

## ARE COMPLEX PSYCHOTHERAPIES MORE EFFECTIVE THAN BIOFEEDBACK, PROGRESSIVE MUSCLE RELAXATION, OR BOTH? A META-ANALYSIS<sup>1</sup>

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*Summary.*—A meta-analysis of 26 studies was conducted to assess whether more complex forms of psychotherapy would be superior to control treatments of either biofeedback, progressive muscle relaxation, or both. Consistent with hypotheses, more complex treatments provided a small, significant improvement over biofeedback and progressive muscle relaxation ( $r = .09$ ). A subset of the more complex behavioral treatments accounted for most of this small incremental effectiveness of more complex treatments ( $r = .15$ ). Possible sources of this incremental effectiveness are discussed.

In this paper the effectiveness of psychotherapy is operationally defined as the magnitude of effect sizes calculated in meta-analyses. Traditionally, psychotherapy has been conceptualized as the net effect of two components, common, nonspecific factors found in many different treatments, and specific factors (i.e., theoretically relevant techniques) proper to a treatment method (Rosenzweig, 1936; Frank, 1973). Meta-analyses that compare specific forms of therapy with common factor control conditions typically report that psychotherapy is more effective than common factor treatments, which are control conditions used to provide a baseline of nonspecific therapeutic factors such as expectancy of improvement and a therapeutic relationship. Typically, common factor treatments have been more effective than no therapy (Lambert & Bergin, 1994; Lambert & Ogles, 2004). These common findings, along with the reported magnitude of effects for both specific psychotherapies and common factor conditions, have led some researchers to estimate the relative contributions of the common factor and specific factor components of treatment. These estimates have varied widely. For example, in a review of 63 meta-analyses of psychotherapy outcome, Matt and Navarro (1997) reported that specific effects surpassed the common factor effect by a ratio of nearly 4:1. In contrast, Wampold (2001) has argued that at most 1% of the variance in outcomes found in psychotherapy studies could be attributed to specific factors.

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Unfortunately, any conclusions regarding the differential effectiveness of common versus specific factors are obscured by at least two major problems. First, the common factor treatments represented in these analyses and estimates often lack adequate standardization. Second, there is an overlap in the conceptual distinction between common factors and specific factors.

#### *Standardization of Common Factor Treatments*

In a meta-analysis of 80 psychotherapy studies containing both common factor and no-treatment controls, Stevens, Hynan, and Allen (2000) reported that specific effects surpassed common factor effects by a ratio of slightly less than 2:1. Stevens, *et al.* also noted that common factor controls in these studies included many heterogeneous treatments, e.g., an altered diet, dynamic treatment, false feedback, group discussion, play writing, progressive muscle relaxation, and sessions with untrained therapists. Such heterogeneity makes it difficult to establish a firm baseline of therapeutic effects, which may hinder any evaluation of additional change processes. To reduce this heterogeneity in the present meta-analysis, the effects of more complex forms of therapy were compared to a more narrowly defined group of controls.

The control treatments in the present meta-analysis, biofeedback and progressive muscle relaxation, represent comparatively less complex forms of therapy that provide both a therapeutic relationship and the opportunity to acquire new skills. Both the therapeutic relationship and various forms of therapeutic learning have been construed as common factors by many reviewers (e.g., Strupp, 1986; Weinberger, 1995; Klein, 1996; Lambert & Ogles, 2004). The main purpose of this meta-analysis was to assess whether more complex forms of psychotherapy provide significant benefits beyond the opportunity to acquire less complex skills in the context of a therapeutic relationship. For ease of presentation, biofeedback and progressive muscle relaxation are described as “less complex” treatments throughout this paper. It is not assumed that biofeedback and progressive muscle relaxation are elementary or rudimentary treatments. The control treatments in this meta-analysis involved bona fide treatments delivered by trained therapists with experience equivalent to therapists delivering the more complex treatments. It is argued, however, that the skills learned in many other psychotherapies are more complex than those acquired in biofeedback and progressive muscle relaxation.

A brief outline of Strupp's (1986) conceptualization of elements common to all psychotherapies is warranted here. Strupp asserted that all psychotherapy necessarily includes two basic factors: “creation of an interpersonal context” and “therapeutic learning” (p. 123). That is, the therapist must create a safe relational context in which clients can express themselves freely and sense the therapist as a trustworthy ally. The client-therapist alliance in turn facilitates therapeutic learning, in which clients learn to correct prob-

lematic cognitive, emotional, and behavioral responses. Without such a relationship and such learning, psychotherapy cannot be effective, according to Strupp.

Strupp (1986) referred to the goal of therapeutic learning as the client's "identifying, understanding, and mastering" a given problem (p. 123), a phrase which makes explicit the conceptual equivalence of therapeutic learning and skill mastery. According to Strupp, therapeutic learning could include recognition of unconscious wishes or irrational beliefs, enhanced coping skills, reduction of phobias, elimination of maladaptive behavior patterns, or increased awareness of intense unacknowledged emotions. What is learned (and mastered) varies with the type of psychotherapy offered. Biofeedback and progressive muscle relaxation are similar learning procedures where clients engage in repetitive cognitive and motor activities assisted by a series of instructions, prompts, feedback over trials, and therapy sessions. Many other therapies theoretically involve the acquisition of more complex skills.

The lengthy and complex process of psychoanalysis has as its primary goal the acquisition of a complex skill, namely, the ability to understand and interpret correctly one's intrapsychic processes and their roots in early childhood experience and so to resolve one's inner conflicts in the best way possible (Arlow, 2005). The purpose of the less lengthy but still theoretically complex processes involved in rational emotive therapy (RET) and cognitive therapy is also a type of skill mastery: in RET, the ability to dispute and replace one's irrational beliefs with rational beliefs (Ellis, 2005); in cognitive therapy, the ability to formulate and test working hypotheses about the nature of reality and adapt one's cognitions and behavior accordingly (Beck & Weishaar, 2005).

