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What Is Science-Based Therapy?

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For much of its history, psychotherapy was not particularly amenable to scientific inquiry. The psychoanalysis developed by Sigmund Freud (1933/1965), which set the stage for the development of more modern psychotherapeutic interventions, proposed several nonfalsifiable constructs, had rather nebulous aims, and was comprised largely of procedures that were difficult to operationalize (see Paniagua, 1987, for review; but see also Westen, 1998, for a counterargument). More contemporary psychodynamic therapies have resolved many (though not all) of these issues, and the past four decades have witnessed an increase in both the quantity and the quality of clinical trials of psychodynamic therapy (Thoma et al., 2012). In reaction to the untestable claims of Freud's psychoanalysis, science-based approaches began to emerge, and they focused on examining testable hypotheses.

For better or for worse, the origins of psychoanalysis were in the clinic, not in the laboratory. As such, psychoanalysis was based on clinical observations of patients, rather than on scientifically demonstrable processes of behavior, thought, and emotion. The first wave of one science-based approach to therapy development began with the early behaviorists, who developed their procedures based on laboratory science with animal and human subjects. Joseph Wolpe (1961) developed systematic desensitization based on earlier studies of classical fear conditioning (Watson & Watson, 1921). Soon thereafter, operant conditioning processes, which had been well established in animals and humans (Skinner, 1953), were used to create strategies such as token economies for patients with chronic mental illness (Ayllon & Azrin, 1968). These early practices served as proof of concept that laboratory science could be used to develop strategies to help patients suffering from psychological problems.

Shortly after the development of behavioral interventions, a second wave of this science-based approach, comprised of cognitive strategies (e.g., Beck, 1976; Meichenbaum, 1977), led to the development of what is now called cognitive-behavioral therapy (CBT). Of note, following Freud's tradition, cognitive interventions came largely from clinical observations, though some research at the time pointed toward the presence of dysfunctional, conscious cognitive processes in

patients that presumably could be addressed by this new form of therapy (Beck, 1963). Perhaps most importantly, CBT was based on procedures that could be operationalized and replicated, and targeted outcomes that could be measured, and it was predicated on purported mechanisms that could be examined scientifically. Thus, psychotherapy, like other aspects of health care, could readily be studied from a scientific perspective, as was done in early trials of CBT for depression (e.g., Blackburn et al., 1981; Rush et al., 1977). And studied it was, with a massive surge in research demonstrating the efficacy of CBT for depression, anxiety disorders, substance use disorders, and a slew of other problems. Under the broad umbrella of CBT, we are now seeing what has been called a "third wave," in which some of the cognitive elements are de-emphasized in favor of strategies such as acceptance and mindfulness. Dialectical behavioral therapy (Linehan, 1993), acceptance and commitment therapy (Hayes et al., 1999), and mindfulness-based stress reduction (Kabat-Zinn et al., 1985) are but a few examples of these interventions. Some have called the idea of a third wave into question, pointing out that in many respects these treatments resemble the first wave of behavioral therapies (e.g., Hofmann & Asmundson, 2008).

We do wish to be clear, however, that calling a treatment "science-based" does not necessarily mean that it must be CBT, nor can we safely assume that any new CBT is automatically based on scientific evidence (for example, see O'Donahue, Snipes, & Soto, 2016, for a critique of the scientific integrity of "third-wave" approaches). The developers of any psychological treatment, regardless of its theoretical origins, must demonstrate that their treatment works, for whom and how well it works, as well as why it works. This leads us to review several key terms: *empirically supported treatments*, *evidence-based practice*, and *science-based therapy* (the term we favor in this book).

Identifying Treatments that Work

Empirically Supported Treatment

The term "empirically supported treatment" (EST) became popular in clinical psychology when the Society of Clinical Psychology (SCP) (Division 12 of the American Psychological Association) first published criteria for what were initially termed "empirically validated psychological treatments" (Task Force on Promotion and Dissemination of Psychological Procedures, 1993) and later termed "empirically supported psychological treatments" (Chambless & Hollon, 1998; Chambless & Ollendick, 2001). In this framework, sometimes referred to as the "Chambless criteria," a treatment was characterized as being *well-established* (also called "strong research support") if it meets *both* of these basic criteria:

1. At least two well-done randomized control trials (RCTs) demonstrate the treatment group has greater symptom reduction than an active comparison group or a placebo group.

