed in Table 1, the degree of observed heterogeneity was within the range of what can be expected from meta-analytic reviews. For example, the majority of studies reported participants' mean age to be between 35 and 40, most studies achieved approximately equal gender distribution, and virtually all studies excluded serious psychiatric comorbidities (e.g., psychotic disorders). Moreover, because patient characteristics were not systematically reported in most included studies, we were unable to formally assess the role played by such variables as age and gender distribution. Nevertheless, in light of these unknown influences, results should be interpreted with caution, and replication across larger samples is recommended. Future work would be improved by incorporating data on patient characteristics.

It is possible that other variables not considered here could have influenced the results. However, our moderator analyses were necessarily restricted to those variables that were reported in the included studies. Moreover, adding post hoc moderator analyses introduces a significant methodological problem in meta-analyses. It has been shown that such analyses are associated with a high Type I error rate (Brookes et al., 2004). Therefore, and in line with the recommendations by Brookes et al., we limited the moderator analyses to the minimally important set of variables that we identified based on our literature review.

Furthermore, we did not have the power to analyze multiple moderators simultaneously in a single model. Therefore, we are unable to speculate about how variables such as study length, publication year, and treatment modality might interact in influencing treatment outcome. It is possible that these unknown interactions may explain some of the variation not accounted for by our single-variable moderator analyses. Thus, our results should be interpreted with caution, and future work would be best informed by a model incorporating multiple moderators simultaneously.

Another limitation of the study is related to the assessment of QOL. We examined a number of different self-report instruments that measure QOL. Although each of these measures is commonly used and psychometrically sound, the assessment of QOL rests on the patients' self-report. Other indicators, such as observer-report or ecological momentary assessments, might provide additional and perhaps more valid measures. Moreover, we were unable to examine the specific QOL domains because studies typically did not report this level of detail. Future studies should examine the individual domains of quality of life, such as physical health, mental health, social activities, work, home, and family (Olatunji et al., 2007). For example, it is possible that CBT for social anxiety disorder primarily enhances QOL by improving social relationships, whereas CBT for panic disorder with agoraphobia might affect mobility and certain areas of work by targeting agoraphobic avoidance.

Despite these limitations, our review suggests that CBT for anxiety disorders not only is an effective treatment for reducing the immediate anxiety symptoms, but it also has a beneficial effect on QOL, especially when CBT is conducted over a longer course of time and face to face.

References

References marked with an asterisk indicate studies included in the meta-analysis.

*Agdal, M. L., Raadal, M., Ost, L., & Skaret, E. (2012). Quality-of-life before and after cognitive behavioral therapy (CBT) in patients with intra-oral injection phobia. *Acta Odontologica Scandinavica, 70,* 463–470. doi:10.3109/00016357.2011.635600

Andersson, G. A. (2009). Using the Internet to provide cognitive behaviour therapy. *Behaviour Research and Therapy, 47,* 175–180. doi:10.1016/j.brat.2009.01.010

*Andersson, G. A., Carlbring, P., Holmstrom, A., Sparthan, E., Furmark, T., Nilsson-Ihrfelt, E., . . . Ekselius, L. (2006). Internet-based self-help with therapist feedback and in vivo group exposure for social phobia: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 74,* 677–686. doi:10.1037/0022-006X.74.4.677

Angermeyer, M. C., & Kilian, R. (1997). Theoretical models of quality of

life for mental disorders. In H. Katschnig, H. Freeman, & N. Sartorius (Eds.), *Quality of life in mental disorders* (pp. 19–54). New York, NY: Wiley.

*Arch, J. J., Eifert, E. H., Davies, C., & Vilardaga, J. C. P. (2012). Randomized clinical trial of cognitive behavioral therapy (CBT) versus acceptance and commitment therapy (ACT) for mixed anxiety disorders. *Journal of Consulting and Clinical Psychology, 80,* 750–765. doi:10.1037/a0028310

Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2005). *Comprehensive Meta-Analysis (Version 2) [Computer software]*. Englewood, NJ: Biostat.

