Evidence-Based Practice in Clinical Psychology: What It Is, Why It Matters; What You Need to Know

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The history and meaning of evidence-based practice (EBP) in the health disciplines was described to the Council of University Directors of Clinical Psychology (CUDCP) training programs. Evidence-based practice designates a process of clinical decision-making that integrates research evidence, clinical expertise, and patient preferences and characteristics. Evidence-based practice is a transdisciplinary, idiographic approach that promotes lifelong learning. Empirically supported treatments (ESTs) are an important component of EBP, but EBP cannot be reduced to ESTs. Psychologists need additional skills to act as creators, synthesizers, and consumers of research evidence, who act within their scope of clinical expertise and engage patients in shared decision-making. Training needs are identified in the areas of clinical trial methodology and reporting, systematic reviews, search strategies, measuring patient preferences, and acquisition of clinical skills to perform ESTs. © 2007 Wiley Periodicals, Inc. J Clin Psychol 63: 611–631, 2007.

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Evidence-Based Practice: What It Is

Evidence-based practice (EBP) is a process that involves "the conscientious, explicit, judicious use of current best evidence in making decisions about the care of individual patients" (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). As noted by Eddy (2005), the phrase EBP connotes somewhat different meanings in different professional disciplines. What is understood as EBP ranges along a spectrum from top-down, normative guidelines to bottom-up, idiographic decision-making principles.

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Nomothetic Approaches

Guidelines. In public health and some areas of medicine, EBP is generally understood to mean practice or policy guidelines. Guidelines, usually issued by federal agencies or professional organizations, specify best practices for addressing a given problem or disorder. Examples of federal agency guidelines are those issued by Veterans Affairs/ Department of Defense, U.S. Public Health Service, or the UK's National Institute of Clinical Excellence. Illustrative guidelines issued by professional societies are those of the American Psychiatric Association and the American Heart Association. All can be traced via links through the National Guidelines Clearinghouse (NGC; U.S. Department of Health and Human Services, 1998). Guidelines usually indicate the level or quality of the evidence supporting each practice recommendation. Increasingly, contemporary guidelines are based upon systematic, often quantitative, review of research that has been graded for quality. Rather than being performance standards, practice guidelines are aspirational. In other words, competent professionals strive to implement the best practices recommended by guidelines, but no "teeth" or punishment is linked to engaging in alternative practices if those are in accord with sound professional judgment.

Importantly, practice guidelines frame treatment recommendations nomothetically. They specify the best research-supported treatment for a disorder, biopsychosocial condition, or life problem. The recommended treatment approach is, in a sense, "one-size-fits-all": It assumes relatively homogeneous intervention needs among different individuals who have the clinical problem.

Empirically supported treatments. The list of empirically supported treatments (EST) assembled for psychology (Chambless & Hollon, 1998; Chambless & Ollendick, 2001) bears similarity to a guideline, except that the compilation is organized based on interventions rather than clinical problems. A shared feature of ESTs and practice guidelines is that both approach evidence-based practice nomothetically—suggesting the best treatment approach for an average patient.

Idiographic Approaches

Individual Clinical Decision-Making. A different, more idiographic approach to evidence-based practice relies upon decision-making for the care of individual patients. This is the EBP model described by Sackett et al. (1996), and the one that now has been adopted by most health professions. The main EBP training text in medicine is the coat-pocket sized paperback called *How to Practice and Teach EBM*. First-authored by David Sackett through its second edition (Sackett, Strauss, Richardson, Rosenberg, & Haynes, 2000), the third edition of the volume, is now led by Sharon Strauss (Strauss, Richardson, Glasziou, & Haynes, 2005). A comparable volume to educate nurses about EBP is written by Craig and Smyth (2002). Leonard Gibbs (2002) is the author of the counterpart work in social work. Most recently, in 2005, the American Psychological Association (APA) adopted the same evidence-based practice policy model. The wording of the policy states, "Evidence-based practice in psychology is the integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences" (APA, 2005). The American Psychological Association Press has published several books about evidence-based practice in psychology (cf., Goodheart, Kazdin & Sternberg, 2006; Norcross, Beutler, & Levant, 2006). However, none yet presents the skill set needed to implement evidence-based practice in a manner comparable to that available for the other health professions (cf., Walker & London, this issue).

The Three Circles of Evidence-Based Clinical Practice

The root metaphor of contemporary, idiographic evidence-based practice is the three circles, also known as *the three-legged stool*. Each circle represents a data strand that needs to be considered and integrated to determine the optimal care for an individual patient. The contents of the three circles (shown in Figure 1) are (a) the best available research evidence; (b) clinical expertise; and (c) patient values, preferences, characteristics, and circumstances. Evidence-based practice is the process of integrating the circles or tying together the three legs via a process of clinical decision-making.