Explicit or implicit skill acquisition pervades other psychotherapeutic schools as well. In person-centered therapy, a client learns unconditional positive self-regard and acquires ability to tap into and use the organismic valuing process without distortion (Raskin & Rogers, 2005). The successful client of the existential psychologist will have learned to face the ultimate concerns of human existence—death, freedom, isolation, and meaninglessness—and build a constructive, meaningful existence in the face of these concerns (May & Yalom, 2005). The successful Gestalt client will have acquired ability to live spontaneously and in the moment in a state of complete awareness (Yontef & Jacobs, 2005). The successful behavior therapy client will have learned to substitute adaptive for nonadaptive behavior patterns (Wilson, 2005), and so on.

#### *The Overlap between Common Factors and Specific Factors*

A second problem in interpreting previous meta-analyses of common versus specific factors is the lack of a clear conceptual distinction between

common and specific factors. Some authors have explicitly recognized that the designation of a therapeutic operation as common or specific is dependent upon theoretical perspective (Weinberger, 1995; Stevens, *et al.*, 2000; Kendall, Holmbeck, & Verduin, 2004). Variables typically considered to be common factors, e.g., the therapeutic relationship and confronting a problem, are differentially emphasized across the different schools of psychotherapy. In some cases, the emphasis is strong enough to change the status of a factor from a common one to a specific one. For example, if the quality of the therapeutic relationship is deemed a common factor in many schools of therapy, the relationship qualifies as a specific factor in person-centered therapy (Raskin & Rogers, 2005). Similarly, variables identified as specific factors in some theoretical systems can be recast as common factors. For example, exposure, typically considered a specific factor in behavioral treatments, can be construed as occurring whenever a client self-discloses a meaningful experience, generally considered a common factor. Thus, in a previous meta-analysis (Stevens, *et al.*, 2000), some or perhaps many of the common factor control groups may have provided therapeutic operations that could be viewed as specific factors by someone with a different theoretical perspective. Regardless of whether an intervention is theoretically viewed as specific or common, the actual change processes that accompany improvement may not reflect the putative causes.

In recognition of this conceptual overlap, in the present meta-analysis it is assumed that most or all of the authors of the source studies view the more complex treatment in their study as theoretically relevant, i.e., specific, to the disorder studied. The same assumption is made about biofeedback and progressive muscle relaxation. Although there are similarities between the present meta-analysis and the previous one (Stevens, *et al.*, 2000), the present meta-analysis incorporates a conceptual reframing of issues. The present meta-analysis can best be conceptualized as a comparison of complex treatments with less complex treatments rather than a comparison of specific factors with common factors. The concern is in evaluating the incremental effectiveness of the complex treatments against a baseline treatment, i.e., less complex therapies that provide both a therapeutic relationship and skill acquisition (Lohr, De Maio, & McGlynn, 2003).

For the present meta-analysis, skill acquisition is viewed as an important factor across all types of therapy. The differences among psychological treatments are the varieties of therapeutic learning. If a less complex treatment affords the same benefits to the client as a more complex treatment, the simpler treatment should be given strong consideration. Does the acquisition of more complex skills have advantages above and beyond that of acquiring less complex skills?

The present study is also conceptually related to other meta-analyses

that have compared active treatments with each other (Wampold, Mondin, Moody, Stich, Benson, & Ahn, 1997; Luborsky, Rosenthal, Diguer, Andrusyna, Berman, Levitt, Seligman, & Krause, 2002). Such meta-analyses have often addressed the issue of the hypothesized equivalence of different forms of psychotherapy, the “Dodo Bird Verdict” (Luborsky, Singer, & Luborsky, 1975). Recently, Luborsky, *et al.* (2002) reviewed six publications of 17 such meta-analyses and reported a small, nonsignificant average effect size of  $d = 0.20$ , i.e., the average difference between any two psychotherapies in comparative studies. One possible explanation for this small effect is the potentially strong role of common factors across different treatments, which may minimize differences between treatments (Wampold, 2001; Luborsky, *et al.*, 2002). It is also possible that the successful acquisition of any therapeutic skill, regardless of complexity, is sufficient for improvement.

The present meta-analysis takes a different approach in that the control treatments consist of a more homogeneous set of less complex treatments, biofeedback and progressive muscle relaxation. The present meta-analysis is not concerned with whether all psychotherapies are equivalent, but with evaluating whether a set of more complex treatments results in greater improvement than less complex control treatments. Messer and Wampold (2002) questioned that some or many of the “common factor controls” in the previous meta-analysis (Stevens, *et al.*, 2000) may not have represented bona fide control conditions. With the control strategy used in the present meta-analysis, it is assumed that biofeedback and progressive muscle relaxation provide a firm baseline of treatment effectiveness to permit an evaluation of incremental effects of more complex therapies. This assumption was evaluated by comparing the effectiveness of biofeedback and progressive muscle relaxation treatments with no-treatment controls whenever possible.

#### *Rationale for Present Study*

Both biofeedback and progressive muscle relaxation typically restrict the client's therapeutic activities to repetitions of somewhat limited motor and cognitive tasks while the therapist provides prompts and feedback. The more complex therapies differ from these less complex therapies on both quantitative and qualitative dimensions. These differences are likely multidimensional. Complex therapies in this meta-analysis typically require the practice and application of qualitatively more complicated skills and a more extensive learning process. Compared with biofeedback and progressive muscle relaxation, complex treatments typically require more substantial self-revelation, e.g., Gestalt, psychodynamic, person-centered, and existentialist therapies; more extensive homework assignments between sessions, e.g., cognitive therapy, rational emotive therapy, applied relaxation, and many behavioral therapies; conflict resolution and insight into the motivations for one's ac-

tions, e.g., psychodynamic and Gestalt therapies; hypothesis testing and changing irrational beliefs, e.g., cognitive therapy and rational emotive therapy; or a combination of the above. More complex techniques also require the therapist, and often the client, to grasp somewhat more intricate theoretical models.

