Evidence-Based Practice:
The Psychology of EBP Implementation

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Prepared for ***Annual Review of Psychology*** (2015), Susan Fiske, editor.

AUTHORS' NOTE: We thank Eric Barends, Richard Larrick, Scott Lilienfield, and Maria Tomprou for their insightful feedback and appreciate the support an H.J. Heinz II Professorship provided in the writing of this chapter.

KEYWORDS: "**evidence-based practice" "decision supports" "evidence appraisal" "critical thinking" "protocols and checklists" "practice-oriented evidence"**

Abstract

Evidence-Based Practice (EBP) is an approach used in numerous professions that focuses on attention on evidence quality in decision making and action. We review research on EBP implementation, identifying critical underlying psychological factors facilitating and impeding its use. In describing EBP and the forms of evidence it employs, we highlight the challenges individuals face in appraising evidence quality, particularly their personal experience. We next describe critical EBP competencies and the challenges underlying their acquisition: foundational competencies of critical thinking and domain knowledge, and functional competencies such as question formulation, evidence search and appraisal, and outcome evaluation. We then review research on EBP implementation across diverse fields from medicine to management and organize findings around three key contributors to EBP: practitioner Ability, Motivation, and Opportunity to practice (AMO). Throughout, important links between Psychology and EBP are highlighted along with the contributions psychological research can make to further EBP development and implementation.

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Evidence-Based Practice

"Strive to do the best imperfect human beings can do"
Harris 2011: 13

Evidence-Based Practice (EBP) is a disciplined approach to decision-making and action, the hallmark of which is attention to evidence quality and the use of the best available evidence. Its goals are to improve the results of professional decisions and increase the use of practices that lead to desired outcomes, while eliminating dysfunctional practices. All professions engaged in EBP make some use of scientific evidence and methodologies reflecting the premise that science can improve outcomes through a better understanding of the world (e.g., Melnyk & Fineout-Overholt 2011; Miller 2004; Wells & Miranda 2006).

However, EBP is implemented to different degrees within the professions and even within the same organization (Ferlie et al 2005; Melnyk et al 2012). This chapter reviews research on the implementation and effective use of EBP. In doing so, we describe the psychological factors underlying its implementation and their ties to EBP's professional and organizational supports. We begin by describing EBP, its background, and the elements that comprise it. We then review research on its implementation across various domains, from medicine to management. This review addresses three key contributors to EBP: practitioner Ability, Motivation, and Opportunity to practice (AMO). The AMO framework highlights important links between EBP and Psychology. This chapter then addresses EBP effectiveness research and trends apparent in EBP implementation. It concludes with a discussion of how psychological research can contribute to the further development and implementation of Evidence-Based Practice.

I. What is Evidence-Based Practice?

Evidence-based practice involves conscientious, explicit, and judicious use of the best available evidence in making decisions (Sackett 2000). Individuals, both laypeople and professionals, typically use some form of evidence in making decisions—if only their past experience. EBP raises the issue of what that evidence is and, in particular, how strong it might be (Barends, et al 2014; Sackett 2000). Evidence-based practitioners seek to improve the quality of the evidence used and condition their decisions and practices on the confidence that the evidence warrants. Importantly, effective EBP practice requires a commitment to continuous practice improvement and lifelong learning (Straus et al 2005).

The Background of Evidence-Based Practice

EBP originated in medicine in the 1980s, with the goal of promoting the more systematic use of scientific evidence in physician education and clinical practice (Barends & Briner, 2014). It arose out of recognition that physicians had tended to prioritize tradition and personal experience, giving rise to troubling variation in treatment quality. Underlying this issue was the tendency for medical schools to teach their own specific approaches to clinical problems, without clear (or at least explicit) links to scientific evidence. This approach to professional education has three problems. First, in fields with rapid advances in research, practices can go out-of-date quickly (e.g., Weber 2009), and educators may lag in updating course content (Rousseau 2006). Second, practices taught in professional education can vary widely in their scientific support, with some unsupported by any scientific evidence (Barends & Briner 2014). Third, professionals faced with novel or unfamiliar situations can lack the ability to access

relevant new evidence (Barends & Briner 2014).

EBP has since become a movement in fields as diverse as nursing (Melnyk et al 2012), conservation (Pullin et al 2004), psychotherapy (Goodheart et al 2006) and management (Rousseau 2012). Recently, the EBP movement has tended to move beyond its original focus on the education of individual practitioners, toward addressing the practices of organizations and professions (Dogherty et al 2013; Stevens 2013). At the same time, EBP has become part of popular culture. The TV program *House*, for example, showcases an iconoclast physician who uses research findings and clinical data to save at least one life within a television hour. The show *Lie to Me* purports to use scientific evidence on facial expressions to aid law enforcement. Exercise studios tout "evidence-based fitness." As a movement, EBP is indicative of the social trend tracing to at least the Enlightenment to ground action in reason and empiricism rather than traditional authority.