Brookes, S. T., Whitely, E., Egger, M., Smith, G. D., Mulheran, P. A., & Peters, T. J. (2004). Subgroup analyses in randomized trials: Risks of subgroup-specific analyses; power and sample size for the interaction test. *Journal of Clinical Epidemiology, 57,* 229–239. doi:10.1016/j.jclinepi.2003.08.009

Candilis, P. J., McLean, R. Y., Otto, M. W., Manfro, G. G., Worthington, J. J., III, Penava, S. J., . . . Pollack, M. H. (1999). Quality of life in patients with panic disorder. *Journal of Nervous and Mental Disease, 187,* 429–434. doi:10.1097/00005053-199907000-00006

*Carlbring, P., Bohman, S., Brunt, S., Buhrman, M., Westling, B. E., Ekselius, L., & Andersson, G. (2006). Remote treatment of panic disorder: A randomized trial of Internet-based cognitive behavior therapy supplemented with telephone calls. *American Journal of Psychiatry, 163,* 2119–2125. doi:10.1176/appi.ajp.163.12.2119

*Carlbring, P., Furmark, T., Seczko, J., Ekselius, L., & Andersson, G. (2006). An open study of Internet-based bibliotherapy with minimal therapist contact via email for social phobia. *Clinical Psychologist, 10,* 30–38. doi:10.1080/13284200500378662

*Carlbring, P., Maurin, L., Torngren, C., Linna, E., Eriksson, T., Sparthan, E., . . . Andersson, G. (2011). Individually-tailored, Internet-based treatment for anxiety disorders: A randomized controlled trial. *Behaviour Research and Therapy, 49,* 18–24. doi:10.1016/j.brat.2010.10.002

*Carlbring, P., Nilsson-Ihrfelt, E., Waara, J., Kollenstam, C., Buhrman, M., Kaldo, V., . . . Andersson, G. (2005). Treatment of panic disorder: Live therapy vs. self-help via the Internet. *Behaviour Research and Therapy, 43,* 1321–1333. doi:10.1016/j.brat.2004.10.002

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

*Cordioli, A. V., Heldt, E., Bochi, D. B., Margis, R., de Sousa, M. B., Tonello, J. F., . . . Kapczinski, F. (2003). Cognitive-behavioral group therapy in obsessive-compulsive disorder: A randomized clinical trial. *Psychotherapy and Psychosomatics, 72,* 211–216. doi:10.1159/000070785

*Craigie, M. A., Rees, C. S., & Marsh, A. (2008). Mindfulness-based cognitive therapy for generalized anxiety disorder: A preliminary evaluation. *Behavioural and Cognitive Psychotherapy, 36,* 553–568. doi:10.1017/S135246580800458X

Cramer, V., Torgersen, S., & Kringlen, E. (2005). Quality of life and anxiety disorders: A population study. *Journal of Nervous and Mental Disease, 193,* 196–202. doi:10.1097/01.nmd.0000154836.22687.13

*Diefenbach, G. J., Abramowitz, J. S., Norberg, M. M., & Tolin, D. F. (2007). Changes in quality of life following cognitive-behavioral therapy for obsessive-compulsive disorder. *Behaviour Research and Therapy, 45,* 3060–3068. doi:10.1016/j.brat.2007.04.014

DuPont, R. L., Rice, D. P., Miller, L. S., Shiraki, S. S., Rowland, C. R., & Harwood, H. J. (1996). Economic costs of anxiety disorders. *Anxiety, 2,* 167–172. doi:10.1002/(SICI)1522-7154(1996)2:4<167::AID-ANXI2>3.0.CO;2-L

Duquette, R. L., Dupuis, G., & Perrault, J. (1994). A new approach for quality of life assessment in cardiac patients: Rationale and validation of the Quality of Life Systemic Inventory. *Canadian Journal of Cardiology, 10,* 106–112.