### *Hypotheses*

Before a presentation of the hypotheses, which incorporate a comparison of the present meta-analysis with a previous one (Stevens, *et al.*, 2000), the use of certain terms must be clarified. In Stevens, *et al.* (2000), the following terminology was used: a "complete treatment effect size" involved a comparison of a complete, i.e., full or experimental, treatment with a no-treatment control; a "specific factor effect size" involved a comparison of a complete treatment with a common factor control; and a "common factor effect size" involved a comparison of a common factor control with a no-treatment control. A similar set of terms was used in the present meta-analysis: a Complete Treatment effect size involved a comparison of a more complex treatment with a no-treatment control, a Complex effect size involved a comparison of a more complex treatment with a less complex control treatment, i.e., biofeedback or progressive muscle relaxation, and a Less Complex effect size involved a comparison of biofeedback or progressive muscle relaxation with a no-treatment control.

Overall, it was hypothesized that the results of the present meta-analysis would replicate previous findings, i.e., the Complete Treatment effect size, the Complex effect size, and the Less Complex effect size would all be statistically significant (Lambert & Bergin, 1994; Lambert & Ogles, 2004).

Using progressive muscle relaxation and biofeedback to provide a homogeneous baseline of skill acquisition in the context of a helping relationship, it was also expected that the Less Complex effect size in the present meta-analysis would be significantly greater than the common factor effect size in Stevens, *et al.* (2000). In Stevens, *et al.* (2000), the common factor effect size ( $r = .11$ , equivalent to  $d = 0.22$ ) accounted for 39% of the complete treatment effect size ( $r = .28$ , equivalent to  $d = 0.58$ ). Effect sizes were calculated using  $r$ , which has a range of .00 to 1.00. Because some of the common factor treatments in Stevens, *et al.* (2000) may not have been bona fide, it was expected that biofeedback and progressive muscle relaxation in the present meta-analysis would have an effect size significantly greater than  $r = .11$ . It was also expected that the Complex effect size in the present meta-analysis would be significantly less than the specific factor effect size, i.e., complete treatment vs common factor control ( $r = .19$ , equivalent to  $d = .39$ ) reported in Stevens, *et al.* (2000). A recent meta-analysis by Baskin, Tierney, Minami, and Wampold (2003) provided data consistent with these expectations. When com-

paring active treatments with common factor controls that were structurally equivalent to the active treatments, Baskin, *et al.* reported an effect size of  $d = 0.15$ , equivalent to  $r = .07$ .

### *Exploratory Analyses*

In an effort to investigate the effects of a more homogeneous set of more complex treatments, the more complex treatments were subcategorized into theoretical schools (e.g., behavioral) to assess whether any approach was particularly effective. There were no hypotheses for this analysis.

## METHOD

### *Studies*

Outcome studies for the present meta-analysis were restricted to the following inclusion criteria: only studies published from 1975, after Bernstein and Borkovec (1973) developed progressive muscle relaxation in its present form, were included; qualifying studies could involve the treatment of physical, psychosomatic, or emotional disorders in adults; both studies with and without no-treatment controls were included; and each study featured a comparison between one or more less complex treatments and one or more more complex treatments.

Less complex treatments included variations of progressive muscle relaxation or one of the various forms of biofeedback, e.g., electromyogram (EMG)-assisted, thermal, and heart rate, used separately or in combination. This combination occurred in two studies. For example, both progressive muscle relaxation alone or in conjunction with EMG-assisted biofeedback qualified as less complex treatments. If in addition to biofeedback or progressive muscle relaxation, treatments incorporated straightforward, arbitrary, additional elements either unrelated to the problem being treated or trivial enough to have no plausible significant effect on treatment outcome, these treatments were also classified as less complex treatments. These judgments were made by the authors of this meta-analysis. Examples included progressive muscle relaxation or biofeedback in conjunction with simple cues such as “relax” or “calm” or delivery of instructions in pace with a metronome, as in metronome-conditioned relaxation.

More complex treatments included the following: cognitive-behavioral treatments such as cognitive therapy, eye-movement desensitization and reprocessing, or other cognitive restructuring techniques; behavioral therapies such as stimulus control, social skills training, or any techniques employing exposure, whether imaginal or *in vivo*; insight-oriented verbal therapies, e.g., psychodynamic therapy; paradoxical intention; and treatments that combined progressive muscle relaxation, biofeedback, or both with additional elements that could plausibly affect treatment outcome in the judgment of the authors

of this meta-analysis. Examples included applied relaxation, which incorporated elements of progressive muscle relaxation but also teaches application of progressive muscle relaxation to stress-inducing situations; systematic desensitization, which yokes progressive muscle relaxation with exposure techniques; and progressive muscle relaxation or biofeedback in conjunction with complex treatments such as those listed above.

The following types of studies were excluded: studies involving brief treatments, e.g., one or two sessions, or fewer than 10 participants, as these are unlikely to yield generalizable or useful results; unpublished psychotherapy outcome studies, as the substantially greater expenditure of time and energy required to recover and include such studies has exerted negligible effects on meta-analytical results (cf. Dush, Hirt, & Schroeder, 1983; Eppley, Abrams, & Shear, 1989); studies for which insufficient data were reported to calculate reasonably accurate effect sizes; studies not available in English; studies in which meditation or yoga were the only complex treatments as these are too heterogeneously defined and operationalized to yield generalizable results; studies in which participants had no medical or psychiatric diagnosis; studies involving trivial comparison, e.g., "soft, relaxing music" versus progressive muscle relaxation; studies in which less complex treatments were simply compared with one another or with a placebo treatment or no-treatment control; studies comparing progressive muscle relaxation with- and without muscle-tension release; and studies involving treatments that, in the judgment of the authors of this meta-analysis, were not arguably more complex than biofeedback or progressive muscle relaxation, e.g., hypnosis and guided imagery.

