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From the Lab to the Clinic: Effectiveness of Cognitive–Behavioral Treatments for Anxiety Disorders

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A controversy exists over whether results of randomized controlled trials of psychological treatment methods generalize to routine clinical practice. To examine the generalizability of cognitive–behavioral interventions for anxiety disorders, a meta-analysis of 11 effectiveness studies was conducted. Only studies that closely approximated real-world clinical practice were included in the present meta-analysis (e.g., studies were conducted in a nonuniversity setting, practitioners had regular caseloads, clients were not excluded if they had comorbid conditions). Cognitive–behavioral interventions were associated with significant improvement in anxiety symptoms at the end of treatment ($d_w = 1.35$) and again at follow-up ($d_w = 1.14$). On the basis of these results, it seems that cognitive–behavioral interventions for anxiety disorders generalize to real-world clinical practice.

Keywords: meta-analysis, cognitive–behavioral therapy, psychotherapy outcome research, effectiveness study, anxiety disorders

Perhaps one of the most robust findings in the evidence-based literature is that cognitive–behavioral therapy is an effective intervention for anxiety disorders. Meta-analyses have indicated that cognitive and behavioral techniques ameliorate symptoms of panic disorder (Gould, Otto, & Pollack, 1995; Mitte, 2005), generalized anxiety disorder (Gould, Otto, Pollack, & Yap, 1997), social phobia (Taylor, 1996), obsessive–compulsive disorder (Abramowitz, 1997) and posttraumatic stress disorder (Foa, Hembree, & Cahill, 2005). On the basis of the magnitude of combined effect sizes across meta-analytic studies, cognitive–behavioral interventions for anxiety disorders as a whole have been described as "highly effective" (Butler, Chapman, Forman, & Beck, 2006, p. 28).

Although evidence from randomized controlled trials (RCTs) indicates that cognitive–behavioral interventions for anxiety disorders are effective, these interventions may be underutilized in real-world clinical practice (Festerheim & Raw, 1996; Freiheit, Vye, Swan, & Cady, 2004). This appears to be due, in part, to a perceived lack of generalizability of treatment findings from RCTs to clinical practice (Westen, Novotny, & Thompson-Brenner, 2004). RCTs are carefully controlled studies that use random assignment, strictly adhere to treatment manuals, and exclude clients with comorbid disorders. By experimentally controlling potential confounds due to treatment and client characteristics, when significant differences are found between the treatment and control groups, it can be concluded that significant symptom reduction for clients in the treatment group was due to the cognitive–behavioral intervention. Because the experimentally controlled conditions of an RCT are rarely, if ever, an option in clinical practice (Barlow, Levitt, & Bufka, 1999; Seligman & Levant, 1998), community-based practitioners may be skeptical about whether evidence from RCTs will apply to their practice.

Given the importance of both internal validity (e.g., RCTs) and external validity (e.g., effectiveness research), recent definitions of evidence-based practice have expanded to include effectiveness studies in addition to RCTs (American Psychological Association Presidential Task Force on Evidence-Based Practice, 2005). In contrast to RCTs, effectiveness studies often involve more flexible treatment delivery and fewer exclusionary criteria (e.g., comorbidity, treatment history, concomitant pharmacotherapy,

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age, symptom severity) than RCTs (Merrill, Tolbert, & Wade, 2003). Effectiveness research is often conducted as part of routine services offered to consumers as opposed to therapy provided for research purposes.

Initial attempts at reviewing effectiveness studies were limited by a lack of effectiveness research that closely approximated clinic settings. A search of 23 journals covering a period of 20 years found only nine studies that met criteria for clinically relevant therapy (Weisz, Donenberg, Han, & Weiss, 1995). In a similar review, Shadish et al. (1997) found only 56 out of over 1,000 studies that met criteria for their lowest level of clinical relevance and found only 1 study (i.e., Katz, de Krasinski, Philip, & Wieser, 1975) that met their most stringent criteria of clinical relevance. Criteria for clinical relevance included the following: Therapy was provided in a nonuniversity setting, patients were referred for clinical rather than experimental reasons, clients presented with heterogeneous problems, therapy was delivered by professional therapists with regular caseloads, treatment was not manualized, and treatment implementation was not monitored. These criteria closely approximate the clinical environment of most practicing psychologists.