Best research evidence. What constitutes best research evidence depends upon the question needing to be addressed (Sackett & Wennberg, 1997). For example, for questions about etiology or prognosis, the optimum research design is often a longitudinal cohort study. For questions concerning the efficacy and effectiveness of treatments, the research design least prone to bias or error is the randomized clinical trial (RCT).
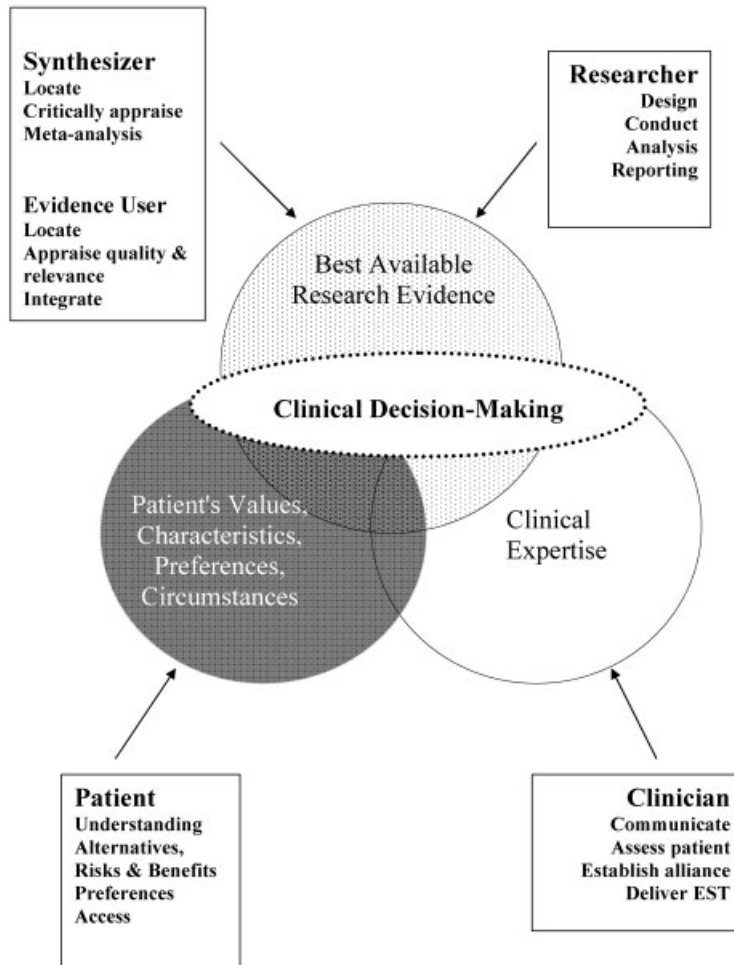

Figure 1. The three circles of evidence-based clinical practice.

Topping what has been called the *Evidence pyramid* or *hierarchy of evidence* is the *systematic review*, which synthesizes the findings from many treatment trials (Oxford Center for Evidence Based Medicine, 2001) In line with many clinicians' demand for more research evidence that derives directly from clinical practice (Weaver, Warren, & Delaney, 2005; Westfall, Mold, & Fagnan, 2007), some presentations of the evidence hierarchy place at the apex of the evidence pyramid an $N = 1$, single-case experimental design study that tests the treatment of interest with the target patient (Guyatt et al, 1986; Mahon, Laupacis, Donner, & Wood, 1996).

Clinical expertise. The circle that has generated greatest controversy is the one labeled, *clinical expertise* (Spring et al., 2005). The critique of clinical expertise no doubt derives largely from the ambiguity of the construct, which can be misconstrued as tantamount to opinion or unquestioned intuition (McFall, 1991; Meehl, 1973; Thornton, 2006). A large empirical literature demonstrates that nonspecific therapeutic factors (e.g., therapist warmth, therapeutic alliance), not unique to any particular treatment, explain the substantial variance in the outcome of psychotherapy (Ilardi & Craighead, 1994). Great individual variability in these attributes is evident among therapists from the outset of training; and how well individuals can be trained beyond a certain threshold level of competency is unclear. The approach to clinical expertise taken in most health care professions is to specify, operationalize, and train the requisite competencies needed to deliver particular practices.

Patient preferences. The least developed of EBP's three circles is patient preferences. However, preferences are the lynchpin in the movement towards shared health decision-making (Edwards et al, 2005; Gravel, Legare, & Graham, 2006). The rationale for shared decision-making is to engage patients more fully in self-management of their own wellness and health care. For shared decision-making to become a reality there are two needed preconditions. One is departure from a paternalistic care model in which the provider makes decisions on the patient's behalf. The other is progress towards a more culturally informed shared model of care. The idea is for providers to respect and help patients clarify their own values and treatment preferences. The need to systematize an approach to patient preferences is inescapable and complex. How patients weigh out the relative risks and benefits of treatment alternatives is personally distinctive, subjective, and often not previously considered by the patient. Effective deliberation also requires information that may be unknown to the patient, such as the range of treatment alternatives, including no treatment, and their potential inconveniences and risks. For many psychological conditions, patients need to determine whether they prefer to be treated pharmacologically, behaviorally, or both. The availability of insurance coverage for specific treatments also factors in, as do such logistical considerations as geographic access to trained therapists, scheduling, transportation, and child care.

<div align="center">Three Histories of Evidence-Based Practice</div>

The evidence-based practice movement in medicine (EBM) has a history that long predates psychology's involvement. The evidence-based practice movement's timeline actually can be characterized as involving three contemporaneous, interwoven histories that occurred in different locations: the United States, the United Kingdom, and Canada.

The Evidence-Based Practice Movement in the United States: The Flexner Report and Practice Variation

The movement towards EBP probably began first in the United States. By the start of the 20th century, medical successes, like antiseptic surgery, vaccination, and public sanitation, made it possible to begin to differentiate between scientific medicine and irrational treatments. These trends encouraged the American Medical Association (AMA) to reinvigorate advocacy for greater quality control in the admission of physician candidates. Simultaneously, the AMA pressed for standardization of a curriculum based upon science and rigorous clinical training. Opposition was mounted by the many proprietary, for-profit schools of medicine that existed at the time and that found their business interests threatened. At the request of the AMA, the Carnegie Foundation appointed the German schoolmaster and educational theorist, Abraham Flexner, to survey American medical schools. Over the course of 18 months, Flexner visited all 155 medical schools. His recommendation, published in 1910, was that all except 31 educational institutions should be closed. Although the eventual closures did not quite meet Flexner's target, cuts were draconian nonetheless. By 1935, more than half of the medical schools Flexner visited had been shut down (Beck, 2004).