Using the above inclusion and exclusion criteria, PsycLit and MedLit were searched from 1975 to 2004 for qualifying studies. References from meta-analyses and reviews published from 1978 were also consulted, all of which included biofeedback or progressive muscle relaxation comparisons among their source studies. Finally, all issues of Archives of General Psychiatry, Behavior Research and Therapy, Behavior Therapy, Biofeedback and Self-Regulation (Applied Psychophysiology and Biofeedback), Cognitive Therapy and Research, Headache, Health Psychology, Journal of Behavior Therapy and Experimental Psychiatry, Journal of Clinical Psychology, Journal of Consulting and Clinical Psychology, Journal of Psychosomatic Research, Psychosomatic Medicine, and Psychotherapy Research from January of 1985 to December of 2004 on were hand-searched for qualifying studies. The above searches yielded 26 potential source studies. Three of the 26 source studies overlapped with Stevens, *et al.* (2000).

#### *Classification and Coding*

Qualifying studies were coded for condition, including therapeutic ori-

entation; disorder type; sample size; number of sessions; and type of effect size; complete, complex or less complex, posttreatment, or follow-up. On a few occasions, calculations of effect sizes resulted in estimates averaged over less than 10 effect sizes. In the interest of reporting reliable estimates, only analyses based on 10 or more data points were reported.

*Condition.*—Using these criteria for the classification of treatments, three of the authors independently examined each source study and rated experimental groups as no treatment, less complex, or more complex. The more complex therapies were also coded as “behavioral” versus “other”. No subset of the “other” orientations provided 10 or more effect sizes. There was 100% agreement on treatment classification among the three raters.

*Type of disorder.*—Disorders were coded as either psychological or physiological/psychosomatic. Disorders were considered psychological if the primary diagnosis included any of the following: generalized anxiety disorder, obsessive-compulsive disorder, panic disorder, posttraumatic stress disorder, major depressive disorder, or test anxiety. Physiological and psychosomatic disorders included the following diagnoses: back pain, dysmenorrhea, headache, high blood pressure, hypertension, and Raynaud’s disease. Three of the authors independently rated the disorders as either psychological or physiological/psychosomatic. There was 100% agreement among raters in classifying disorder type.

#### *Computational Procedures*

The present study employed the variance-centered meta-analytic methods developed by Hunter and Schmidt (1990). Effect sizes were weighted by sample size and were calculated by dividing the posttreatment mean difference of each of the three major comparisons by the pooled standard deviation of all of the groups being compared. These comparisons were the more complex versus the no-treatment control, i.e., the Complete effect size; the more complex versus the less complex treatment, i.e., the Complex effect size; and the less complex versus the no-treatment control, i.e., the Less Complex effect size. The resultant  $d$  was then converted to  $r$  using the following formula:  $r = \frac{d}{\sqrt{d^2 + 4}}$  (Hunter & Schmidt, 1990, p. 284), as  $r$  requires

less complex correction formulas than does  $d$  and is in general a simpler statistic to use (Boster & Mongeau, 1984). Although  $r$  has a conservative bias when used to calculate effect sizes, this bias is small. For example, with sample sizes greater than 40, the bias is less than .005, far less than the error due to rounding  $r$  to the customary two decimal places (Hunter & Schmidt, 1990, p. 213).

The following major effect sizes were calculated for each study: Complex effect size, Complete effect size (if applicable), and Less Complex effect

size (if applicable). Effect sizes were also calculated relating to type of treatment. When a source study contained more than one complex treatment, effect sizes were calculated separately for two groupings, behavioral approaches versus other approaches but not within either of these two groups. Therefore, some effect sizes were averaged across complex treatments within the same group, e.g., individual vs group behavior therapy effect sizes within a single study were aggregated into a behavior therapy effect size. Otherwise, the different approaches were analyzed separately, and the results for Complex effect sizes are based on calculations of 34 major effect sizes from the 26 source studies.

Whenever possible, multiple dependent measures were aggregated in the calculation of effect sizes. For example, if one study contained two measures of depression and two measures of anxiety, these four measures were averaged in the calculation of the effect size for that study. Two complex effect sizes were calculated within each of the eight source studies that contained both behavioral and "other" complex treatments. The calculation of multiple effect sizes from the same study is a violation of the assumption of independence. A Monte Carlo simulation, however, showed that the mean effect size and the estimate of variance are unaffected by nonindependence (Tracz, 1985). Hedges (1986) also believed that multiple effect sizes do not dramatically affect statistical precision.

Of the 26 studies, 14 included sufficient data to calculate follow-up Complex effect sizes. Only two studies contained follow-up data for Complete effect sizes and Less Complex effect sizes. Follow-up effect sizes were not computed for one of the following reasons: follow-up data were reported for improved patients only; insufficient data were reported to calculate reasonably accurate effect sizes; or given very high posttreatment to follow-up dropout rates, the authors of the source study chose not to report follow-up results.

In a number of cases, posttreatment means or standard deviations were not supplied, or neither were supplied. Whenever possible, the authors of the source studies were contacted with a request for the needed data; these were kindly supplied by the authors when such data were still available. Otherwise, if means but no standard deviations were given and if the measure had been used in a previous study, the standard deviations reported in the previous study were used. If only  $t$  or  $F$  was given, Hunter and Schmidt's (1990, p. 213), conversion formulas for transforming  $ts$  and  $Fs$  were used. Hunter and Schmidt's conservative standards for estimating  $r$  were also used when only the significance levels of  $t$  or  $F$  were given. If pairwise  $Fs$  were given without an analysis of variance table, nonsignificant  $Fs$  were assigned  $rs$  of .00. If  $t$  was reported as significant, with no other statistics,  $t$  was set equal to 2, and  $r$  was computed as noted above. If  $t$  was reported as nonsig-

nificant, with no information other than the direction of the difference or mean values,  $t$  was set equal to 2 and converted to  $r$ , then the resultant value was divided by 2. If no statistics were given, but nonsignificant effects were reported,  $r$  was set equal to .00. Five of the 26 source studies required the use of this conservative procedure for calculating effect sizes.