2. And at least two of these RCTs are conducted by at least two different research teams.

Alternatively, a treatment could be characterized as *probably efficacious* (also called "modest research support") if it meets *either* of these basic criteria:

1. At least one well-done RCT demonstrates the treatment group has greater symptom reduction than an active comparison group or a placebo group.
2. Or at least two well-done RCTs demonstrate the treatment group has greater symptom reduction than a control group. In this case the control group does not need to include an active comparison group or a placebo. Also, the two RCTs do not need to be from different research teams for this criterion.

Within this framework, a large number of treatment approaches have been identified as being well established, and many treatments are also probably efficacious. Most chapters in this book will identify the current level of support for the treatments being discussed. For adult patients, the best place to keep up-to-date on the status of ESTs is the website for the Society of Clinical Psychology (www.psychologicaltreatments.org). For youth, the website for the Society of Clinical Child and Adolescent Psychology (www.effectivechildtherapy.org) provides updated information (that resource uses the term "works well" for well-established treatments and "works" for probably efficacious treatments). However, it is important to note that changes in the way we identify ESTs are currently underway.

The initial criteria for ESTs were criticized for setting a low bar for efficacy and failing to account for mixed findings (Borkovec & Castonguay, 1998; Henry, 1998; Herbert, 2003), relying solely on symptom reduction over functional outcomes and quality of life (Cowen, 1991; Hayes, 2004; Seligman, 1995), and failing to account for variations in the internal validity and degree of research bias in clinical trials (Luborsky et al., 1999; Wachtel, 2010). In response to these concerns, the Society of Clinical Psychology updated their EST requirements (Tolin et al., 2015) to include broad and inclusive reviews of the scientific literature, taking methodological quality of the study into account and allowing for a multitude of outcomes.

The updated EST requirements suggested by Tolin et al. (2015), sometimes referred to as the "Tolin criteria," emphasize the role of high-quality evidence in the form of systematic reviews comprised of a wide range of well-done studies with consistent results. Based on this type of evidence, for a treatment to be provided a *very strong recommendation* it must meet *all* of the following criteria:

1. The treatment results in clinically meaningful symptom reduction.
2. The treatment results in clinically meaningful functional outcome improvement.
3. Symptom reduction and/or functional outcome improvement last at least three months once the treatment has ended.
4. At least one well-done study demonstrates a clinically meaningful effect in a nonresearch setting.

Alternatively, a treatment can be given a *strong recommendation* (as opposed to the aforementioned "very strong" recommendation) based on moderate- to high-quality evidence from systematic reviews and *at least one* of the following criteria:

1. The treatment results in clinically meaningful symptom reduction.
2. And/or the treatment results in clinically meaningful functional outcome improvement.

Overall, these updated criteria raise the bar for providing a recommendation about which treatments have adequate research support. Rather than relying on only two (possibly cherry-picked) studies, the revised criteria now require that *all* of the available evidence on a given treatment's effects be taken into account, not only those studies that are favorable to the treatment. Rather than relying on posttreatment symptom reduction alone, the revised criteria now highlight the importance of functional improvement and longer-term outcomes. And, finally, the effectiveness of a therapy in a "front-line" clinical setting is considered. To date, only a handful of treatments have been evaluated within this framework (see the Postscript for an overall summary).