The U.S. campaign to deliver best health care practices in a standardized, consistent manner has remained vigorous throughout the 20th and 21st centuries. Since 1973, one active proponent, John Wennberg from Dartmouth has tirelessly demonstrated that dramatic regional differences in healthcare spending persist even after controlling for differences in health status (Wennberg & Gittelsohn, 1973). Wennberg's findings, consistently replicated, indicate that medical expenditures increase directly in proportion to the medical resources that are present in a geographic area. Moreover, additional expenditures do not result necessarily in better health outcomes (Wennberg, Fisher, & Skinner, 2004; Wennberg, Fisher, Stukel, & Sharp, 2004). Government reports throughout the same period have continued to document a gap, perhaps even a chasm between what research shows to be effective and what is done in usual clinical practice (Dubinsky & Ferguson, 1990; Field & Lohe, 1992; Institute of Medicine [IOM], 2001). It continues to be estimated that only a minority (perhaps 15–25%) of medical practices are based upon sound evidence (Booth, 2007).

The United Kingdom: Epidemiology, Randomized Clinical Trials, and the Cochrane Collaboration

At about the same time that Wennberg and Gittelsohn (1973) published documentation of practice variation, Archibald Cochrane was catalyzing an evidence-based practice movement in the United Kingdom. Cochrane was an epidemiologist who set new standards by demonstrating the feasibility of directly measuring entire populations. In 1950, he launched the Rhondda Fach Scheme, an important longitudinal study to understand the etiology of lung disease in the mining communities of South Wales (Cochrane and Thomas, 1965).

Cochrane's exposure to clinical trials methodology came largely second-hand, through the teaching of Bradford Hill (1965). Cochrane conducted only one randomized clinical trial in his lifetime, in his own estimation, badly, while serving as a medical officer in a prisoner of war camp (Cochrane, 1989). However, he became convinced that the British National Health Service could be vastly improved if RCTs were used to test treatments because this study methodology would provide more reliable, unbiased information than other methods. Cochrane laid out his argument clearly and convincingly in a 1972 book entitled, *Effectiveness and Efficiency: Random Reflections on Health Services*. Economic

resources will always be limited, he argued, and should therefore be divided equitably and wisely: spent only to support forms of health care that are proven in high-quality RCTs. At its launch in 1992, the international voluntary organization dedicated to conducting systematic reviews of RCTs of treatments was named the Cochrane Collaboration in honor of Cochrane's accomplishments.

The Evidence-Based Practice Movement Canadian Style: Clinical Epidemiology at McMaster University

At McMaster University in Canada in the early 1980s, there developed a critical mass of faculty with interests in clinical epidemiology: the study of the determinants and consequences of health care decisions. Key among them was David Sackett, who published his first article on clinical epidemiology in 1969. The first use of the phrase, *evidence-based medicine* is credited to Gordon Guyatt, who claims to have chosen it in preference to "scientific medicine," which his colleagues construed to connote rejection of their clinical expertise (Gorman, 2007).

The McMaster group had an ambitious agenda. They wanted to develop a method that let practitioners engage in the process of evidence-based medicine in real time, during the actual clinical encounter to overcome automatic, unconscious decision-making biases. The group evolved a 5-step EBM process that entailed performing 5 A's: Ask (formulate the question), Acquire (search for answers by acquiring the evidence), Appraise (evaluate the evidence for quality, relevance, and clinical significance), Apply the results, and Assess the outcome (Sackett et al., 2000; Strauss et al., 2005). This method, described in greater detail below, requires a knowledge base and skill set for which the McMaster epidemiologists began to develop training materials. Having strong familiarity with the research evidence base was clearly necessary to perform the EBP process. Consequently, many of the group's journal articles and books addressed understanding and keeping up with the medical literature (Guyatt & Rennie, 2002; Haynes et al, 1986; McKibbon, Eady, & Marks, 2000). Having rapid access to the research evidence base at the point of care became critically important. Such access became feasible as the emergence of large electronic data sets brought library resources to the desktop (Spring & Pagoto, 2004).

In addition to clinical epidemiology, the McMaster group played a pivotal role in developing another field that is integral to evidence-based practice: the discipline called *health informatics*. Informatics addresses resources, devices, and structures (like treatment algorithms, practice guidelines, systematic evidence reviews, and electronic medical records) that are needed to store, retrieve, manage, and use health information at the time and place that decisions need to be made. Otherwise stated, health informatics involves the technological systems infrastructure that provides decision support.

Evidence-Based Practice: Why It Matters

Quality and Accountability

A major impetus behind evidence-based practice is the press to improve the quality of health care services. Quality enhancement was one theme highlighted by Wennberg and colleagues (Wennberg & Gittelsohn, 1973; Wennberg, Fisher, & Skinner, 2004; Wennber, Fisher, Stukel, et al., 2004) and by Cochrane (1972). More recently, the Institute of Medicine (2000) echoed a similar message about needed quality improvement. Wennberg et al. and Cochrane both also advocated for accountability. They emphasized the need to use scarce health care dollars equitably and only on treatments of demonstrable worth.