## RESULTS

### *Heterogeneity of Variance Considerations*

Homogeneity tests were conducted and compared with a distribution of  $(k - 1)$  degrees of freedom, where  $k$  is the number of estimates contributing to the analysis, to judge whether all effect sizes had been derived from the same "population" (Hunter & Schmidt, 1990). All effect size distributions were homogeneous.

### *Posttreatment Effects*

Unless noted otherwise, all reported effect sizes were greater than zero ( $p < .05$ ). To simplify the reporting of results, more complex treatment versus no-treatment comparisons are referred to as a Complete effect size, less complex versus no-treatment comparisons are referred to as a Less Complex effect size, and more complex treatment versus less complex treatment comparisons are referred to as a Complex effect size. A list of the source studies is provided in Table 1. It should be noted that a majority of the studies did not have a no-treatment control. The Complete effect size was  $r = .33$  ( $SD = .16$ , 95% CI = .23 to .42,  $N = 15$ ); the Less Complex effect size was  $r = .26$  ( $SD = .18$ , 95% CI = .17 to .37,  $N = 12$ ); and the Complex effect size was  $r = .09$  ( $SD = .15$ , 95% CI = .03 to .14,  $N = 34$ ). Although all three of these effect sizes were significantly greater than zero, the Complete effect size was not significantly larger than the Less Complex effect size ( $t_{25} = 1.03$ , ns).

The upper panel of Table 2 illustrates the results of Stevens, *et al.* (2000) in comparison with the present meta-analysis. Complete effect sizes were quite similar in the previous and present studies ( $r_s = .28$  and  $.33$ , respectively). In the present study, the Complex effect size was significantly lower than the analogous specific treatment effect size found in Stevens, *et al.* (2000) ( $r_s = .09$  and  $.19$ , respectively;  $t_{136} = 2.8$ ,  $p < .01$ ). In addition, the Less Complex effect size in the present study ( $r = .26$ ) was significantly larger than the common factor effect size ( $r = .11$ ) in Stevens, *et al.* (2000) ( $t_{92} = 2.7$ ,  $p < .01$ ).

### *Secondary Analyses*

*Follow-up.*—The majority of source studies did not include a no-treatment comparison for their follow-up measures. More specifically, of 23 follow-up effect sizes, 19 were derived from Complex effect sizes ( $r = .11$ ,  $SD = .16$ , 95% CI = .04 to .19), whereas only two effect sizes each were derived

TABLE 1  
LIST OF SOURCE STUDIES WITH EFFECT SIZES FOR EACH COMPARISON TYPE

| Study                              | Disorder                      | Complex (C)<br>Treatments | Less Complex<br>(LC)<br>Treatments | C vs LC<br>Post/Follow-up | C vs NT<br>Post/Follow-up | LC vs NT<br>Post/Follow-up |
|------------------------------------|-------------------------------|---------------------------|------------------------------------|---------------------------|---------------------------|----------------------------|
| Achmon, <i>et al.</i> , 1989       | Hypertension                  | Cog-Bx                    | HRBF                               | .03/-.20                  | .46                       | .60                        |
| Attanasio, <i>et al.</i> , 1987    | Headache                      | Cog+PMR                   | PMR                                | .03                       |                           |                            |
| Barrios, 1980                      | Headache                      | SST <sup>b</sup>          | PMR                                | -.09/.11                  |                           |                            |
| Beck, <i>et al.</i> , 1994         | Panic disorder                | Cog                       | PMR                                | .01/.00                   |                           |                            |
| Blanchard, <i>et al.</i> , 1990a   | Headache                      | TBF+R+Cog                 | TBF+R                              | -.04                      | .11                       | .14                        |
| Blanchard, <i>et al.</i> , 1990b   | Headache                      | PMR+Cog                   | PMR                                | -.06/.00                  | .11                       | .18                        |
| Blanchard, <i>et al.</i> , 1990c   | Headache                      | TBF+R+Cog                 | TBF+R                              | .04                       | .19                       | .15                        |
| Espie, <i>et al.</i> , 1989        | Insomnia                      | SC <sup>b</sup>           | R                                  | .10/.04                   | .29                       | .26                        |
|                                    |                               | PI                        | (PMR)                              | .13/.12                   | .33                       | (.26)                      |
| Fals-Stewart, <i>et al.</i> , 1993 | Obsessive-compulsive disorder | Bx (I+G) <sup>a,b</sup>   | PMR                                | .22                       |                           |                            |
| Holroyd, <i>et al.</i> , 1977      | Headache                      | Stress coping             | BF                                 | .48/.25                   | .59/.57                   | .21/.21                    |
| Hughes, <i>et al.</i> , 1978       | Insomnia                      | SC <sup>b</sup>           | BF, PMR <sup>†</sup>               | .06                       |                           |                            |
| Lacks, <i>et al.</i> , 1983        | Insomnia                      | SC <sup>b</sup>           | PMR                                | .36/.21                   |                           |                            |
|                                    |                               | PI                        | (PMR)                              | -.24/-.18                 |                           |                            |
| Marks, <i>et al.</i> , 1998        | PTSD                          | CR, CR+E <sup>*</sup>     | PMR                                | .26/.36                   |                           |                            |
|                                    |                               | Exposure <sup>b</sup>     | (PMR)                              | .22/.20                   |                           |                            |
| McLean & Hakstian, 1979            | Depression                    | Dyn                       | PMR                                | -.08/.06                  |                           |                            |
|                                    |                               | Bx <sup>b</sup>           | (PMR)                              | .24/.17                   |                           |                            |
| Öst, 1988                          | Panic disorder                | Applied R <sup>b</sup>    | PMR                                | .35/.45                   |                           |                            |
| Richter, <i>et al.</i> , 1986      | Migraine                      | Cog coping                | RT                                 | .03/.03                   |                           |                            |
| Ryan, <i>et al.</i> , 1976         | Test anxiety                  | SD <sup>b</sup>           | RT                                 | .08                       | .26                       | .18                        |
| Sanavio, 1988                      | Insomnia                      | PI                        | BF                                 | -.08                      |                           |                            |
| Sanavio, <i>et al.</i> , 1990      | Insomnia                      | Cog-Bx                    | BF                                 | -.02                      | .23                       | .25                        |
|                                    |                               | SC+PMR <sup>b</sup>       | (BF)                               | .24                       | .47                       | (.25)                      |