The purpose of the present study was to examine whether cognitive–behavioral interventions for anxiety disorders are effective in real-world clinical settings. Because previous reviews of community-based research included studies that maintained aspects of RCTs (e.g., random assignment and control groups), this article provides a current review of effectiveness studies with the highest clinical relevance for the treatment of anxiety. Anxiety was chosen for review because it is one of the most prevalent of the psychological disorders (Kessler, Berglund, Demler, Jin, & Walters, 2005), and the majority of existing effectiveness studies (approximately one third) involved clients with this problem.[1] Changes in severity of anxiety, depression, and other types of distress were examined. This review is not exhaustive, but instead serves as a catalyst for future real-world effectiveness research.

Method

Studies

To identify published effectiveness studies of cognitive–behavioral interventions for anxiety disorders that closely approximated real-world practice, we searched the PsycINFO, Medline, and Google Scholar databases (keyword terms: *effectiveness study, anxiety, panic disorder, OCD, PTSD, social phobia, generalized anxiety disorder, cognitive behavior therapy, service clinic settings, benchmarking study, nonrandomized samples*). We also completed an issue-by-issue search of relevant journals from 1985 to the present and examined reference lists from relevant articles.[2] We included studies that met the highest level of clinical relevance (as described earlier; see Shadish et al., 1997). We excluded non–university-based effectiveness studies that did not include clients with comorbid diagnoses and those that used random assignment, control groups, strict adherence to treatment manuals, and therapist monitoring for purposes of the research.

Fourteen studies initially met our inclusion criteria. After closer examination, we decided that three studies should be excluded. These studies were excluded because attempts to contact an author for necessary unpublished statistics were unsuccessful (Howard, 1999) or because clients diagnosed with mood and anxiety disorders were combined together for statistical analysis, thereby negating our ability to examine the effectiveness of cognitive–behavioral interventions for anxiety specifically (Westbrook & Hill, 1998). Because two studies were based on the same sample of clients (i.e., Stuart, Treat, & Wade, 2000; Wade, Treat, & Stuart, 1998), only the follow-up study was included in the present meta-analysis (Stuart et al., 2000). The remaining 11 studies examined the effectiveness of cognitive–behavioral therapy in private clinics for clients with the following primary diagnoses: obsessive–compulsive disorder ($N = 4$; Franklin, Abramowitz, Kozak, Levitt, & Foa, 2000; Rothbaum & Shahar, 2000; Warren & Thomas, 2001; Wetzel, Bents, & Florin, 1999), panic disorder with or without agoraphobia ($N = 3$; Hahlweg, Fiegenbaum, Frank, Schroeder, & von Witzleben, 2001; Sanderson, Raue, & Wetzler, 1998; Stuart et al., 2000), social phobia ($N = 1$; Hunt & Andrews, 1998), posttraumatic stress disorder ($N = 2$; Gillespie, Duffy, Hackmann, & Clark, 2002; Monson, Rodriguez, & Warner, 2005), and generalized anxiety disorder ($N = 1$; Durham et al., 2004).

The number of clients in the included studies ranged from 18 to 401, with an overall total of 973 clients. A majority of the clients were women (54.6%), with an average age of 35.6 years. About half of the participants were diagnosed with a comorbid disorder in addition to an anxiety disorder. On average, therapy consisted of 20.9 contact hours, and most clients completed the course of therapy (see Table 1). Treatment settings included community mental health centers ($n = 1$), outpatient clinics, medical centers, HMOs ($n = 7$), a university-affiliated outreach clinic ($n = 1$), and private practice ($n = 2$). Treatment providers were doctoral psychologists exclusively ($n = 4$), combinations of doctoral and/or master's-level therapists ($n = 3$), and combinations of psychologists, mental health nurse practitioners, social workers, and other professional counselors ($n = 4$).