Policy

Policy determinations regarding support for clinical treatments or public health practices are being based, increasingly, upon systematic reviews of research evidence. Policy judgments often have implications for whether insurance will cover a treatment. A good illustration of evidence-based health care policy can be found in the United Kingdom, where the National Institute of Clinical Excellence (NICE) commissions systematic evidence reviews of treatment efficacy when it wishes to determine whether a procedure should be paid for by the National Health Service. In the United States as well, policy deliberations based on systematic evidence reviews determine coverage of specific procedures by Veterans Affairs/Department of Defense (U.S. Department of Veterans Affairs) and by Centers for Medicaid and Medicare (U.S. Department of Health and Human Services, 2006). For behavioral interventions to become standard of care, it is critically important that trials of behavioral treatments be evaluated in systematic evidence reviews. Often, incomplete reporting and/or inadequacies in research design and implementation cause behavioral clinical trials to be excluded from research syntheses (Davidson et al., 2003; Spring, Pagoto, et al., 2007). Lack of inclusion of behavioral treatments in research syntheses deprives psychology's evidence of an opportunity to influence policy.

Growth of the Behavioral Science Evidence Base

The greatest problems facing evidence-based practice stem from gaps in the research literature. Insufficiencies are especially stark in the areas of behavioral science and preventive care (Maciosek et al., 2006; Moyer et al., 2005). The U.S. Preventive Services Task Force (USPTF) has addressed this issue with particular eloquence. Members of the USPTF note the disparity between the abundant quality and availability of evidence demonstrating the impact of behavioral risk factors for disease versus the meager quality and availability of evidence supporting the efficacy, impact, and risk/benefit ratio of clinical preventive services to modify these risk factors (Maciosek et al., 2006).

Policy-making bodies often find insufficient high-quality evidence to recommend for or against the delivery of many behavioral interventions. Of course, absence of evidence is not evidence of absence of an effect. However, policy-making bodies like the USPSTF assign a grade of "I" for "insufficient evidence" and cannot advise for or against practices whose support is limited to expert consensus or less rigorous evidence (Moyer et al., 2005). The fact that systematic reviewers apply the same evaluative criteria when considering trials of medical and behavioral treatments levels the playing field for psychological interventions. Efforts like the establishment of the new Cochrane Behavioral Medicine Field (The Cochrane Collaboration, 2006) offer an impetus to enhance and disseminate the evidence base for psychological interventions.

Transdisciplinary Opportunities

Because progress is often made at the interface of preexisting disciplines, the NIH Roadmap encourages transdisciplinary collaboration (Abrams, 2006; Zerhouni, 2005). Boundary spanning has undeniable advantages. However, progress is frequently impeded by vast differences in vocabularies and frames of reference between the disciplines trying to collaborate (Ruggill & McAllister, 2006). The emergence across health disciplines of common vocabulary about evidence-based practice offers tremendous advantages for communication. Learning EBP vocabulary and methods affords psychologists invaluable opportunities to participate in transdisciplinary collaboration.

Useful Infrastructure

The research evidence base relevant to health care proliferates at an astonishing rate. Approximately 23,000 biomedical journals publish more than two million articles annually (Goodman, 2003). It is difficult to imagine how a clinician could have time to routinely engage in on-the-spot evidence-based practice by searching the primary literature (Koonce, Giuse, & Todd, 2004; Swinglehurst & Pierce, 2001). A growing set of databases of secondary, synthesized literature has evolved to meet practitioners' needs. Phrases like "evidence-based capitulation" (Satterfield, 2006) are sometimes used pejoratively to describe practitioner reliance on this filtered, synthesized literature rather than primary research studies. Nevertheless, creation and use of such an elaborate infrastructure are in keeping with the realities of contemporary science and practice.

Both practitioners and researchers stand to gain considerably by learning about the secondary, synthesized research literature. One important resource is the Cochrane Collaboration's online database of Systematic Reviews of Health Care Practices (Cochrane Collaboration, 1999). A parallel resource prepared by the Campbell Collaboration (1998/1999) reviews findings in education, social welfare, crime, and justice. Other more clinically oriented resources are available online and/or on personal Digital Assistant (PDA) to address practical questions raised by practitioners. These tools, based upon continually updated evidence reviews, offer pithy evidence synopses, clinical practice guidelines, and structured abstracts. Examples are UpToDate (1989), MDConsult (1997), ACP Journal Club (1991), *BMJ* Clinical Evidence (1999), InfoPOEMS (1996), and Clin-eguide (2004). Those tools and others are described in greater depth by Walker and London (this issue).

Lifelong Learning

A most compelling rationale for evidence-based practice is that it offers an approach to foster lifelong learning (Miller, 2005). Practitioners in most health professions continue to implement the practices they learned during training (Isaacs & Fitzgerald, 1999; Pagoto et al., this issue; Turner, 2001). However, it is to be hoped that scientific progress supplants older best practices with newer and better ones. How is the practitioner to keep current? The basic premise of EBP is that there should be no learning disjuncture between graduate school and subsequent professional life. While in school, just as afterward, engaging in evidence-based practice involves finding and implementing the practices that are supported by best available research evidence (if these are consistent with the patient's preferences and one's clinical skills).

Evidence-Based Practice: What You Need to Know

An Informal Snapshot of Current Psychology Training in Evidence-Based Practice

In August 2005, the APA Council unanimously adopted as policy Sackett et al.'s (2000) model of evidence-based practice (APA, 2005). The three-circle EBP model differs somewhat from the training model expressed in the APA's Guidelines and Principles for Accreditation of Programs in Professional Psychology (APA, 2007). Intrigued to learn how graduate training programs were educating students in the new EBP model, I conducted an informal listserv survey. In November 2006, I sent the following query to professional listservs on which graduate training in behavioral interventions has been discussed:

Does anyone on the list teach a course on evidence-based practice (EBP)? Specifically, I am searching for syllabi that cover one or more "legs" of the three-legged EBP stool: a) research evidence, b) clinical expertise, c) patient values, preferences, characteristics. I am glad to collate and distribute responses.