(continued on next page)

TABLE 1 (CONT'D)  
LIST OF SOURCE STUDIES WITH EFFECT SIZES FOR EACH COMPARISON TYPE

| Study                          | Disorder                  | Complex (C)<br>Treatments | Less Complex<br>(LC)<br>Treatments | C vs LC<br>Post/Follow-up | C vs NT<br>Post/Follow-up | LC vs NT<br>Post/Follow-up |
|--------------------------------|---------------------------|---------------------------|------------------------------------|---------------------------|---------------------------|----------------------------|
| Sigmon & Nelson, 1988          | Dysmenorrhea              | AS <sup>b</sup>           | PMR                                | .13/.05                   | .52/.56                   | .46/.55                    |
| Taylor, <i>et al.</i> , 2003   | PTSD                      | Exposure <sup>b</sup>     | RT                                 | .08/.21                   |                           |                            |
|                                |                           | EMDR                      | (RT)                               | -.05/.10                  |                           |                            |
| Townsend, <i>et al.</i> , 1975 | Anxiety                   | Dyn group therapy         | BF                                 | -.07                      |                           |                            |
| Turner, 1982                   | Back pain                 | Cog-Bx+PMR                | PMR                                | .10/.18                   | .32                       | .38                        |
| Turner & Ascher, 1979          | Insomnia                  | SC <sup>b</sup>           | PMR                                | .04                       | .48                       | .47                        |
|                                |                           | PI                        | (PMR)                              | .03                       | .51                       | (.47)                      |
| Turner & Ascher, 1982          | Insomnia                  | SC <sup>b</sup>           | PMR                                | .07                       |                           |                            |
|                                |                           | PI                        | (PMR)                              | .14                       |                           |                            |
| Zieffle & Romney, 1985         | Impulsivity & inattention | SI                        | PMR                                | .20                       | .12                       | -.09                       |

*Note.*—All effect sizes are *rs*. NT=No treatment. Treatment abbreviations are: AS=activity scheduling; BF=electromyograph (EMG) biofeedback; BPBF=blood pressure biofeedback; Bx=behavior therapy; Cog=cognitive therapy; CR=cognitive restructuring; Dyn=psychodynamic; E=exposure; EMDR=eye movement desensitization and reprocessing; G=group; HR=heart rate; HRBF=heart-rate biofeedback; I=individual; MCR=metronome-conditioned relaxation; PI=paradoxical intention; PMR=progressive muscle relaxation; R=relaxation; RT=relaxation training; SC=stimulus control; SD=systematic desensitization; SI=self-instruction; SST=social skills training; TBF=thermal biofeedback. Disorder abbreviation: PTSD=posttraumatic stress disorder. \*Effect sizes were collapsed across complex treatments. †Effect sizes were collapsed across less complex treatments. () information is redundant to information appearing immediately above. <sup>b</sup>Complex treatments identified as behavioral.

from Complete effect sizes and Less Complex effect sizes. The follow-up Complex effect size (noted above) was not significantly different from the posttreatment Complex effect size ( $r = .09$ ).

TABLE 2  
PREVIOUS VERSUS PRESENT META-ANALYSIS: OVERALL POSTTREATMENT EFFECT SIZES ( $r$ )

| Study                              | Type of Comparison      |           |                         |           |                              |           |
|------------------------------------|-------------------------|-----------|-------------------------|-----------|------------------------------|-----------|
|                                    | Complex vs Less Complex |           | Complex vs No Treatment |           | Less Complex vs No Treatment |           |
|                                    | <i>M</i>                | <i>SD</i> | <i>M</i>                | <i>SD</i> | <i>M</i>                     | <i>SD</i> |
| Stevens, <i>et al.</i> , 2000      | .19 <sup>*a1</sup>      | .21       | .28 <sup>*b1</sup>      | .21       | .11 <sup>*c1</sup>           | .16       |
| No. effect sizes                   | 104                     |           | 104                     |           | 82                           |           |
| Current Study                      | .09 <sup>*a2</sup>      | .15       | .33 <sup>*b1</sup>      | .16       | .26 <sup>*b2</sup>           | .18       |
| No. effect sizes                   | 34                      |           | .15                     |           | 12                           |           |
| Current Study Psychotherapies Only |                         |           |                         |           |                              |           |
| Behavioral                         | .15 <sup>*</sup>        | .13       |                         |           |                              |           |
| No. effect sizes                   | 14                      |           |                         |           |                              |           |
| Other                              | .04                     | .15       |                         |           |                              |           |
| No. effect sizes                   | 20                      |           |                         |           |                              |           |

Note.—Means in the same row that do not share alphabetical superscripts differ at  $p < .05$ . Means in the same column that do not share numerical superscripts differ at  $p < .05$ .

\* $p < .05$ . † $p < .001$ .

*Length of treatment.*—There was no significant difference in the number of sessions received by participants receiving Less Complex treatments ( $M = 8.6$ ,  $SD = 5.0$ ) and More Complex treatments ( $M = 8.5$ ,  $SD = 5.0$ ).

*Type of disorder.*—The magnitude of the Complex effect size for physiological/psychosomatic disorders ( $r = .07$ ,  $SD = .15$ ,  $N = 22$ ) was not significantly different from the Complex effect size for psychological disorders ( $r = .12$ ,  $SD = .15$ ;  $N = 12$ ;  $t_{32} = 1.0$ , ns).