Duval, S., & Tweedie, R. (2000). Trim and fill: A simple funnel-plot-based method of testing and adjusting for publication bias in meta-analysis. *Biometrics, 56,* 455–463. doi:10.1111/j.0006-341X.2000.00455.x

Endicott, J., Nee, J., Harrison, W., & Blumenthal, R. (1993). Quality of Life Enjoyment and Satisfaction Questionnaire: A new measure. *Psychopharmacology Bulletin, 29,* 321–326.

*Eng, W., Coles, M. E., Heimberg, R. G., & Safren, S. A. (2001). Quality of life following cognitive behavioral treatment for social anxiety disorder: Preliminary findings. *Depression and Anxiety, 13,* 192–193. doi:10.1002/da.1037

*Eng, W., Coles, M. E., Heimberg, R. G., & Safren, S. A. (2005). Domains of life satisfaction in social anxiety disorder: Relation to symptoms and response to cognitive-behavioral therapy. *Journal of Anxiety Disorders, 19,* 143–156. doi:10.1016/j.janxdis.2004.01.007

EuroQol-Group. (1990). EuroQol: A new facility for the measurement of health-related quality of life. *Health Policy, 16,* 199–208.

Frisch, M. B. (1998). Quality of life therapy and assessment in health care. *Clinical Psychology: Science and Practice, 5,* 19–40. doi:10.1111/j.1468-2850.1998.tb00132.x

Frisch, M. B., Cornell, J., Villanueva, M., & Retzlaff, P. J. (1992). Clinical validation of the Quality of Life Inventory: A measure of life satisfaction for use in treatment planning and outcome assessment. *Psychological Assessment, 4,* 92–101. doi:10.1037/1040-3590.4.1.92

Frisch, M. B., Clark, M. P., Rouse, S. V., Rudd, M. D., Paweleck, J., & Greenstone, A. (2005). Predictive and treatment validity of life satisfaction and the Quality of Life Inventory. *Assessment, 12,* 66–78. doi:10.1177/1073191104268006

*Furmark, T., Carlbring, P., Heman, E., Sonnenstein, A., Clevberger, P., Bohman, B., . . . Andersson, G. (2009). Guided and unguided self-help for social anxiety disorder: Randomised controlled trial. *British Journal of Psychiatry, 195,* 440–447. doi:10.1192/bjp.bp.108.060996

*Gilliam, C. M., Norberg, M. M., Villavicencio, A., Morrison, S., Hannan, S. E., & Tolin, D. F. (2011). Group cognitive-behavioral therapy for hoarding disorder: An open trial. *Behaviour Research and Therapy, 49,* 802–807. doi:10.1016/j.brat.2011.08.008

Gladis, M. M., Gosch, E. A., Dishuk, N. M., & Crits-Christoph, P. (1999). Quality of life: Expanding the scope of clinical significance. *Journal of Consulting and Clinical Psychology, 67,* 320–331. doi:10.1037/0022-006X.67.3.320

Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. New York, NY: Academic Press.

Hedges, L. V., & Vevea, J. L. (1998). Fixed- and random-effects models in meta-analysis. *Psychological Methods, 3,* 486–504. doi:10.1037/1082-989X.3.4.486

*Hedman, E., Andersson, E., Ljotsson, B., Andersson, G., Ruck, C., & Lindefors, N. (2011). Cost-effectiveness of Internet-based cognitive behavior therapy vs. cognitive behavioral group therapy for social anxiety disorder: Results from a randomized controlled trial. *Behaviour Research and Therapy, 49,* 729–736. doi:10.1016/j.brat.2011.07.009

Hofmann, S. G., Asmundson, G. J., & Beck, A. T. (2013). The science of cognitive therapy. *Behavior Therapy, 44,* 199–212. doi:10.1016/j.beth.2009.01.007

Hofmann, S. G., & Smits, J. A. J. (2008). Cognitive-behavioral therapy for adult anxiety disorders: A meta-analysis of randomized placebo-controlled trials. *Journal of Clinical Psychiatry, 69,* 621–632. doi:10.4088/JCP.v69n0415