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[1] This figure is based on a PsycINFO search for the keywords *effectiveness* and *cognitive behavior therapy*. The search yielded 97 results. Of the 41 studies that were actually effectiveness studies, 14 (35%) were for an anxiety disorder, 8 (20%) were for mood disorders, 7 (17%) were for pain management/health issues, and the remaining studies were effectiveness studies for a variety of other diagnoses (e.g., alcohol dependence, eating disorders, personality disorders).

[2] An issue-by-issue search from 1985 to the present was conducted in the following journals: *Professional Psychology: Research and Practice*; *Psychotherapy: Theory, Research, Practice, Training*; *Journal of Cognitive Psychotherapy: International Quarterly*; *Cognitive and Behavioral Practice*; *International Journal of Cognitive Psychotherapy*; *Clinical Case Studies*; *Clinical Psychologist*; *Prevention and Treatment* (an American Psychological Association online journal); *Journal of Anxiety Disorders*; *Journal of Consulting and Clinical Psychology*; *Behaviour Research and Therapy*; *Clinical Psychology Review*; *British Journal of Psychiatry*; *Clinical Psychology and Psychotherapy*; *Behavior Therapy*; *The Behavior Therapist*; *Journal of Affective Disorders*; *Clinical Psychology: Science and Practice*; *Journal of Behavioral Therapy and Experimental Psychiatry*; *Clinical Psychology Review*; *Psychological Bulletin*; *Psychology and Psychotherapy: Theory, Research, and Practice*; and *Psychotherapy and Psychosomatics.*

Table 1
Characteristics of Effectiveness Studies

Study characteristic	*M*	Median	Range
Clients per study	88.5	78.0	18.0–401.0
Attrition pre- to posttest (%)	26.8	30.0	9.0–36.0
Male clients (%)	45.4	43.0	22.4–100.0
Client age years	35.6	34.2	30.1–47.8
Clients with psychiatric comorbidity (%)	51.1	54.0	32.0–74.0
Length of treatment hours	20.9	15.0	8.0–52.0

Note. Clients per study is based on the number of clients who completed both pretreatment and posttreatment assessments. Percentage of attrition is based on the number of clients who started the effectiveness study but did not complete the posttreatment assessment.

Estimating Treatment Effects

All of the studies included in the present review were repeated measures designs that assessed symptom severity at the beginning of therapy and at termination. Five studies also obtained follow-up information, typically 1 year after termination. Treatment outcome was assessed with a variety of clinician-rated and self-report anxiety, depression, and other distress measures. Cohen's effect sizes (*d*) based on outcome measures with known reliability and validity were used in the present meta-analysis. When effect sizes were not reported in the published study, we calculated the effect size by taking the difference between the pretest and posttest means and dividing that result by the pretest standard deviation. When means and standard deviations were not provided, we converted the pretest–posttest comparison statistic (typically a *t* value) into an effect size (Morris & DeShon, 2002). To give each study equal weight in the overall meta-analysis, we averaged multiple measures of anxiety within a study to generate one anxiety effect size per study. The same procedure was completed for studies with multiple depression measures. Because other measures of distress were conceptually distinct and could not be meaningfully combined, we report these effect sizes separately.

To estimate the average effect size change from pretest to posttest and from pretest to follow-up, we calculated mean variance-weighted effect sizes (d_w). We used the mean variance-weighted effect size because sample sizes in the present meta-analysis varied widely from 18 to 401 clients. Because larger samples may result in more precise effect size estimates, an estimated mean effect size based on variance-weighted effect sizes may be more precise than a mean effect size based on unweighted effect sizes (Hedges & Olkin, 1985). To calculate variance-weighted mean effect sizes, estimates of the population effect size (δ) and the population correlation (ρ) were needed. To estimate δ, we calculated the unweighted mean effect size from the 11 studies in the present meta-analysis. The unweighted mean effect size was 1.54 for anxiety measures and 1.15 for depression measures. To estimate ρ, we calculated a small meta-analysis of the test–retest correlation coefficients. Because few of the studies that we reviewed reported test–retest correlation coefficients, *t* statistics based on pretest–posttest comparisons were converted to correlation coefficients (Morris & DeShon, 2002). The estimated population correlation was .35 for anxiety measures and .50 for depression measures.