Primary Types of Evidence Used in EBP

As a discipline, EBP involves a mindful integration of both scientific evidence and local evidence. When available, scientific evidence is seen as a critical contributor to effective practice. In nature conservation, for example, evidence-based decision-making stands in contrast to decision-making based on anecdote and habitat management handbooks (Pullin et al 2004). In fields from medicine to management, EBP has led to greater attention to the critical appraisal and synthesis of existing research, to identify what is known or unknown about effective practice (Sackett 2000; Tranfield et al 2003). Still, EBP is not limited to scientific evidence, but also incorporates local or situational information, stakeholder concerns, and practitioner judgment and experience. Rather than

a narrow focus on scientific research, a focus on "evidence" directs attention to the quality of the available information and knowledge, the various forms it can take, and the way people use it in decision-making and action. "Practice," in turn, refers to the entire decision-making process: before, during, and after.

Scientific evidence enters EBP in several ways. At least in EBP fields, it now informs the content of practitioners' professional education. At the same time, practitioners need to learn how to acquire scientific evidence pertinent to their professional practice (Sackett 2000). These skills permit them to use scientific evidence to stay current and address new questions that arise as their careers progress. Accessing scientific evidence is still not enough, however. Practitioners need to evaluate its quality, a task many find challenging (Scurlock-Evans et al 2014). The quality of a particular research study (or an entire body of research) depends on the type of question being answered (Petticrew & Roberts 2003). If the practitioner wonders whether a practice or intervention works as intended (e.g., Can training reduce staff dissatisfaction? Does it increase compliance with patient care protocols?), quality depends on whether the available evidence employs sufficient controls to rule out competing explanations (e.g., randomization and control groups). If the question is how particular kinds of employees are likely to feel about a new way of working, quality depends on the representativeness of the populations studied and relevance of their assessments. Thus, in contrast to critiques of EBP as overly valuing randomized controlled trials (RCTs; e.g., Webb 2001), the diversity of possible practice questions necessitates methodological pluralism (e.g., O'Neill et al 2011). Nonetheless, EBP does presume that, for a given question, some

available evidence may be of better quality, and practitioners need to be able to assess evidence quality.

Scientific evidence relevant to practice is also subject to evidence synthesis, where researchers and sometimes practitioners collaborate to evaluate the implications of a body of evidence to a particular practice question (Haynes 2001). Practitioners in many fields can now access evidence summaries related to their practice via such online sources as the Cochrane Library (for healthcare) and the Campbell Library (for education, criminology, social work, and social science generally). Such summaries make EBP easier. Nonetheless, practitioners need to pay careful attention to the quality of evidence on which such summaries are based. Summaries based on low quality evidence can lead to use of ineffective or dysfunctional practices. Practices based on low quality evidence may ultimately be overturned by better quality research as in the case of the now-refuted use of hormone replacement therapy for post-menopausal women (Guyatt et al 2008). Luckily, some useful standards exist for determining which scientific findings to export to organizations and how (Fiske & Borgida 2011).

EBP also makes use of local evidence regarding the circumstances and setting in which practice occurs. Local evidence takes the form of diagnostic information that practitioners obtain from patients (human or animal), clients (individual, family, firm, etc.; Goodheart et al 2006; Groopman 2007) as well as organizational facts and indicators (Kovner et al 2009). It also includes situational factors such as constraints (e.g., time and resources) and contingencies (e.g., risks) as well as observed practice outcomes (Kovner

et al 2009; Lambert 2011; Nutt 1999). Importantly, outcome assessment is needed to evaluate whether an application of scientific evidence is working.

Local evidence is also important in EBP because the available scientific evidence in most fields is limited relative to the array of problems practitioners may face. Although no one knows the exact percentage of professional practices that have been submitted to scientific study, one commentator estimated the number at 25% (e.g., clinical practices, Goodman 1998). Practices that have not been studied scientifically need not be ineffective, however; they simply lack affirmative evidence. In the absence of scientific evidence, local evidence provides a necessary basis for action, recognizing that much remains unknown and much of what we "know" may turn out to be incorrect, ineffective, or even harmful. The failure of once-popular programs like "scared straight," formerly believed to reduce juvenile delinquency (Petrosino, et al 2013), and science-informed recommendations overturned by new evidence (e.g., to eat breakfast in order to avoid weight gain; Mekary & Giovannucci 2014) have raised awareness that knowledge requires frequent reevaluation and testing.

Attention to differences in the quality of local evidence has led to the development of integrated organizational databases (e.g., "Big Data" linking clinical and financial data in healthcare or diverse functions in business; Davenport et al 2010). Nevertheless, little consensus exists on the quality criteria to apply to local evidence. Reliability and validity certainly contribute, but other criteria like timeliness for specific decisions or usefulness to particular stakeholders may too (Davenport et al 2010; Staubus

1999). Independent outsiders like auditors may help to assess the quality of local evidence (Cokins et al 2008).