Howard, K. I., Kopta, S. M., Krause, M. S., & Orlinsky, D. E. (1986). The dose–effect relationship in psychotherapy. *American Psychologist, 41,* 159–164. doi:10.1037/0003-066X.41.2.159

Jenkinson, C., Layte, R., Jenkinson, D., Lawrence, K., Petersen, S., Paice, C., & Stradling, J. (1997). A shorter form health survey: Can the SF-12 replicate results from the SF-36 in longitudinal studies? *Journal of Public Health Medicine, 19,* 179–186. doi:10.1093/oxfordjournals.pubmed.a024606

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey replication. *Archives of General Psychiatry, 62,* 593–602. doi:10.1001/archpsyc.62.6.593

*Kiropoulos, L. A., Klein, B., Austin, D. W., Gilson, K., Pier, C., Mitchell, J., & Ciechomski, L. (2008). Is Internet-based CBT for panic disorder and agoraphobia as effective as face-to-face CBT? *Journal of Anxiety Disorders, 22,* 1273–1284. doi:10.1016/j.janxdis.2008.01.008

*Klein, B., Mitchell, J., Abbott, J., Shandley, K., Austin, D., Gilson, K., . . . Redman, T. (2010). A therapist-assisted cognitive behavior therapy Internet intervention for posttraumatic stress disorder: Pre-, post- and 3-month follow-up results from an open trial. *Journal of Anxiety Disorders, 24,* 635–644. doi:10.1016/j.janxdis.2010.04.005

*Klein, B., Mitchell, J., Gilson, K., Shandley, K., Austin, D., Kiropoulos, L., . . . Cannard, G. (2009). A therapist-assisted Internet-based CBT intervention for posttraumatic stress disorder: Preliminary results. *Cognitive Behaviour Therapy, 38,* 121–131. doi:10.1080/16506070902803483

Koran, L. M., Thienemann, M. L., & Davenport, R. (1996). Quality of life for patients with obsessive-compulsive disorder. *American Journal of Psychiatry, 153,* 783–788. doi:10.1016/j.comppsych.2009.10.001

*Koszycki, D., Benger, M., Shlik, J., & Bradwejn, J. (2007). Randomized trial of a meditation-based stress reduction program and cognitive behavior therapy in generalized social anxiety disorder. *Behaviour Research and Therapy, 45,* 2518–2526. doi:10.1016/j.brat.2007.04.011

*Ledley, D. R., Heimberg, R. G., Hope, D. A., Hayes, S. A., Zaider, T. I., van Dyke, M., . . . Fresco, D. M. (2009). Efficacy of a manualized and workbook-driven individual treatment for social anxiety disorder. *Behavior Therapy, 40,* 414–424. doi:10.1016/j.beth.2008.12.001

Lehrer, J. (2010, December 13). The decline effect and the scientific method: The truth wears off. *New Yorker*. Retrieved from http://www.newyorker.com

*Marchand, A., Roberge, P., Primiano, S., & Germain, V. (2009). A randomized, controlled clinical trial of standard, group and brief cognitive-behavioral therapy for panic disorder with agoraphobia: A two-year follow-up. *Journal of Anxiety Disorders, 23,* 1139–1147. doi:10.1016/j.janxdis.2009.07.019

Marks, G. B., Dunn, S. M., & Woolcock, A. J. (1992). A scale for the measurement of quality of life in adults with asthma. *Journal of Clinical Epidemiology, 45,* 461–472. doi:10.1016/0895-4356(92)90095-5

Mendlowicz, M. V., & Stein, M. B. (2000). Quality of life in individuals with anxiety disorders. *American Journal of Psychiatry, 157,* 669–682. doi:10.1176/appi.ajp.157.5.669

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Med, 6*(7): e1000097. doi:10.1371/journal.pmed.1000097

*Mörtberg, E., Clark, D. M., & Bejerot, S. (2011). Intensive group cognitive therapy and individual cognitive therapy for social phobia: Sustained improvement at 5-year follow-up. *Journal of Anxiety Disorders, 25,* 994–1000. doi:10.1016/j.janxdis.2011.06.007