Results

Cognitive–behavioral interventions for anxiety were associated with large decreases in anxiety symptoms (see Table 2). On average, clients indicated a substantial decrease in anxiety symptoms from pretest to posttest ($d_w = 1.35$). These treatment gains tended to be maintained from pretest to follow-up. In the five studies that included a follow-up assessment (with a modal follow-up time of 1 year), anxiety symptoms remained significantly decreased ($d_w = 1.14$).

Cognitive–behavioral interventions for anxiety were associated with large decreases in symptoms of depression (see Table 3). Clients reported a significant decrease in depressive symptoms from pretest to posttest ($d_w = 0.96$). In the four studies that assessed follow-up depression, typically at 1 year, these treatment gains continued after treatment had ended ($d_w = 1.12$).

Cognitive–behavioral interventions for anxiety disorders may also be associated with improvement in overall mental health but may have limited impact on personality characteristics and alcohol use. As indicated by individual effect sizes from two studies that assessed overall mental health, cognitive–behavioral interventions for anxiety were associated with improved general mental health ($d = 0.83$, Hahlweg et al., 2001; $d = 1.17$, Wetzel et al., 1999; both were based on the Symptom Checklist–90–Revised, Global Severity Index). Cognitive–behavioral interventions for anxiety disorders were associated with relatively small treatment effects for personality ($d = 0.33$, Hunt & Andrews, 1998; results were based on the Eysenck Personality Questionnaire–Neuroticism subscale) and alcohol symptoms ($d = 0.50$, Monson et al., 2005; results were based on the Alcohol Severity Index).

A potential problem with any meta-analysis is the file drawer problem. This problem occurs when studies that fail to find a significant treatment effect are discarded and not submitted for publication. Because studies that found a treatment effect may be more likely to be submitted for publication than those studies yielding nonsignificant results, the average effect sizes reported in meta-analytic studies may be an overestimate of the effectiveness of a treatment. To examine the likelihood of unpublished studies significantly changing the average effect sizes reported here, we calculated a fail-safe *N* analysis (Orwin, 1983). According to this analysis, it would take about 50 studies with small effect sizes ($<.30$) to reduce the average effect sizes of the present study to small effects. This seems unlikely given the relatively recent interest in effectiveness research.

Discussion

Results from the present meta-analysis of effectiveness research that closely approximates real-world clinical practice indicated that cognitive–behavioral interventions for anxiety disorders were effective in community-based settings. Cognitive–behavioral interventions for anxiety disorders were associated with large decreases in anxiety symptoms, and these treatment gains were maintained at follow-up. Cognitive–behavioral interventions for anxiety disorders were also associated with large decreases in depressive symptoms and with improvement in general mental health, but these interventions had a limited impact on more comorbid conditions, such as personality disorders and substance use.

These results are consistent with other meta-analyses of cognitive–behavioral interventions for anxiety disorders. For