Evidence-Based Practice

Work on ESTs was an important catalyst for an increased emphasis on *evidence-based practice* (EBP). EBP is a broad template of activities that include assessment, case formulation, relationship factors, and treatment decisions that are hoped to assist the clinician to achieve the best possible outcome. In 2006, a Presidential Task Force of the American Psychological Association (APA Presidential Task Force on Evidence-Based Practice, 2006) adapted the Institute of Medicine's (2001) definition of evidence-based medicine, defining EBP as practice that integrates three sources of information: patient characteristics, clinical expertise, and the best available research evidence. It is unclear as to whether EBP represents a step forward or a step backward from the EST movement. The emphasis not only on science but also on patient characteristics and clinical expertise seems intuitively logical, and it's hard to argue that these other factors *shouldn't* be taken into consideration. On the other hand, it is not clear, in this "three-legged stool" model, whether each leg of the stool should be weighted equally. What should a clinician do, for example, when the best scientific evidence points to exposure with response prevention for obsessive-compulsive disorder, yet the clinician's patient differs from the RCT participants in important ways and the clinician's expertise is in another aspect of therapy? Should the scientific findings be thrown out? One possible solution is to give priority to scientific research, with clinician expertise and patient characteristics serving as "filters" through which the research must pass (Tolin, 2012). However, that has not been codified into the EBP definition used by the American Psychological Association

(APA), and at present the term "evidence-based" has been used (and misused) so often that we fear its meaning has been degraded.

Science-Based Therapy

In this book, we're going to use the term "science-based therapy," which overlaps with the Chambless and Tolin criteria for ESTs and the more recent conceptualization of EBP. Although the Chambless criteria were silent on the ingredients of treatment (that is, the question at hand was simply whether or not a treatment worked), the Tolin criteria did note that the ingredients and mechanisms of therapy were also important:

> The Task Force may take into account the purported mechanism or active ingredient(s) of treatment, and may upgrade or downgrade the recommendation based on the quality of evidence supporting that mechanism or ingredient(s). It is conceptually difficult to standardize this consideration into the criteria, as admittedly the mechanisms of many efficacious treatments are unclear. However, to the extent that a given treatment is based on a specific purported mechanism, or relies strongly on a particular treatment ingredient, the [reviewers] can and should consider whether those assertions are supported.
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> (Tolin et al., 2015, p. 331)

This added emphasis on not only *whether* a treatment works, but also *why* it works, represented a step forward in the EST movement, pointing toward what would later be termed "science-based practice." That term, proposed by Lilienfeld et al. (2018), denotes that "treatment outcome data are considered along with broader research evidence bearing on the *plausibility of the treatment's theoretical rationale* when evaluating an intervention's scientific status" (p. 44; italics added). Thus, science-based practice extends the idea of ESTs by focusing not just on outcomes but also on whether the treatment is based on mechanisms of change that are scientifically credible. Here, in addition to RCTs comparing a treatment to a control condition, dismantling studies become critical, in which elements of the treatment are systematically withdrawn to test whether those elements are indeed responsible for the clinical outcomes. Rosen and Davison (2003) illustrated the idea with a tongue-in-cheek description of "purple hat therapy," in which a practitioner uses well-established CBT principles while the patient also wears a purple hat, and then mistakenly attributes the patient's successful outcome to the purple hat, later packaging and selling this "new" therapy. In case you think this was just for laughs, consider for a moment the promulgation of what have been called "energy" therapies, in which noncredible (in our opinion) elements such as acupressure point tapping have been added to traditional elements of CBT, and are currently being marketed as "evidence-based" new treatments.

We had purple hat therapy firmly in mind as we compiled this book. We want you, the reader, to understand not only *what* treatments work for given psychological problems, but also *why* they work. Hence, we strove to eliminate therapeutic "filler."

Box 1.1 Pseudoscience-Based Therapy

Many of the components used in the so-called energy therapies can be characterized as *pseudoscience*. That is, saying that acupressure point tapping is evidence-based, when in fact no rigorous research supports this claim, represents the dissemination of false information under the cover of scientific-sounding language. Energy therapies are commonly used for anxiety- and trauma-based disorders, but pseudoscience abounds for just about every other type of disorder as well. Some of the more outrageous treatments include bee-sting therapy for depressive disorders, dolphin-assisted therapy for neurodevelopmental disorders, and homeopathy for just about every mental health affliction that ails you. In fact, there are so many dubious therapeutic approaches that two books in this series focus solely on the topic. The book *Pseudoscience in Therapy* (Hupp & Santa Maria, 2019) critiques dubious treatments for adults, and the clinical topics are covered in the same order they are covered in this book, making the two books great companions. Further, the book *Pseudoscience in Child and Adolescent Psychotherapy* (Hupp, 2019) critiques dubious treatments for youth.