Last, local evidence is important when practitioners confront novel circumstances such as previously unknown diseases or the advent of disruptive innovations, because historical evidence is less likely to apply. In these circumstances, practitioners may need to learn by doing, that is, by experimenting with alternative courses of action and evaluating the results (Weick & Sutcliffe 2011). Local evidence gathered via pilot tests and experiments may be critical to solving novel problems.

Stakeholder perspectives constitute additional forms of evidence. Attending to stakeholder concerns, interests, and points-of-view has been characterized as a professional or even ethical obligation of EBP (Rousseau 2012; Sackett 2000). For example, physicians often weigh patient preferences and family concerns with scientific evidence when devising a treatment plan (Straus et al 2005). Stakeholder perspectives tend to be decision-specific and include client or family preferences, community or regulatory concerns, or the interests of an organization's employees, managers, and shareholders (Baba & HakemZadeh 2012). These perspectives play varying roles in EBP depending on the profession, playing a more consistent role in clinical disciplines like medicine (Sackett 2000) and psychology (American Psychological Association 2006) than in broad fields like management that are buffeted by a wide variety of incentives, regulatory pressures, and other contextual factors (Ghoshal 2005). Nonetheless, considering stakeholder perspectives can help balance out immediate situational pressures and the narrowing of judgment that decision-makers face under stress (cf.

Heath & Heath 2012; Yates & Potwoworski 2012). It can introduce multiple objectives into professional decisions, calling attention to trade-offs and optimizations where cost and human wellbeing or short- and long-term goals are concerned, helping to generate more integrative decisions (Heath & Heath 2012). Explicit attention to multiple objectives when framing decisions helps resolve some ambiguities that decision-makers routinely face (Heath & Heath 2012). Last, stakeholders (e.g., employees, patients) are sources of outcome assessments when scientific and local evidence are applied.

A final, critical source of evidence is professional experience. Like all forms of evidence, EBP practitioners must appraise the quality and relevance of their own experience to the situation at hand (Barends & Briner 2014; Thyer 2002). Similarly, if considered, the experience of others, from consultants to in-house experts, must also be appraised. In reality, however, appraising individual experience is problematic.

Psychologists are of two minds about the value of experience for decision-making. One research stream substantiates the fallibility of experience-based decisions due to cognitive biases and processing limitations—factors that even sustained practice cannot easily overcome (Dawes 2008; Kahneman 2011). In contrast, another stream focuses on domain-specific expertise where experts including firefighters and nurses quickly and accurately draw from experience to recognize and respond to new situations, tapping extensive domain-specific expertise using automatic pattern recognition (Salas, et al 2009).

A weak link between experience and decision quality has been reported in areas as diverse as medical diagnosis (Camerer & Johnson 1997), professional software design (Sonnentag 1998), and management (March 2010). A systematic review of 62 published

studies found that the quality of care physicians provided tended to decline as their years of experience increased (Choudhry, et al 2005) due to less up-to-date factual knowledge and lower adherence to professional standards and guidelines. Nonetheless, Hay et al (2008) noted that physicians' confidence in their effectiveness increases with experience even when they do not track their patients' outcomes. Likewise, in clinical psychology, the ability to make correct diagnoses does not appear to improve with experience, as even relatively simple statistical models objectively outperform the most experienced practitioners (Clement 2014; Dawes et al 1989), perhaps because conventional wisdom holds that most psychological treatments work comparably well.

One reason such beliefs persist is that professionals often "obtain little to no information about the accuracy of their predictions" (Dawes et al 1989: 1671); in other words, opportunities for feedback are often rare. Gigerenzer (2014) notes that heuristics validated by feedback, like the gaze heuristic that both pilots and ballplayers use for positioning, can be reliably applied intuitively as well as systematically. On the other hand, professionals may not always seek out feedback regarding their judgments when it is available (Lambert 2011). Indeed, the effectiveness of "intuitive" or fast decisions appears to depend on learning from feedback, which in turn requires feedback that is prompt, information-rich, and consistent (Kahneman & Klein 2009). Few, if any, of these conditions exist in the context of practice in fields such as psychotherapy or management. One issue the present review raises is the effects EBP might have on the practitioner's ability to learn from experience, a matter research has not yet addressed.

The complicated link between experience and effectiveness means that individuals may have a hard time appraising their own judgment. More difficult still may

be appraising the experience of others, since individuals tend to overweight their own opinions (Soll & Larrick 2009). The tendency toward confirmation bias means that individuals are likely to find support for their own judgments, experiencing little uncertainty while acting on their intuitions (Morewedge & Kahneman 2010). Aggravating such difficulties is the tendency of both laypeople and experts to use less information in their decisions than they recognize (Fischoff 2003). Indeed, a narrowing of focus may impair the use of any form of evidence—one motivation behind the development of EBP decision supports.