*More complex behavioral therapies versus the less complex treatments.*—There were 14 studies in which more complex behavioral therapies (identified in Table 1) were compared with the less complex treatments. No other theoretical school provided 10 or more Complex effect sizes. These behavioral therapies were described as applied relaxation, activity scheduling, exposure, exposure plus response prevention, social skills training, stimulus control, and systematic desensitization. The Complex effect sizes of these behavioral treatments were compared with the Complex effect sizes of the remaining other group of more complex psychotherapies. The lower panel of Table 2 shows the comparison of the complex effects of the behavioral treatments versus the other treatments. The mean Complex effect size for these behavioral therapies was significantly larger ( $r = .15$ ,  $SD = .13$ , 95% CI = .08 to .22,  $N = 14$ ) than the Complex effect size for the combined other psychotherapies, which was not significantly greater than zero ( $r = .04$ ,  $SD = .15$ ,

95% CI =  $-.03$  to  $.12$ ;  $N=20$ ;  $t_{32}=2.2$ ,  $p<.05$ , two-tailed test). There were no significant differences in treatment length between the behavioral more complex therapies ( $M=8.1$  sessions,  $SD=5.5$ ) and the other more complex therapies ( $M=8.8$  sessions,  $SD=4.0$ ;  $t_{30}=0.33$ , ns).

Table 3 utilizes a binomial effect size display (Rosenthal, 1995) to illustrate some of the results of this meta-analysis based on the magnitude of Less Complex and More Complex effect sizes. The lowest row provides a baseline improvement rate without psychotherapy (40%) estimated by Lambert, Shapiro, and Bergin (1986). Ascending rows indicate that therapy with less complex treatments provides an increase in improvement rate from 40% to 66%, and therapy with the subset of more complex behavioral treatments provides an increase in improvement rate from 66% to 81%.

TABLE 3  
BINOMIAL EFFECT SIZE DISPLAY OF LESS COMPLEX EFFECTS AND BEHAVIORAL COMPLEX EFFECTS

|                                | Treatment Outcome |                  | Sum |
|--------------------------------|-------------------|------------------|-----|
|                                | Improved (%)      | Not Improved (%) |     |
| Behavioral Complex Effect Size | 81                | 19               | 100 |
| Less Complex Effect Size       | 66                | 34               | 100 |
| No Treatment Effect Size       | 40                | 60               | 100 |

#### DISCUSSION

As predicted, the Less Complex effect size for biofeedback and progressive muscle relaxation ( $r=.26$ ) was significantly larger than zero and also significantly larger than the common factor effect size ( $r=.11$ ) in Stevens, *et al.* (2000). This outcome supports the contention that biofeedback and progressive muscle relaxation would provide a solid baseline of therapeutic effectiveness. Indeed, the effect size for biofeedback and progressive muscle relaxation is quite similar to the magnitude of the Complete Treatment effect size in Stevens, *et al.* (2000) ( $r=.28$ ), which involved 104 comparisons of a variety of complete treatments with no treatment. Both Stevens, *et al.* (2000) and the present meta-analysis used identical computational procedures.

It was also predicted that the Complete Treatment effect size in this meta-analysis would surpass the Less Complex effect size for biofeedback and progressive muscle relaxation. There was mixed support for this hypothesis. On the one hand, the Complete Treatment effect size ( $r=.33$ ,  $N=15$ ) was not significantly larger than the Less Complex effect size ( $r=.26$ ,  $N=12$ ). Calculations of both of these effect sizes were based on improvement beyond no-treatment controls, which were present in only 12 of the 26 source studies. On the other hand, a more direct evaluation of any superiority of more complex treatments over biofeedback and progressive muscle relaxation can be made by examining the Complex effect size ( $r=.09$ ,  $N=33$ ),

which was significantly greater than zero and also significantly less than the specific factor effect size ( $r = .19$ ) reported by Stevens, *et al.* (2000).

For the purposes of comparison, Cohen (1992) has labeled the magnitude of effect sizes as small ( $d = 0.20$ ), medium ( $d = 0.50$ ) or large ( $d = 0.80$ ). In the present study, the mean Less Complex effect size ( $r = .26$ ,  $d = 0.54$ ) at posttreatment qualifies as medium. In contrast, the mean posttreatment Complex effect size ( $r = .09$ ,  $d = 0.18$ ) qualifies as a small effect size, remaining so at follow-up ( $r = .11$ ,  $d = 0.22$ ).

The overall Complex effect size in this study ( $r = .09$ ) is very similar to the results of a recent meta-analysis reported by Baskin, *et al.* (2003). Baskin, *et al.* compared a group of active treatments with common factor controls that were structurally equivalent, i.e., equated on number and length of sessions, therapy format, training of therapists, and other dimensions. Baskin, *et al.* reported a mean effect size for this comparison of  $d = 0.149$  (equivalent to  $r = .07$ ). The magnitude of the Complex effect size in this study is also similar to the magnitude of the difference between active treatments reported in other meta-analyses (e.g., Wampold, *et al.*, 1997; Luborsky, *et al.*, 2002). Although any incremental benefits from the total group of more complex therapies in this meta-analysis were quite small, the pattern changes when only the behavioral therapies were considered.

The Complex effect size for the behavioral treatments ( $r = .15$ ,  $d = 0.30$ ) falls into the small range. In contrast, the Complex effect size for the other treatments ( $r = .04$ ,  $d = 0.08$ ) was not significantly greater than zero. In many ways, the design of this meta-analysis "stacked the cards" against the emergence of additional more complex effects. Biofeedback and progressive muscle relaxation provided a solid baseline of therapeutic effectiveness, which should be difficult to improve upon. The more complex behavioral therapies, however, did provide a modest, but notable, benefit beyond biofeedback and progressive muscle relaxation. There are some possible sources of this incremental benefit.