I e-mailed queries to listservs for the following organizations: APA Divisions 12 (clinical) and 38 (health), SSCPnet (Section III of APA Division 12), Academy of Behavioral and Cognitive Therapy, Academy of Behavioral Medicine Research, and Society of Behavioral Medicine Special Interest Groups in Evidence-Based Behavioral Medicine, Integrated Primary Care, Multiple Risk Behaviors, Obesity, and Cancer. On my behalf, Dr. Beverly Thorn kindly mailed the query to the listserv for the Council of University Directors of Clinical Psychology.

In response, I received 39 course syllabi and 17 additional recommended articles or books. I melded these into a 273-page document that I e-mailed to approximately 150 requesters. A handful of syllabi were provided by disciplines outside psychology (three public health, three medicine, one nursing, one physical education/sports studies). The vast majority of syllabi ($n = 30$) covered coursework in psychology, primarily at the graduate level.

My plan had been to group the syllabi into different clusters based on how they addressed each of Sackett's three circles. It soon became clear, however, that only one course template prevailed and that what it addressed fell at the interface between two of Sackett's three circles: research and clinical expertise. As their program's coverage of evidence-based practice, the vast majority of respondents identified courses with various names including *Cognitive Behavioral Therapy* (CBT), *Empirically Supported Treatments* (EST), *Empirically Validated Treatments*, *Psychological Interventions*, or *Psychotherapy Research*. In addition to articles, the primary assigned text was usually David Barlow's (2001) *Clinical Handbook of Psychologic Disorders*, or sometimes Allen Bergin and Sol Garfield's (1994) *Handbook of Psychotherapy and Behavior Change*. What emerged was that most respondents equated evidence-based practice with empirically supported treatment (EST). There seemed to be little awareness of EBP's different history and meaning in other health professions, or consideration that adoption of EBP policy has implications for psychology's training model.

My informal survey suggests that psychology is doing a good job of covering several constituents of one circle in the EBP model: research evidence. Graduate training in psychology is generally strong in the research methodology and statistics needed to create or critically appraise research. Indirectly, EST training exposes students to methodology that was used to derive and validate the best currently available psychological treatments. On the other hand, more focused exposure to clinical trials methodology could equip students to participate more fully in transdisciplinary research. Didactic EST coursework also lays theoretical and conceptual groundwork for subsequent development of practical, technical clinical skills. It is unclear whether trying to cover the research aspects and some clinical skill development aspects of ESTs in a single course is the best way to do justice to both. Recent findings suggest that there remains substantial unmet need for greater clinically supervised experiential training in ESTs (Weissman et al., 2006; Woody, Weisz, & McLean, 2005).

Inclusion of ESTs in the core curriculum for clinical psychologists is unquestionably a good thing. Mastering today's best available psychological treatments is the right place to begin. Nevertheless, the story should not end there. In addition, learning to perform the evidence-based practice process equips psychologists to continue creating and mastering tomorrow's best treatments. In the following sections, I suggest additional content from

each of the three EBP circles that psychology may wish to consider integrating into training. In part, the suggested additions reflect knowledge and skills that facilitate trans-disciplinary collaboration. In part, they reflect new roles for psychologists in the transition to evidence-based health care.

Skill Sets for Three Ways Psychologists Can Relate to Research Evidence

As diagrammed in Figure 1 and described previously (Spring et al., 2005), psychologists can have three primary kinds of relationship to research evidence. First, as researchers, they can design, conduct, analyze, and report research, thereby contributing directly to creating the evidence. Second, as systematic reviewers, they can locate, appraise, and quantitatively synthesize research for evidence users. Third, as research consumers, they can access research evidence, appraise its quality and relevance for their context, and integrate research into their practical decision-making. Each of these three ways of relating to research assumes some common base of research knowledge, and each also entails some specialized skills.

Researcher: Evidence creator. Behavioral and medical treatments now represent viable treatment alternatives for many of the same biopsychosocial problems. Indeed, a considerable number of behavioral clinical trials are now reported in medical journals (Spring, Pagoto, Knatterud, Kozak, & Hedeker, 2007). Both public health and psychologists' professional wellbeing stand to benefit from more primary and secondary research that directly compares outcomes and cost-effectiveness for medical and psychosocial treatments. To advance the study of behavioral treatments and facilitate comparative effectiveness research, it is useful for psychologists to understand research traditions in clinical medicine (Kohlwes et al., 2006).

Clinical medicine and behavioral science both employ correlational as well as experimental research designs, but their usages have tended to differ. Whereas correlational studies in psychology often entail convenience samples, epidemiological studies in medicine often involve measurement of entire populations. Partly because of interest in understanding the natural course of disease, medicine has a tradition of following cohorts longitudinally to address prognostic questions (Fletcher, Fletcher, & Wagner, 2005; Szklo & Nieto, 2006). Medicine also has a tradition of applying certain conventions that suggest causal inferences from observational data (Hill, 1965).

The experimental tradition in psychology derives from laboratory studies (Maher, 1968; Wilson, 1981). Particularly in animal laboratory research, the experimenter can exert very tight control over the intervention. Sources of variation including temperature, lighting, ambient noise, crowding, and diet can all be regulated. The experimental manipulation and assessment period are usually brief and, ordinarily, there are few or no missing data. If a mishap occurs and an animal escapes or a human quits the study part-way through, it is logical to replace the lost case because the subject was not exposed to the intervention or control condition.