Decision Supports in EBP

Decision supports refer to tools, rubrics, and processes that aid human information processing by overcoming the limits of human judgment and memory, reducing the effect of distractions, and integrating expertise (Simon 1990; 1996). These supports, inspired by the difficulties practitioners face in using large amounts of information, take many forms in EBP, applicable in some cases to problem solving generally and in others to specific circumstances.

Checklists and protocols derived from scientific and local evidence provide guidelines for action under specific circumstances (Byrnes et al 2009; Gawande 2010), increasing the regular use of effective practices. Other forms of information gathering routines, like those used by physicians to assess patient vital signs and history, aid general problem solving, as in the case where assessment routines help physicians avoid the temptation to stop searching prematurely (Groopman 2008). Similarly, decision rubrics that guide information gathering help reduce the tendency to focus on only a small portion of the evidence (Larrick 2009). Rubrics can take the form of logic models

(e.g., Inputs→Throughputs→Outputs) to guide decision-making and problem solving generally (Goodman 1998; Zanardelli 2012), or provide criteria like the CAMEL framework (capital adequacy, asset quality, management, earnings, and liability) for the specific problem of evaluating loans (Heath et al 1998). Supports also exist to help practitioners appraise the quality and relevance of scientific evidence (e.g., Down & Black 1998). Nonetheless, there are two critical requirements for EBP-related decision supports to work well: 1) practitioners need to understand the quality of the evidence on which they are based in order to use them appropriately, and 2) they need to be updated regularly as new evidence emerges (Knappen 2013).

In fields where domain or technical knowledge is critical to high-quality decisions (e.g., medicine), decision supports typically are not meant for standalone use. Checklists and guidelines are "approximates" (cf. Simon 1990), rough blueprints to guide thinking and action (Gawande 2010). They do not generally substitute for education and training; instead they require that the user be trained in both their appropriate use and underlying evidence. Training aids the user in balancing fidelity to the guidelines with flexibility in the face of practice conditions (Gawande 2010; Sewell et al 2011). Without such training, practitioners may apply guidelines to incorrect situations or slavishly follow their recommendations in the face of contradictory local evidence (Gawande 2010). Even without special training, patient care protocol use (a form of guideline) has been found to improve the uptake of EB practice in critical care settings (Sinuff et al 2013), although staff in those settings may already have considerable professional education.

Specific decision processes may also help in the acquisition and effective use of evidence (Rousseau 2012). Yates's Cardinal Issue Perspective, for example, may aid

group decision-making, where relevant evidence is distributed, and stakeholders have diverse interests (Yates & Potworoski 2012). Likewise, decision reviews, which seek to introduce new information and perspectives before a decision is finalized, may help to identify biases and permit reconsideration. Groopman (2008:185-6) describes the practice of having several doctors independently read X-rays and record their findings into a database each day. After-actions reviews help workgroups learn and improve practice by evaluating decisions, projects, or interventions immediately after they occur (Ellis & Davidi 2005; Salas et al 2008). The use of decision aids and systematic decision processes appears to increase with a field's involvement in EBP, particularly via the efforts of institutions that incorporate EBP into their mission (e.g., the Agency for Healthcare Research and Quality's National Guideline Clearinghouse in the US and the National Clinical Guideline Centre in the UK). In sum, decision supports come in many forms and help with many aspects of EBP, but practitioners need to use them thoughtfully in order to improve decisions and practice outcomes.

II. Existing Research on EBP Implementation

This section reviews research on the implementation of evidence-based practice. Extensive research on this topic exists for professions with substantial EBP experience, particularly medicine, nursing, and allied health fields such as clinical psychology. Since EBP is a form of goal-related behavior, we organize our review using an integration of Ajzen's (1991) theory of planned behavior and Vroom's (1964) theory of workplace behavior. The integrated Ability, Motivation, Opportunity (AMO) framework is useful for describing workplace-related behavior (e.g., Hughes 2007; Petty & Cacioppo 1986).

This framework helps to shed light on why people do or do not adopt EBP as a function of their *ability*, *motivation*, and *opportunities* to engage in EBP-related activities.

Ability to Practice

Effective use of EBP requires the individual to possess both foundational and functional competencies. *Foundational competencies* are general skills and knowledge required to engage in all aspects of EBP. *Functional competencies* are specific skills and knowledge related to discrete EBP activities like evidence search and critical appraisal.