Moses, L. E., Mosteller, F., & Buehler, J. H. (2002). Comparing results of large clinical trials to those of meta-analyses. *Statistics in Medicine, 21,* 793–800. doi:10.1002/sim.1098

Olatunji, B. O., Cisler, J. M., & Tolin, D. F. (2007). Quality of life in the anxiety disorders: A meta-analytic review. *Clinical Psychology Review, 27,* 572–581. doi:10.1016/j.cpr.2007.01.015

Otto, M. W., Tolin, D. F., Nations, K. R., Utschig, A. C., Rothbaum, B. O., Hofmann, S. G., & Smits, J. A. J. (2012). Five sessions and counting: Considering ultra-brief treatment for panic disorder. *Depression and Anxiety, 29,* 465–470. doi:10.1002/da.21910

*Paunovic, N., & Ost, L. (2001). Cognitive-behavior therapy versus exposure therapy in the treatment of PTSD in refugees. *Behaviour Research and Therapy, 39,* 1183–1197. doi:10.1016/S0005-7967(00)00093-0

*Paxling, B., Almlov, J., Dahlin, M., Carlbring, P., Breitholtz, E., Eriksson, T., & Andersson, G. (2011). Guided Internet-delivered cognitive behavior therapy for generalized anxiety disorder: A randomized controlled trial. *Cognitive Behaviour Therapy, 40,* 159–173. doi:10.1080/16506073.2011.576699

*Pier, C., Austin, D. W., Klein, B., Mitchell, J., Schattner, P., Ciechomski, L., . . . Wade, V. (2008). A controlled trial of Internet-based cognitive-behavioural therapy for panic disorder with face-to-face support from a general practitioner or email support from a psychologist. *Mental Health in Family Medicine, 5,* 29–39.

RAND Health Sciences Program. (1992). *RAND 36-item health survey 1.0*. Retrieved from http://www.rand.org/health/surveys_tools/mos/mos_core_36item.html

Rapaport, M. H., Clary, C., Fayyad, R., & Endicott, J. (2005). Quality-of-life impairment in depressive and anxiety disorders. *American Journal of Psychiatry, 162,* 1171–1178. doi:10.1176/appi.ajp.162.6.1171

Rosenthal, R. (1991). *Meta-analytic procedures for social research* (Rev. ed.). Thousand Oaks, CA: Sage.

Rosenthal, R., & Rubin, D. B. (1988). Comment: Assumptions and procedures in the file drawer problem. *Statistical Science, 3,* 120–125. doi:10.1214/ss/1177013014

Rubin, H. C., Rapaport, M. H., Levine, B., Gladsjo, J. K., Rabin, A., Auerbach, M., . . . Kaplan, R. (2000). Quality of well being in panic disorder: The assessment of psychiatric and general disability. *Journal of Affective Disorders, 57,* 217–221. doi:10.1016/S0165-0327(99)00030-0

*Rufer, M., Albrecht, R., Schmidt, O., Zaum, J., Schnyder, U., Hand, I., & Mueller-Pfeiffer, C. (2010). Changes in quality of life following cognitive-behavioral group therapy for panic disorder. *European Psychiatry, 25,* 8–14. doi:10.1016/j.eurpsy.2009.05.003

Safren, S. A., Heimberg, R. G., Brown, E. J., & Holle, C. (1996–1997). Quality of life in social phobia. *Depression and Anxiety, 4,* 126–133. doi:10.1002/(SICI)1520-6394(1996)4:3<126::AID-DA5>3.0.CO;2-E

Schmidt, S., Muhlan, H., & Power, M. (2006). The EUROHIS-QOL 8-item index: Psychometric results of a cross-cultural field study. *European Journal of Public Health, 16,* 420–428. doi:10.1093/eurpub/cki155

*Schneier, F. R., Belzer, K. D., Kishon, R., Amsel, L., & Simpson, H. B. (2010). Escitalopram for persistent symptoms of generalized anxiety disorder after CBT. *Journal of Nervous and Mental Disease, 198,* 458–461. doi:10.1097/NMD.0b013e3181da4d77