Drawing upon their research training, which rarely includes coursework in clinical trials, psychologists tend to conceptualize RCTs as laboratory experiments. This stands psychologists in good stead for designing trials that have strong internal validity and treatment fidelity. However, because laboratory experimental tradition offers little context to explain handling of missing data or why intent-to-treat is preferable to completer analysis in an RCT, these aspects of trial conduct or reporting suffer in the psychological, as compared to the medical research literature (Spring, Pagoto, et al.,

2007). A clearer understanding of the rationale for intent to treat analysis is given in epidemiological training. There RCTs are presented as tests of whether a treatment constitutes sound public policy. Framed in that manner, a treatment that is declined or deserted in midtreatment by many individuals is a poor treatment, regardless of whether it has outstanding efficacy among the subset that continues to adhere. From a public health perspective, the treatment's viability needs to be evaluated by considering outcomes for all who were assigned to receive it. Hence, the policy, "Once randomized, always analyzed."

A useful tool to support reporting of RCTs was created by an international group of epidemiologists, statisticians, journal editors, and trialists known as the CONSORT group. The CONSORT reporting guidelines (Moher, Schultz, Altman for the CONSORT Group, 2001) have been endorsed by many leading journals in the medical (*Journal of the American Medical Association* [*JAMA*], *Lancet*) and behavioral sciences (*Journal of Consulting and Clinical Psychology*, *Health Psychology*, *Annals of Behavioral Medicine*). The CONSORT guidelines include a checklist of 22 items that should be reported when presenting an RCT and a flow diagram that depicts participants' progress through the trial. The CONSORT Group's aim is to standardize and make more transparent the experimental process, so that evidence users and synthesizers can clearly evaluate validity and relevance for their context.

Several checklist items are of particular relevance to psychologists because they represent areas in which our reporting of trials is often incomplete (Spring, Pagoto, et al., 2007; Stinson, McGraph, & Yamada, 2003). One example involves specifying the study eligibility criteria and their impact on enrollment (important for appraising external validity). A second is describing how the sample size was determined. A third involves detailing how the randomization sequence was generated, concealed, and implemented. A fourth concerns describing whether any blinding was implemented and how its success was evaluated, including blinding assessors of the study outcomes. A particularly important area in which reporting of behavioral intervention trials often falls down involves specifying, in advance, clear primary and secondary outcomes, so that a priori hypothesis testing can be discriminated from subsequent "cherry-picking." Finally, improvement is needed in providing enough information about the number of cases analyzed in each group to enable readers to tell whether comparisons were conducted on an intent-to-treat basis. Exposure to the CONSORT statement is useful for psychologists, regardless of whether they wish to appraise, create, or synthesize research evidence about the effectiveness of treatments.

Evidence synthesizer. Evidence syntheses are an increasingly vital part of the infrastructure needed to perform evidence-based practice, as noted above. Systematic reviewing per se, not just meta-analysis, warrants consideration for inclusion in psychology training. Some scientific journals (e.g., *JAMA*) no longer accept traditional narrative literature reviews, but continue to welcome systematic evidence reviews. The distinctive features of a systematic review stem from the care that is taken to avoid bias in gathering and summarizing the literature (Dickersin, 2002; Pai et al, 2004). One key tool is the prespecified search protocol. The protocol states the foreground question to be answered by the review. The question is phrased in P.I.C.O language, which specifies the target population, intervention, comparison, and study outcomes (primary and secondary dependent variables). Also specified are clear criteria for including or excluding studies, and all keywords and terms that will be used to guide the search.

To minimize bias, the approach in conducting searches for a systematic review is to be as inclusive and transparent as possible. The search protocol declares which databases

will be examined and by which search engines (e.g., searching Medline via OVID (OVID Technologies, New York, NY) and via PubMed (U.S. National Library of Medicine, 1971) can yield somewhat different results). The protocol also states whether gray literature (unpublished manuscripts, conference proceedings, etc.) will be scrutinized and whether articles written in certain languages will be filtered out. Selection of databases to be searched has important practical and substantive implications. Key indexing terms differ across databases (e.g., PubMED uses MeSH terms; psycINFO (APA, 1997) uses the Thesaurus of Psychological Index Terms). EMBASE (Medline's European counterpart; 1974) and CINAHL (a database used extensively by nurses and other allied health professionals; Cinahl Information Systems, 1984) include many journals that are not included in either MEDLINE or psycINFO. As compared to Medline or psycINFO, searching EMBASE, the Cochrane Database of Systematic Reviews (Cochrane Library, 1999a), and the Cochrane Controlled Clinical Trials Registry (Cochrane Library, 1999b) is more likely to yield reports of null or negative findings which can, in turn, influence a review's conclusions (Sampson, 2003). The Cochrane Database of Systematic Reviews and the Cochrane Controlled Clinical Trials Registry may also yield unique citations, and sometimes unpublished studies identified by Cochrane reviewers. The assistance of a trained librarian can be invaluable throughout the search process.

Once the initial pool of articles has been assembled (usually at least several hundred), two or more raters sort the articles for quality and relevance using prespecified criteria. Of the many available rating scales for methodological quality, Jadad et al.'s (1996) is the most widely used, but its emphasis on double-blinding is inappropriate for many behavioral trials. The PEDro scale offers a good quality rating alternative when double-blinding is not possible (Bhogal, Teasell, Foley, & Spechley, 2005). For many behavioral interventions, so few high-quality studies exist that implementing quality considerations beyond whether a study used randomization leaves too few remaining studies to synthesize quantitatively (cf., Spring, Howe, et al., 2007).