EBP's foundational competencies include the capacity for critical thinking and the domain or technical knowledge acquired through education and practice experience in a particular field (Sackett 2000). Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, analyzing, evaluating, and synthesizing information as a guide to belief and action (Facione & Facione 2008; Profetto-McGrath 2005). It reflects the capacity for higher-order thinking, including reflection on one's own thinking and experience, evaluation of information, and hypothetical thinking about alternatives. Because an individual's observations and mental models can be somewhat inaccurate or incomplete, practitioners who can attend to discrepancies and alternative mental models are better able to search and make sense of a problem space. Since individuals appear to have difficulty employing more than one mental model at a time, however, the ability to consider multiple mental models requires individuals to adopt a critical standard to avoid merely accepting the first mental model that provides a minimally satisfactory answer (Falcone 2004), the response known as satisficing (Simon 1990). In effect, critical thinking imposes standards on one's thinking in order to reduce

bias and distortion and increase the completeness of available information. Thus, it is likely to aid the EBP process of asking practice-related questions and adapting evidence to practice (Profetto-McGrath 2005).

Critical thinking is positively related to academic performance (Kowalski & Taylor 2009). Denney (1995) observed that it appears to increase with age, at least among educated people. Some evidence from nursing suggests that training in thinking processes can enhance critical thinking (e.g., Allen et al 2004). Conversely, when individuals are busy or otherwise overloaded cognitively, their ability to think critically can be impaired (DeNuys 2006). Low levels of critical thinking correspond to naïve realism (Lilienfeld et al 2008), where individuals unreflectively accept an initial mental model triggered by an experience as if there were no error in perception. Insufficient critical thinking is associated with a preference for intuitive decisions (Dawes 2008) and a preference for intuition over scientific evidence (cf. Highhouse 2008, Lilienfeld et al 2008).

Another foundational competency for EBP is domain or technical knowledge—i.e., specific knowledge and procedural skills related to a professional practice area, corresponding to the psychological construct of expertise (Ericsson & Lehman 1996). Important in its own right for attaining and sustaining a successful professional career, domain knowledge also facilitates the critical thinking underlying EBP, and the two may be mutually-reinforcing (Bailin 2002). Specifically, domain knowledge helps practitioners recognize incomplete information, evaluate evidence quality, and interpret new evidence (Ericsson & Lehman 1996). More generally, domain knowledge provides

the mental models that can facilitate appropriate inferences regarding problems and helps practitioners judge the relevance of evidence.

As a field adopts EBP, the domain knowledge that practitioners develop can evolve. Importantly, widespread adoption of EBP increases the likelihood that practitioners will have been disabused of inaccurate beliefs, especially when learners can think critically (Kowalski & Taylor 2009). For example, criminal justice professionals might begin to recognize that innocent people sometimes confess to crimes (Howard-Jones 2014). Given individuals' strong tendency to accept their initial mental model, evidence-based domain knowledge increases the likelihood that an initial mental model represents an accurate understanding of a problem. In sum, foundational competencies like domain knowledge are broad skills necessary to excel as a practitioner, especially an EB practitioner.

EBP's core functional competencies are associated with obtaining and applying the best available evidence, and are supported by the foundational competencies above. Individuals with strong functional skills are able to follow the core steps of EBP evidence use: Ask, acquire, appraise, apply, and assess (Sackett 2000). More generally, practitioners need to be able to identify their information needs as they arise, translate them into potentially answerable questions, and acquire the evidence needed to answer them. They must then critically evaluate its quality and applicability and use the highest-quality evidence to inform their actions.

Asking. Fundamental to formulating a question amenable to obtaining evidence is the aptitude for organizing problems that are ill-structured, that is, subject to several interpretations or involving choices that are difficult to specify (Chi et al 1988). To ask

tractable questions, practitioners must structure their thinking. Structured thinking enables them to ask questions for diagnosis (what is happening?), challenging assumptions (is what I know true?), intervention (how can we induce change?), or risk assessment (how certain is it that if we do X we get Y?). Asking such questions amounts to recognizing that uncertainty or ambiguity exists and can lead to the realization that adequate evidence is available, or that search is needed. The way a question is formulated impacts the process of acquisition or search. EBP question formulation often entails the use of templates that structure the question in order to facilitate search. In healthcare, PICO (Population-Intervention-Comparison-Outcome) is a common question framework (Richardson et al 1995), adapted for use in other domains like management (Rousseau & Barends 2011) and speech therapy (Schlosser et al 2007).

Acquiring. Acquiring scientific evidence typically entails a search process (Kaplan Jacobs et al 2003), commonly via online databases, a capability increasingly incorporated into professional education and development (Rousseau & Barends 2011; Straus et al 2005). This competency varies not only with education and training but with EBP support from the practitioner's work setting (e.g., librarians, search tools, etc.).

The extent of a field's EBP-related knowledge determines whether evidence exists in the form of systematic reviews and evidence summaries (Melnyk et al 2004). Considerable attention has been devoted to the methodology of systematic reviews and evidence summaries in order to enhance their quality (Haynes 2001; Tranfield et al 2003). Yet, their availability tends to be greater in fields with longer EBP experience, increasingly via new information technologies (e.g., smartphone apps for medical specialties; Heneghan & Badenoch 2006).