Table 2
Effect Sizes of Anxiety Measures for Each Effectiveness Study

		Pretreatment			Posttreatment			Follow-up				Study effect size	
Study	Variable	*N*	*M*	*SD*	*M*	*SD*	*d*	*N*	*M*	*SD*	*d*	PrPo *d*	PrFU *d*
Durham et al. (2004)	HARS	18	20.3	5.0	14.2	8.4	1.22	18	16.2	10.1	0.82	1.46	1.14
	STAI	18	64.4	8.1	50.8	16.8	1.68	18	53.2	17.5	1.38		
	ATI	18	61.1	10.7	45.4	16.7	1.47	18	48.1	18.0	1.21		
Franklin et al. (2000)	YBOCS	100	26.6	4.9	10.5	5.9	3.29					3.29	
Gillespie et al. (2002)	PDS	78	33.4	8.5	11.9	8.9	2.53					2.53	
Hahlweg et al. (2001)	BAI	399	27.0	12.4	13.8	10.3	1.06	292	12.8	10.5	1.15	1.21	1.28
	ACQ	400	2.3	0.6	1.7	0.5	1.00	293	1.6	0.5	1.17		
	BSQ	390	2.9	0.7	2.0	0.7	1.29	284	2.0	0.7	1.29		
	MIA	365	3.2	1.0	1.7	0.7	1.50	269	1.7	0.8	1.50		
Hunt & Andrews (1998)	SCL-90-R ANX	93	1.9	0.9	1.3	0.8	0.67	93	0.8	0.7	1.22	0.66	1.11
	SCL-90-R PHO	93	1.6	1.1	0.9	0.8	0.64	93	0.5	0.7	1.00		
Monson et al. (2005)	MISS	45	42.1	4.1	41.0	5.0	0.27					0.27	
Rothbaum & Shahar (2000)	YBOCS	23	24.0	6.4	7.9	3.5	2.52					2.52	
Sanderson et al. (1998)	HARS	30	30.8	12.4	14.8	9.5	1.29					1.29	
Stuart et al. (2000)	FQ-AG	81	15.1	11.4	8.9	7.5	0.54	57	7.4	7.4	0.68	0.74	0.90
	FQ-SP	81	16.0	9.0	9.9	7.2	0.68	57	8.1	6.3	0.88		
	FQ-BL	81	13.5	8.6	11.3	7.7	0.26	57	8.1	6.2	0.63		
	PANAS-NA	81	30.5	8.8	17.5	6.9	1.48	57	18.2	5.7	1.40		
Warren & Thomas (2001)	YBOCS	19	23.0	5.6	11.6	5.0	2.04					2.04	
Wetzel et al. (1999)	HZI	85	56.4	26.8	32.4	21.1	0.90	85	33.1	23.2	0.87	0.95	1.02
	SCL-90-R O-C	85	1.8	0.8	1.0	0.7	1.00	85	0.9	0.7	1.16		

Note. All positive effect sizes indicate a decrease in anxiety. PrPo *d* = the combined effect size for the pretreatment–posttreatment comparison; PrFU *d* = the combined effect size for the pretreatment–follow-up comparison; HARS = Hamilton Anxiety Rating Scale; STAI = State–Trait Anxiety Inventory; ATI = Anxious Thoughts Inventory; YBOCS = Yale–Brown Obsessive Compulsive Scale; PDS = Post-Traumatic Diagnosis Scale; BAI = Beck Anxiety Inventory; ACQ = Anxiety Cognition Questionnaire; BSQ = Body Sensation Questionnaire; MIA = Mobility Inventory, Alone subscale; SCL-90-R ANX = Symptom Checklist–90–Revised, Anxiety subscale; SCL-90-R PHO = Symptom Checklist–90–Revised, Phobia subscale; MISS = Mississippi Scale for Combat-Related PTSD; FQ-AG = Fear Questionnaire, Agoraphobia subscale; FQ-SP = Fear Questionnaire, Social Phobia subscale; FQ-BL = Fear Questionnaire, Blood Injury subscale; PANAS-NA = Positive and Negative Affect Scale–Negative Affect; HZI = Hamburger Zwangsinventar/German OCD questionnaire; SCL-90-R O-C = Symptom Checklist–90–Revised, Obsessive–Compulsive subscale.

example, meta-analyses of RCTs of cognitive–behavioral interventions for panic disorder (Gould et al., 1995) and social phobia (Taylor, 1996) yielded mean effect sizes ($d = 0.88$ and $d = 1.06$, respectively) similar to those in the present review. A broad review of 35 effectiveness studies for a wide range of adult, child, and adolescent disorders compared treatment completion rates and improvement rates from effectiveness studies with those reported in RCTs and found comparable results (Hunsley & Lee, 2007), providing evidence that treatments with established efficacy are transportable to clinical settings.