The next step in systematic reviewing is the design of a data extraction form and extraction of data on the primary outcomes. At this juncture, a decision usually needs to be made about whether to contact study authors to obtain data not available in their published reports. Data synthesis via meta-analysis comes next and requires decision-making about the handling of study heterogeneity. The optimal approach to heterogeneity is a very active area of investigation in systematic review science (Viechtbauer, 2007), as are questions of how to adequately reflect data on harms (Chou & Helfand, 2005) or synthesize qualitative information (Dixon-Woods et al., 2007).

Evidence consumers. When psychologists integrate research evidence to engage in evidence-based decision-making with their clients, they act as consumers of the research evidence. Engaging in the process of evidence-based practice entails performing five steps (5 *A*s), each of which can be regarded as a skill or competency needed for EBP (Strauss et al., 2005). The steps are to *ask* the clinical question, *acquire* the evidence, *appraise* the evidence, *apply* the results, and *assess* the outcome. Asking effective clinical questions involves formulating them in a focused manner that allows them to be readily answerable. This competency involves framing well-built, foreground questions using the P.I.C.O. format, in contrast to broader, more general background questions. An example of a background question is, "What are effective treatments for bulimia?" A counterpart foreground question might be, "In adults with binge eating disorder (P), does interpersonal therapy (IPT) (I) compared to CBT (C) reduce the frequency of binge episodes (O). The diffuse background question will yield too many diverse citations to be useful efficiently. In contrast, the better focused foreground question will yield cites that

inform the clinician about whether to proceed with CBT or IPT, assuming he or she is trained to provide both, and both are acceptable to the client.

Acquiring the evidence is the next step. As noted earlier, it is expected that busy practitioners will turn first to the secondary synthesized literature to answer their questions. Useful search strategies for retrieving systematic reviews have been published (Montori, Wilczynski, Morgan, & Haynes, 2005). Often the authors of the systematic review will already have critically appraised the quality of the primary research literature, but the clinician will still need to appraise the systematic review for its quality and relevance (Hunt & McKibbon, 1997).

A word may be offered about appraising research relevance. Given the limited body of research evidence for behavioral interventions, few treatments with high quality evidence of efficacy have been evaluated adequately across demographic and cultural groups. Psychology has very few behavioral treatments whose generalizability has been established, particularly for underserved populations. Before applying a treatment to a patient whose demographic subgroup's response to the treatment has not yet been studied, it behooves the clinician to search the primary research literature for evidence of Treatment $\times$ Subgroup Interactions indicative of differential benefit or harm. Finding no evidence of treatment interaction, clinical decision-making integrates the best available evidence that there is an effective treatment that warrants exploration. By applying treatments supported by high-quality evidence, assessing the results, and iterating treatment accordingly, psychologists actualize their Boulder model training and can begin to generate a needed evidence base of practice-based research.

When trying to incorporate research findings from other disciplines into their clinical practices, psychologists may benefit from understanding several concepts derived from epidemiological research. Psychologists are usually very familiar with statistics such as ANOVA and regression, which analyze continuous variables. In contrast, statistics in clinical medicine usually treat variables categorically and express findings as odds ratios. Odds ratios are operationalized as:

(odds[disease/exposed]/odds[disease/unexposed])

In addition to odds ratio, several other epidemiological terms are likely to be encountered in systematic reviews. One pair involves the distinction between Absolute Risk, operationalized as:

(p[disease] in a particular population)

versus Relative risk, operationalized as:

(p[disease/exposed]/p[disease/unexposed])

Finally, epidemiologists have two particularly helpful and straightforward ways of numerically expressing clinical significance. One such metric is called the *number needed to harm* (NNH). A NNH = 5 means that if 5 patients were treated with the experimental treatment, 1 would be more likely to have an adverse event than if all had received the control treatment. A counterpoint metric is the *number needed to treat* (NNT). A NNT = 13 means that 13 patients would need to be treated with the experimental treatment to see one success not seen with the control treatment.

Training for Clinical Expertise

The approach to clinical expertise taken in most health care professions is to specify, operationalize, and train the requisite competencies needed to deliver particular practices. Communication skills are essential for implementing most health care procedures. Accreditation and leadership organizations across health disciplines have articulated the importance of communication skills and these are increasingly taught in foundational

courses. The degree of added emphasis placed on relationship, trust, or alliance-building skills has been greatest in clinical psychology, social work, and nursing training, but is now receiving increased attention in medical education (American Association of Colleges of Nursing & the American Organization of Nurse Executives Task Force on Differentiated Competencies for Nursing Practice, 1995; American Association of Medical Colleges, 1999; Committee on Education and Training of Psychologists, 1999; International Association of Schools of Social Work & the International Federation of Social Workers, 2004).

Skills in assessment and diagnosis are also taught systematically in all health professions. Finally, universally, key clinical skill sets need to be mastered before particular procedures can be considered ethically to fall within a practitioner's scope of professional practice. In surgical education, training can emphasize acquisition of discrete manual dexterities needed to accomplish specific surgical procedures. In psychology, training cultivates skill in implementing techniques utilized in empirically supported treatments. Examples include competencies like mindfulness, emotion modulation, and paradoxical intervention that need to be practiced and mastered before a clinical psychologist can be considered to have expertise in a complex EST, like dialectical behavior therapy (Linehan, 1993). There are distinct limits on the degree to which practical technical skills can be mastered in didactic courses. Clinically supervised experiential training offers the more effective learning milieu (Gordon et al, 2000; Weissman et al., 2006; Woody et al., 2005).

Measurement of clinical competencies poses some challenges, particularly once practitioners have left the training environment. Self-assessment of one's own clinical expertise remains an accessible evaluative channel, but is not a simple matter. Standards for competency self-assessment can be expected to remain an active area of development in continuing education (Belar et al., 2001; Davis et al., 2006).