We challenged our chapter authors to name the specific and credible ingredients of effective treatments, and to produce evidence showing why those ingredients are effective. Of course, we recognize that not every ingredient in therapy will have solid evidence from dismantling research. But, in the absence of such evidence, we should at least expect that there will be a scientific reason why these ingredients should be credible. That is, how well do these therapy ingredients match up with what is currently known about the brain and behavior? Elements such as acupressure tapping are disconnected from current scientific understanding of psychological processes, and as such lack credibility (let alone evidence). To be sure, we aren't saying that such things *can't* work, but we should remain skeptical until we see compelling evidence that they *do* work. And when an ingredient is credible yet unsupported, that should serve as a call for researchers to investigate.

Conclusion

Over the last few decades, the Society for Clinical Psychology has led the way in conceptualizing and identifying ESTs. Most, but not all, of these treatments tend to be from the behavioral and cognitive traditions, though it need not be so. The conceptualization of ESTs is continuing to evolve, and previously identified ESTs are just now starting to get reassessed using the newer science-based criteria that place a greater emphasis on systematic reviews, functional outcomes, lasting effects, and credible active ingredients.

We would argue that science-based therapy is not merely an academic issue, but also an ethical issue. That is, the ethical practice of psychological therapy is based on

science. Patients receiving any form of health care have a right to expect that their provider will be aware of, understand, and apply the best available science to their condition. Behavioral health should be no different. The American Psychological Association's ethical guidelines state "Psychologists' work is based upon established scientific and professional knowledge of the discipline" (American Psychological Association, 2017, p. 5), though we note that the ethics code is silent on what constitutes "scientific and professional knowledge." We would take this a step further by suggesting that our patients have the right not only to receive treatments based on the best available science, but also to receive accurate information about their condition, why it has occurred, and what will help. Here, we suggest that an ethical practitioner appropriately applies knowledge from the science of psychology to explain the patient's condition and its resolution (see Sechrest & Smith, 1994). Accordingly, explanations based on empirically unsupported mechanisms such as energy meridians, chakras, eye movements, and similar features are not only scientifically unsound but also ethically unjustifiable.

In this book, you'll hear from leading clinician-scientists about their areas of expertise. One emphasis will be on what works, both for adult patients and, to a lesser extent, for their younger counterparts (other books in this series place a greater emphasis on children and adolescents). Each author will describe the psychological treatments known to be efficacious for a given condition, and will provide the scientific justification for how we know those treatments are efficacious. This aim will help you answer the basic question of "what treatment should be used with this patient?" But the chapters don't stop there. In keeping with the principle of science-based therapy, we have asked each author to also describe the credible mechanisms of change within and across ESTs. That is, rather than solely asking what treatment "package" works, we also wanted to clarify which mechanisms of change have empirical support or are at least scientifically plausible. In our opinion, a good therapist needs to be more like a chef than a cook – that is, able not only to follow a recipe (e.g., a manualized treatment approach), but also to use a case formulation approach to build a patient-focused treatment from the ground up, based on the best available science and the particular characteristics of the patient. You'll see in these chapters that even within a given therapeutic framework, there's a fair amount of wiggle room. So a good "chef" therapist will strive to maximize the elements of treatment that lead to the largest effects, rather than just sticking to a manual.

We also want you to see where the gaps are in our current knowledge. That is, what don't we know? Our hope is that clinicians, researchers, and clinician-researchers will find this book to be a useful guide toward further inquiry about what works and why. We recognize that the domain of science-based therapy is very much a work in progress, so nothing in this book should be taken as the last word on the topic. Science is constantly adding new information and new perspectives, and we hope to be able to update this book in the future with that new knowledge.

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