Less systematic attention has been given to the acquisition of local, stakeholder, or experiential evidence, although gathering these forms of evidence is typically an important part of the EBP diagnostic process via interviews, focus groups, etc. Acquisition can also entail running local experiments and using in-house databases for monitoring outcomes (Davenport et al 2010; Kovner et al 2009). As in the case of scientific evidence, the ability to acquire local evidence depends on the abilities of the practitioner (e.g., analytical; Davenport et al 2010) as well as local infrastructure like high-quality data and control systems (Davenport et al 2010) and senior leadership support for data acquisition (Kovner et al 2009).

Appraising. As noted, practitioners often have difficulty appraising evidence quality (Scurlock-Evans et al 2014), finding appraisal more difficult than acquisition (McCluskey & Lovarini 2005). For scientific evidence, this difficulty persists despite the existence of systematic reviews, since many reviews fail to qualify their conclusions based on evidence quality (Berkman et al 2013). A systematic review of training in critical appraisal concluded that appraisal skills of undergraduates improved more than those of medical residents (Norman & Shannon 1998), possibly due to the latter group's prior training or busy schedules and weak compliance.

Guidelines and checklists for appraising research quality improve the accuracy of scientific evidence appraisals (e.g., Down & Black 1998; Sackett 2000). In contrast, little guidance currently exists for appraising local evidence, practitioner experience, or stakeholder perspectives, leaving such appraisals up to individual judgment.

Applying. Having high-quality evidence is not equivalent to having answers. Practitioners have to interpret the available evidence for their own situations. When

existing evidence does not correspond to the situations practitioners confront, EBP becomes more difficult (Feinstein & Horwitz 1997; Goodman 1998). Additionally, the published scientific evidence on interventions may not be detailed enough to guide actual use. Glasziou et al (2008) reviewed 80 studies chosen for their importance to evidence-based medicine and found that clinicians could reproduce the particular intervention in only half.

Practitioners often need to adapt evidence from the simpler controlled conditions of scientific research to the more complicated conditions of practice. Alternatively, the best available evidence may come from an altogether different field or discipline. Patient safety practitioners learn from airline safety research (Denham, et al 2012). Veterinarians regularly adapt findings from human medicine (e.g., Roudebusch et al 2004). Scholars have noted that transferring knowledge between disciplines may require a different paradigm than creating new knowledge (Watson & Hewitt 2006), however, and it also may require different practitioner skills.

Assessing. Once an action has been taken based on evidence, it is necessary to evaluate the outcome. However, meaningful outcome assessment requires the practitioner to prepare in advance by obtaining a relevant and reliable baseline measure (e.g., pre- and post-test measures of rates of infection, customer complaints, employee satisfaction or retention). The need for assessment applies both in the application of scientific evidence and in circumstances where the practitioner made a decision when scientific or local evidence regarding a problem were unavailable. In the latter case, the practitioner can rely only on the last step of the EBP process: assessing the outcome. By providing the practitioner with feedback in the latter case, this last phase of the EBP process permits

valid learning to occur based on experience. Overall, functional competencies allow practitioners to engage in all relevant aspects of EBP, from asking questions to assessing outcomes.

Measuring These Functional Competencies. The importance of assessing EBP proficiency is demonstrated by performance variability in fields that lack standards and required competencies, like fingerprinting and criminal profiling (Lililienfeld & Landfield 2008). In contrast, over 100 instruments exist to evaluate the functional competencies in medical students and post-graduate trainees (Shaneyfelt et al 2006), although less attention has been given to how to best help practitioners acquire these specific skills. The FRESNO test, which assesses performance of each component of EBP rather than relying on self-reports, is widely used in evaluation (McCluskey & Bishop 2009). As EBP becomes more sophisticated within a given discipline, additional functional skills may become important, including participation in research (e.g., Scurlock-Evans et al 2014). At the same time, training in evidence acquisition and use is not likely to lead to actual behavior change unless individuals are motivated to do so (McCluskey & Lovarini 2005).

Motivation to Practice

Motivation, the drive to engage in a certain behavior, is a function of three individual beliefs (Ajzen 1991). *Behavioral beliefs* represent a favorable or unfavorable attitude toward the behavior; *perceived behavioral control* reflects an individual's belief that he or she is capable of the behavior; and *normative beliefs* reflect perceived social norms regarding the commonality of the behavior. The individual's intention to perform a

behavior generally is expected to be strongest when all three beliefs are high (Ajzen 1991).

Behavioral beliefs reflect the extent to which a behavior is seen as beneficial. The appeal of EBP has been linked to beliefs in its benefits (Aarons 2004). Practitioners who possess EBP-related knowledge are more likely to see it as beneficial (e.g., Jette et al 2003; Melnyk et al 2004). Where introduction of EBP economically or psychologically costs the practitioner in some fashion, it is more likely to be resisted (Ajzen 1991). Simply stopping a non-evidence based practice tends to be more difficult than replacing it with an evidence-based practice that brings the user benefits (Bates et al 2003). For example, managers tend to resist following structured hiring practices that simply reduce their control over who gets hired (Bozionelos 2005).