It has been suggested that common factors and specific factors are interdependent concepts, not independent ones (Stevens, *et al.*, 2000). It is useful, however, to consider the possible mechanisms of incremental benefit in terms of the more traditional conceptualization of common factors versus specific factors. It is unlikely that more common factors in the more complex behavioral treatments account for the modest superiority of these behavioral treatments over biofeedback and progressive muscle relaxation. If a higher quality or quantity of common factors were the source of benefit, a similar increment in effectiveness associated with the other more complex treatments should also have occurred. This assumes that more complex behavioral treatments do not naturally provide more common factors than the other more complex treatments. One can conclude that the modest superior-

ity of more complex behavioral treatments involves procedures that occur in specific behavioral treatments. The validity of this conclusion depends on the absence of systematic differences between the more complex behavioral treatments and the more complex other psychotherapies.

#### *Alternative Considerations*

It is possible that certain variables, thought to be related to effect size magnitude; e.g., treatment credibility, type of disorder, reactivity of measure, and so forth; might systematically vary between the more complex behavioral treatments and other more complex treatments.

*Credibility.*—It is argued that there are no systematic differences in credibility between the behavioral and other more complex therapies for a number of reasons. First, it is assumed that the authors of all of the source studies constructed the more complex therapies as treatments of integrity. Second, many of the other and the behavioral complex therapies listed in Table 1 have been identified as empirically supported, i.e., credible, treatments (DeRubeis & Crits-Christoph, 1998). Third, there were no differences in treatment length between the behavioral and the other complex therapies. Fourth, the previous meta-analyses of 80 outcome studies (Stevens, *et al.*, 2000) systematically rated the credibility of the treatment groups. No correlation was found between treatment credibility and effect size magnitude.

*Type of disorder.*—The effectiveness of more complex treatments did not differ between physiological/psychosomatic disorders and psychological disorders. Behavioral treatments were represented in six of the 12 effect sizes for psychological disorders and eight of the 22 effect sizes for physiological/psychosomatic disorders.

*Reactivity of measure.*—The source studies contained behavioral measures, physiological measures, and psychological measures, primarily questionnaires for anxiety and depression. Subanalyses of these measures were not reported because such calculations would have involved additional violations of the assumptions of independence. Behavioral measures were infrequent, studies of physiological and psychosomatic disorders typically reported both physiological and psychological measures, and studies of psychological disorders typically reported psychological measures. Depending on how these measurements are obtained, each of these three types of measurement may vary in reactivity (Stevens, *et al.*, 2000). Within any study, computations of the More Complex effect sizes were based on identical dependent measures. No obvious, systematic relationship was observed between presumed reactivity of measure and classification of complex treatments as behavioral or other. Even if such a relationship had been observed, it would not account for the differences between the behavioral and other therapies. A prior meta-analysis (Stevens, *et al.*, 2000) systematically studied the relationship between reactivity of measure and effect size magnitude. No correlation was found

between measure reactivity and magnitude of an effect size, a result also reported in other meta-analyses (Bowers & Clum, 1988; Ogles, Lambert, Weight, & Payne, 1990).

In summary, after lengthy consideration, there did not seem to be alternative, confounding variables which could account for the difference between the behavioral more complex treatments and the other more complex treatments. Also, the fact that both the behavioral and the other more complex therapies were always contrasted with biofeedback and progressive muscle relaxation comparison groups would aid in controlling for the operation of extraneous confounding variables.

### *Limitations*

Some caution is needed regarding these interpretations of the difference between behavioral and other more complex therapies. First, it was not based on *a priori* hypotheses. This meta-analysis was not designed with the intention of comparing different systems of more complex therapies. Second, this finding is based on only 14 effect sizes for the behavior therapies and 20 effect sizes for the other therapies. Third, the 14 major effect sizes that were aggregated to assess whether the behavioral complex effect sizes represent diverse procedures. Finally, although these behavioral therapies did provide greater incremental effectiveness than the other therapies, one cannot be sure of the actual mechanisms of effectiveness or that all behavioral procedures have incremental effectiveness. The actual change processes may involve nonbehavioral mechanisms. Behavioral treatments often involve processes that are closely related to other schools of therapy, for example, cognitive therapy (Emmelkamp, 2004; Wilson, 2005). It would also be incorrect to conclude that treatments in the other category in this meta-analysis are strictly nonbehavioral. Many of the other treatments contain procedures that would be considered behavioral. As Table 1 illustrates, some of the Complex effect sizes for the other treatments exceeded the mean for the behavioral Complex effect sizes, and one of the behavioral Complex effect sizes was negative.

An additional limitation in the present meta-analysis derives from its fairly stringent inclusion criteria, especially the criterion that every source study had to include both more complex and less complex treatments. Strict inclusion criteria were clearly needed to ensure homogeneous, less complex treatment baselines, the very premise on which the study was based. At the same time, the inclusion criteria brought with them unavoidable limitations. One such limitation was the lack of statistical power for some of the comparisons. This lack of power was directly related to the relatively small number of source studies included in the meta-analysis, which in turn resulted from the inclusion criteria employed.

The inclusion criteria for the more complex treatments might be considered inappropriate. There was certainly varying complexity, both quantitative and qualitative, within these complex treatments. One could argue that there are only slight, or nonexistent, differences in complexity between biofeedback and progressive muscle relaxation and a few of the more complex treatments that happen to be of lower complexity. To some extent, judgments of complexity depend on the eye of the observer.

There are additional limitations concerning the generalizability of the results of the present meta-analysis. The studies in this meta-analysis used adult samples. Also, comparisons of the more complex versus less complex treatments were more common in studies involving physiological and psychosomatic disorders than other conditions. The psychological disorders represented in the source studies were almost exclusively anxiety-related. It is possible that both the more complex and less complex treatments might be more or less effective with other psychological disorders.

Despite these cautions, when more complex treatments are considered appropriate in the therapeutic setting, the present analyses suggest that behavioral treatments should deserve consideration, perhaps primary consideration.

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