*Schneier, F. R., Neria, Y., Pavlicova, M., Hembree, E., Suh, E. J., Amsel, L., & Marshall, R. D. (2012). Combined prolonged exposure therapy and paroxetine for PTSD related to the World Trade Center attack: A randomized controlled trial. *American Journal of Psychiatry, 169,* 80–88. doi:10.1176/appi.ajp.2011.11020321

*Schnurr, P. P., Friedman, M. J., Foy, D. W., Shea, M. T., Hsieh, F. Y., Lavori, P. W., . . . Bernardy, N. C. (2003). Randomized trial of trauma-focused group therapy for posttraumatic stress disorder: Results from a Department of Veterans Affairs cooperative study. *Archives of General Psychiatry, 60,* 481–489. doi:10.1001/archpsyc.60.5.481

Schooler, J. (2011, February 23). Unpublished results hide the decline effect. *Nature, 470,* 437. doi:10.1038/470437a

*Shandley, K., Austin, D. W., Klein, B., Pier, C., Schattner, P., Pierce, D., & Wade, V. (2008). Therapist-assisted, Internet-based treatment for panic disorder: Can general practitioners achieve comparable patient outcomes to psychologists? *Journal of Medical Internet Research, 10*(2), e14. doi:10.2196/jmir.1033

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., . . . Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (M. I. N. I.): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry, 59*(Suppl. 20), 22–57.

*Sherbourne, C. D., Wells, K. B., & Judd, L. L. (1996). Functioning and well-being of patients with panic disorder. *American Journal of Psychiatry, 153,* 213–218.

*Simpson, H. B., Foa, E. B., Liebowitz, M. R., Ledley, D. R., Huppert, J. D., Cahill, S., . . . Hembree, E. (2008). A randomized, controlled trial of cognitive-behavioral therapy for augmenting pharmacotherapy in obsessive-compulsive disorder. *American Journal of Psychiatry, 165,* 621–630. doi:10.1176/appi.ajp.2007.07091440

*Simpson, H. B., Zuckoff, A. M., Maher, M. J., Page, J. R., Franklin, M. E., Foa, E. B., . . . Wang, Y. (2010). Challenges using motivational interviewing as an adjunct to exposure therapy for obsessive-compulsive disorder. *Behaviour Research and Therapy, 48,* 941–948. doi:10.1016/j.brat.2010.05.026

*Sousa, M. B., Isolan, L. R., Oliveira, R. R., Manfro, G. G., & Cordioli, A. V. (2006). A randomized clinical trial of cognitive-behavioral group therapy and sertraline in the treatment of obsessive-compulsive disorder. *Journal of Clinical Psychiatry, 67,* 1133–1139. doi:10.4088/JCP.v67n0717

Spitzer, R. L., Kroenke, K., Linzer, M., Hahn, S. R., Williams, J. B., deGruy, F. V., III, . . . Davies, M. (1995). Health-related quality of life in primary care patients with mental disorders: Results from the PRIME-MD 1000 Study. *JAMA: Journal of the American Medical Association, 274,* 1511–1517. doi:10.1001/jama.1995.03530190025030

*Stanley, M. A., Beck, J. G., Novy, D. M., Averill, P. M., Swann, A. C., Diefenbach, G. J., & Hopko, D. R. (2003). Cognitive-behavioral treatment of late-life generalized anxiety disorder. *Journal of Consulting and Clinical Psychology, 71,* 309–319. doi:10.1037/0022-006X.71.2.309

*Stanley, M. A., Hopko, D. R., Diefenbach, G. J., Bourland, S. L., Rodriguez, H., & Wagener, P. (2003). Cognitive-behavior therapy for late-life generalized anxiety disorder: Preliminary findings. *American Journal of Geriatric Psychiatry, 11,* 92–96. doi:10.1176/appi.ajgp.11.1.92