Such "costs" to the practitioner often make higher-level intervention and more complex implementation processes necessary to effect a transition to EBP (Bates et al 2003). Having an EBP mentor increases its perceived benefits, knowledge, and practice (Melnyk et al 2004). Ties to favorable EBP opinion leaders outside the organization also increase its perceived benefits and increase people's openness to innovation, a disposition that contributes to positive EBP attitudes (Aarons 2004). Older practitioners who came of age before EBP tend to be more skeptical and have different notions of evidence than younger practitioners (Aarons & Sawizky 2006), which may contribute to the finding that experience is negatively related to guideline compliance (Choudhry et al 2005). Whatever their source, then, behavioral beliefs that EBP is beneficial contribute to its active adoption.

Perceived behavioral control reflects confidence in one's ability to manifest a behavior. As a form of self-efficacy, perceived behavioral control has been linked to EBP behaviors (Beidas & Kendall 2010; Salbach et al 2007). Given that EBP involves self-directed, lifelong learning (Sackett 2000), self-efficacy is an essential component of effective EBP application. Evidence concerning the effectiveness of self-efficacy training programs on EBP is mixed. Some EBP training programs have been shown to increase EBP-related self-efficacy (Kiss et al 2010; Salbach et al 2007), while others increase EBP skill without any change in self-efficacy (e.g., Speck et al 2013). Education in EBP does typically increase student knowledge and self-perceived skills (e.g., Haas et al 2012). Ongoing supervisory support following EBP training appears to heighten these effects (Beidas & Kendall 2010; Hennggler et al 2010). In sum, perceived behavioral control is related to training and support that shapes practitioners' abilities, thus promoting their self-efficacy as EB users.

Normative beliefs reflect the extent an individual believes that a specific behavior is normal or common within a reference group. Behaviors seen as normal, in turn, are more likely to be adopted by others (Ajzen 1991). Faced with uncertainty, for example, professionals tend to rely upon existing norms (Montgomery & Oliver 1996), which may or may not support EBP. Such norms can reflect an individual's education and training as well as the education and training of coworkers. In workgroups with shared beliefs that EBP is difficult, an individual is less likely to perceive EBP as normative (Dalheim et al 2012).

EBP-related norms, as well as other motivational beliefs, are shaped by broad organizational and/or institutional cultures. When first adopted within a field, EBP's

emphasis on scientific evidence and evidence quality can seem to dismiss practice experience. In its early years, for example, evidence-based medicine's protocols and guidelines were ridiculed as "cookbook medicine" (LaPaige 2009). In the same way, EBP's introduction can initially threaten a practitioner's professional identity (e.g., "you think police are corrupt," Sherman 2002) or a manager's sense of self as a competent decision-maker (Highhouse 2008). A particularly important countervailing force is leadership support, which helps to legitimate EBP and explain its complementarity with practitioner experience (Melnyk & Fineholt-Overholt 2004; Melnyk et al 2012). Similarly, the support of professional peers encourages the uptake of innovations generally, and EBP in particular (Ferlie et al 2006), as do the views of pro-EBP opinion leaders (Soumerai et al 1998).

Structural arrangements can also shape beliefs in the commonality of EBP. For example, roles that encourage practitioners to participate in or conduct their own research promote pro-EBP norms (Kothari & Wathen 2013; Melnyk & Fineholt-Overholt 2011). Such norms are more likely to be weak or absent when leaders and peers reject EBP or other situational supports are absent. Lastly, research on diffusion of innovation has suggested that members of a profession may not adopt new norms and transition to new practices for a generation (Rogers 1995), and such generational differences may characterize EBP. In sum, normative beliefs trace to an array of organizational and/or institutional factors and can exert a strong influence on the decision to engage in EBP.

Opportunity to Practice

Opportunity to practice refers to perceptions regarding the support that the practice context provides for engaging in EBP. Having the ability and motivation to engage in EBP is less likely to lead to actual behavior unless individuals also experience the opportunity to practice (Jette et al 2003). A sense that practice conditions interfere with EBP is often referred to as the "reality of practice" (Mantzoukas 2008; Novotney 2014). The opportunity to practice EBP is linked to on-the-job autonomy and flexibility (Belden et al 2012). Time pressure is negatively related to EBP (Dalheim et al 2012; Jette et al 2003) and increases reliance on intuition (Klein et al 2001). Lack of authority to act on evidence creates another barrier (Dalheim et al 2012).