Although examining nonrandomized community trials with relaxed experimental control was the purpose of the present review,

Table 3
Effect Sizes of Depression Measures for Each Effectiveness Study

		Pretreatment			Posttreatment			Follow-up				Study effect size	
Study	Variable	*N*	*M*	*SD*	*M*	*SD*	*d*	*N*	*M*	*SD*	*d*	PrPo *d*	PrFU *d*
Franklin et al. (2000)	BDI	100	18.7	8.4	8.1	7.4	1.26					1.14	
	HDRS	100	12.5	5.9	6.5	5.4	1.02						
Gillespie et al. (2002)	BDI	33	28.6	11.8	8.2	9.1	1.73					1.73	
Hahlweg et al. (2001)	BDI	400	15.6	8.1	8.1	7.7	0.93	293	7.7	7.4	0.98	0.93	0.98
Hunt & Andrews (1998)	SCL-90-R DEP	93	1.5	0.9	0.9	0.7	0.67	93	0.8	0.7	0.78	0.67	0.78
Sanderson et al. (1998)	BDI	30	20.9	9.4	10.3	8.6	1.13					1.00	
	HDRS	30	20.1	12.4	9.3	9.5	0.87						
Stuart et al. (2000)	BDI	81	14.4	7.8	6.5	6.4	1.01	57	5.3	6.9	1.17	1.01	1.24
	PANAS-PA[a]	81	25.9	7.9	32.5	8.3	0.83	57	36.3	8.1	1.32		
Wetzel et al. (1999)	BDI	85	21.7	8.1	8.7	5.9	1.60	85	8.2	7.2	1.67	1.60	1.67

Note. All positive effect sizes indicate a decrease in depression. PrPo *d* = the combined effect size for the pretreatment–posttreatment comparison; PrFU *d* = the combined effect size for the pretreatment–follow-up comparison; BDI = Beck Depression Inventory; HDRS = Hamilton Depression Rating Scale; SCL-90-R DEP = Symptom Checklist–90–Revised, Depression subscale; PANAS-PA = Positive and Negative Affect Scale–Positive Affect.
[a] The PANAS-PA is the only measure where higher scores indicate less severe depression. To be consistent with other effect size comparisons, a positive effect size was reported for the PANAS-PA.

the lack of control leaves open the possibility that other factors accounted for the changes in symptom severity. One possible factor that may have affected client outcomes was the passage of time. Without a control group, it is not clear how much of the decrease in symptom severity was due to effective therapy versus spontaneous remission. Nonetheless, studies have shown that changes in wait-listed clients and other control groups are minimal without treatment (e.g., Nathan & Gorman, 2002; Weisz, Doss, & Hawley, 2006). However, in light of the limitations of nonrandomized community trials, we want to underscore that effectiveness studies alone provide limited information about whether treatments, as opposed to other potentially confounding variables, are associated with outcomes. Effectiveness results should be viewed alongside the results of RCTs. Because practitioners may believe that most RCT research is not applicable to their clinical work (Nelson, Steele, & Mize, 2006), an examination of effectiveness studies that closely approximate real-world clinical practice may enhance the penetration of treatment research into clinical practice.

On the basis of the present review of real-world effectiveness research, we recommend that future practitioner–scientists who plan to examine the effectiveness of an intervention in their clinic choose widely used, validated outcome measures, report pretest and posttest means and standard deviations at a minimum, and label their studies *effectiveness studies*. Because the terms associated with evidence-based practice have changed and the definition of what constitutes an effectiveness study is not consensual, the identification of relevant studies was challenging. Another suggestion is to find ways to closely monitor the actual interventions used in light of the treatment protocols that are under investigation. Although the therapists in the studies examined here received training in the cognitive–behavioral therapy interventions provided, the degree to which the actual therapy delivered was consistent with cognitive–behavioral therapy was not monitored carefully in all studies, and this represents a limitation of this analysis.

There are still few effectiveness studies conducted in community settings, and most effectiveness studies to date have been conducted in specialty settings. Although the studies reviewed here have moved beyond the laboratory into more real-world practice settings, only two studies involved a private practice setting. Examining interventions from RCTs in real-world clinical practice may be an important step in transporting these interventions into real-world clinical practice (Rounsaville, Carroll, & Onken, 2001). The present study is an initial attempt to move in that direction. On the basis of our results, it may be reasonable to conclude that evidence-based cognitive–behavioral interventions for anxiety can be effectively transported from the lab to the clinic.

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