*Stanley, M. A., Wilson, N. L., Novy, D. M., Rhoades, H. M., Wagener, P. D., Greisinger, A. J., . . . Kunik, M. E. (2009). Cognitive behavior therapy for generalized anxiety disorder among older adults in primary care: A randomized clinical trial. *JAMA: Journal of American Medical Association, 301,* 1460–1467. doi:10.1001/jama.2009.458

*Telch, M. J., Schmidt, N. B., Jaimez, T. L., Jacquin, K. M., & Harrington, P. J. (1995). Impact of cognitive-behavioral treatment on quality of life in panic disorder patients. *Journal of Consulting and Clinical Psychology, 63,* 823–830. doi:10.1037/0022-006X.63.5.823

Thomas, B. H., Ciliska, D., Dobbins, M., & Micucci, S. (2004). A process for systematically reviewing the literature: Providing the research evidence for public health nursing. *Worldviews on Evidence-Based Nursing, 1,* 176–184. doi:10.1111/j.1524-475X.2004.04006.x

*Tillfors, M., Carlbring, P., Furmark, T., Lewenhaupt, S., Spak, M., Eriksson, A., . . . Andersson, G. (2008). Treating university students with social phobia and public speaking fears: Internet delivered self-help with or without live group exposure sessions. *Depression and Anxiety, 25,* 708–717. doi:10.1002/da.20416

*van Apeldoorn, F. J., Timmerman, M. E., Mersch, P. P. A., van Hout, W. J. P. J., Visser, S., van Dyck, R., & den Boer, J. A. (2010). A randomized trial of cognitive-behavioral therapy or selective serotonin reuptake inhibitor or both combine for panic disorder with or without agoraphobia: Treatment results through 1-year follow-up. *Journal of Clinical Psychiatry, 71,* 574–586. doi:10.4088/JCP.08m04681blu

*Wagner, B., Schulz, W., & Knaevelsrud, C. (2012). Efficacy of an Internet-based intervention for posttraumatic stress disorder in Iraq: A pilot study. *Psychiatry Research, 195,* 85–88. doi:10.1016/j.psychres.2011.07.026

Ware, J. E., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical Care, 30,* 473–483. doi:10.1097/00005650-199206000-00002

*Watanabe, N., Furukawa, T. A., Chen, J., Kinoshita, Y., Nakano, Y., Ogawa, S., . . . Noda, Y. (2010). Change in quality of life and their predictors in the long-term follow-up after group cognitive behavioral therapy for social anxiety disorder: A prospective cohort study. *BMC Psychiatry, 10,* 81–91. doi:10.1186/1471-244X-10-81

Weissman, M. M., & Bothwell, S. (1976). Assessment of social adjustment by patient self-report. *Archives of General Psychiatry, 33,* 1111–1115. doi:10.1001/archpsyc.1976.01770090101010

*Wetherell, J. L., Ayers, C. R., Sorrell, J. T., Thorp, S. R., Nuevo, R., Belding, W., . . . Patterson, T. L. (2009). Modular psychotherapy for anxiety in older primary care patients. *American Journal of Geriatric Psychiatry, 17,* 483–492. doi:10.1097/JGP.0b013e3181a31fb5

*Wetherell, J. L., Gatz, M., & Craske, M. G. (2003). Treatment of generalized anxiety disorder in older adults. *Journal of Consulting and Clinical Psychiatry, 71,* 31–40. doi:10.1037/0022-006X.71.1.31

WHOQOL Group. (1998). Development of the World Health Organization WHOQOL-BREF quality of life assessment. *Psychological Medicine, 28,* 551–558. doi:10.1017/S0033291798006667

Wittchen, H. U., & Beloch, E. (1996). The impact of social phobia on quality of life. *International Journal of Clinical Psychopharmacology, 11*(Suppl. 3), 15–23. doi:10.1097/00004850-199606003-00004

Wood, V., Wylie, M. L., & Sheafor, B. (1969). An analysis of a short self-report measure of life satisfaction: Correlation with rater judgments. *Journal of Gerontology, 24,* 465–469. doi:10.1093/geronj/24.4.465

Received April 1, 2013
Revision received October 30, 2013
Accepted November 22, 2013 ■