Understanding and Measuring Patient Preferences

The development of tools to measure patient preferences is a burgeoning area in medical research (Man-Son-Hing et al., 2000; Murtagh & Thomas, 2006). Nonetheless, greater development of tools pertaining to psychological problems and treatments is needed. Measurement of patient preferences has usually been based upon the assessment of *utilities*. In utility assessment, all possible outcomes are assigned a value between 0 (death) and 1 (perfect health). (The debate is ongoing about whether to allow assignment of negative values for conditions perceived to be worse than death; Franic & Pathak, 2003).

Two preference assessment methodologies are most widely used (Birch & Ismail, 2002). In the *time trade-off approach*, the patient is asked to estimate the proportion of life in a particular health state (e.g., severe depression or complete amputation of both limbs) she or he would be willing to give up to attain perfect health. If the patient's answer is 30%, then the utility of that health state is $1 - (30\%) = .70$. The other main utility computation method is the *standard gamble approach*. In the standard gamble, the patient is asked to identify the point at which she or he would be indifferent to the choice between spending the rest of her of his life in the health state at issue versus a gamble between perfect health and instant death, where the probability of perfect health represents the utility of the health state.

Decision analysis involves systematically creating and computationally working through decision trees to guide decision-making (Chapman & Sonnenberg, 2000; Inadomi, 2004). Derivation of the probabilities of each possible health outcome of treatment, and the utility the patient ascribes to each, makes it possible to calculate mathematically

the best treatment option for the patient (Petitti, 2000). The apparent rigor, precision, and patient tailoring of decision analytic techniques are comforting when coping with decisional uncertainty. It is important to note, however, that the conclusions reached in decision analyses can vary dramatically depending upon the stringency of the criteria used to select evidence to use in the model (Braithwaite, Roberts, & Justice, 2007). Little has been done yet to formalize probability estimates that characterize alternative treatments for psychosocial conditions. There may be some question as to how meaningful it is to calibrate alternative psychosocial outcomes against an eventuality like instant death. The degree of numeracy expected for patients to respond meaningfully to trade-off or standard gamble approaches may also be unrealistic (Lipkus, Samsa, & Rimer, 2001). Greater involvement of psychologists in the derivation of user-friendly preference measures would help to support evidence-based decision-making.

Discussion

In this article, I have reviewed the history of the evidence-based practice movement in medicine internationally and in other disciplines. Evidence-based practice is a transdisciplinary approach that aims to improve accountability for health care practices and promote lifelong learning. EBP entails an idiographic process of clinical decision-making that integrates research evidence, clinical expertise, and patient preferences and characteristics. As one of the last health care disciplines to adopt evidence-based practice policy, psychology still needs to work through some terminological confusion. For example, although ESTs are an important component of EBP, EBP cannot be reduced to ESTs.

For psychologists to continue building the evidence base for behavioral treatments and take full advantage of transdisciplinary collaborations, there is a need for knowledge and skill development in several areas. Training needs were identified in clinical trial methodology and reporting, systematic reviews, search strategies, assessment of patient preferences, and acquisition of clinical skills to perform ESTs.

The National Institutes of Health Office of Behavioral and Social Sciences, acting through its contract office, the National Library of Medicine, has issued research contract #N01-LM-6–3512 to Northwestern University's Feinberg School of Medicine Research to develop Resources for Training in Evidence-Based Behavioral Practice. The co-chair, Dr. Barbara Walker, the Web developer, Dr. Martin McCarthy, and the Project Coordinator, Kristin Hitchcock, and I are in the process of assembling an interdisciplinary Council and Scientific Advisory Board to advise on training needs in evidence-based behavioral practice. The Council and Board will prepare a white paper to characterize training, skills, and competencies that reflect education in evidence-based behavioral practice.

Also under development for contract #N01-LM-6–3512 is a Web site that will serve as a training resource for evidence-based behavioral practice. Filmed interviews with EBP speakers from the midwinter CUDCP meeting, together with their powerpoint presentations, will soon be available for viewing at the site. Featured speakers are Drs. Bonnie Spring, Barbara Walker, Dianne Chambless, David DiLillo, and Thad Leffingwell.

The plan is to develop and post Web-based modules that cover the needed EBP training content. We will be looking to collaborate with graduate training programs that are willing to try out the materials and provide feedback. A portion of the Web site will also be equipped to allow users to communicate and share their own EBP training materials.

In addition to Web-based materials, we and our collaborators continue to offer symposia, seminars, and training workshops on evidence-based practice at an array of multidisciplinary professional conferences. Recent symposia on evidence-based practice have

been held at the American Psychological Association (2006), the Association for Behavioral and Cognitive Therapy (2006), and Academy of Behavioral Medicine Research (2007) annual meetings. Additional offerings have included workshops and symposia on clinical decision-making offered at the Society of Medical Decision-Making (2006) and the Society of Behavioral Medicine (2005) annual meetings. Other relevant symposia have been presented on systematic reviews at the International Society of Behavioral Medicine (2006) and Society of Behavioral Medicine (2007) and on clinical trials at the Society of Behavioral Medicine (2005, 2007) annual meetings.

With psychology's recent adoption of EBP, all major health professions now endorse the same model of evidence-based practice. Prospects for psychology to benefit from the resultant interdisciplinary collaboration are good. In turn, psychology brings to the table an expertise in the cognitive science of decision-making. There is a definite need to understand and better systematize the decisional processes involved in integrating research, clinical skills, and patient preferences. By helping to master that challenge, psychology can make a valuable contribution to both EBP and public health.

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