Complexity and variability in practice conditions also impose perceived barriers. Facing multiple interrelated problems rather than only one (e.g., a depressed alcoholic patient versus simply a depressed patient) can make it difficult for practitioners to fit the evidence to practice conditions. Additionally, the opportunity to practice can be constrained by large heterogeneous caseloads, limiting the accessibility of relevant evidence and decision supports (Hoagwood et al 2001), and by a lack of supervisory support (Hoagwood et al 2001; Melnyk, et al 2004; 2012). A particularly important factor in the opportunity to practice is psychological safety, the shared belief among workgroup members that the setting is safe for risk-taking. Psychological safety increases the likelihood of engaging in the experiential learning needed to adapt evidence-based practices to the work setting (Tucker et al 2007).

The perceived barriers imposed by practice conditions can change as practitioners gain experience with EBP. More skilled practitioners perceive fewer barriers to practice than do less-skilled (Melnyk et al 2004), suggesting a link between EBP self-efficacy and

perceived opportunities to practice. Experience with EBP can help individuals and their organizations learn to adapt evidence to practice and develop decision supports that ease evidence use (Zanardelli 2012). Barriers to EBP practice may thus be especially salient in EBP's initial implementation phases. Wright (2013) observed that volunteers given release time and mentoring still had problems obtaining research articles and often felt they lacked both the time and work space to reflect on, process, and use the information obtained to question practice. Such problems may stem from a lack of autonomy, high workloads, and low skill in searching and reflection. Swain et al (2010) found that 80% of mental health agency sites that used an implementation toolkit along with EBP consultants or trainers sustained EBP after two years, though effects varied with the availability of financing, training, and leadership support. Qualitative research on factors facilitating the expansion of evidence-based practices suggests that leadership support, the involvement of other specialties in EBP, and demands from an organization's performance management system affect perceived opportunities for EBP (Tierney et al 2013).

Institutional supports beyond the work setting can provide infrastructure that increases perceived EBP opportunity. The development of online search portals and research databases (e.g., the Cochrane Library) has advanced professionals' access to scientific research over the last decade. In the early years of EBP, information in such databases was largely limited to questions about what works. In recent years, systematic reviews using new approaches have emerged that address a broader array of questions including cost-effectiveness, risks associated with interventions, and implementation concerns (Lavis et al 2005). This expansion of review topics is aided by the development

of practice-oriented research investigating the practice conditions that serve as EBP barriers and facilitators (Castonguay et al 2013). In sum, we now have a good understanding of the factors that increase opportunity to practice, as well as the fact that, without the opportunity to practice, the ability and motivation to practice may not be enough.

III. Evidence for EBP Effectiveness

EBP's guiding principle is to rely on high-quality evidence rather than tradition or authority. This means that collecting evidence on the effectiveness of EBP is essential. Although we attempt an overview of the evidence amassed to-date, a full review is beyond our scope. Additionally, our review reveals that evaluating EBP effectiveness is no easy matter, so much more evidence remains to be gathered.

In evaluating EBP, it is important to first recognize that the differences between practice conditions and the conditions under which the original evidence was obtained can have serious implications. It is widely recognized that effect sizes from controlled studies tend to decline in field applications; situational demands, problem complexity, and individual practitioner differences all play a role (Weisz et al 2013).

Studies of EBP effectiveness differ considerably in focus and operationalization. EBP has been operationalized variously as adherence to guidelines and checklists (Haynes et al 2009), training in evidence search (Coomersawamy & Khan 2004), avoidance of dysfunctional practices (Ziewacz, et al 2011), and effects of evidence-based interventions under "real world" conditions (Michelson, Davenport, Dretzke, Barlow & Day, 2013). Local evidence like patient data and organizational outcomes are one source of effectiveness criteria, researcher-generated assessments another.

As an indicator of EBP, decision supports like guidelines have shown widely beneficial effects. For example, documentation of nursing interventions based on evidence guidelines was positively associated with home care patients' health (Doran et al 2014). The use of checklists has been found to improve uptake of evidence-based practices and produce greater fidelity in their application (Arriaga et al 2003), resulting in improved outcomes (Gawande 2012; Haynes et al 2009).

When effectiveness is operationalized in terms of the impact of specific practices, evaluation studies refer to these practices as including "evidence-based," "evidence-informed," or "best" practices. It is important to closely examine studies of so-called best practices because that label is sometimes misleadingly applied to popular practices lacking an evidence base (Marchington & Gruglius 2000). In the case of evidence-based "best" practices, these refer both to discrete interventions like cognitive behavioral therapy for obsessive-compulsive disorder (Hofmann & Smits 2008) and bundles of mutually supportive practices as in adult offender rehabilitation (Cullen 2013). In investigating the effects of discrete practices, it is important to consider the conditions of their use in order to gauge whether co-occurring factors influence these effects. Studies of discrete practices in isolation may be misleading if their success is tied to bundles of mutually reinforcing practices. For example, although criminal justice research in the late 20th century commonly concluded that rehabilitation of criminals did not work, a fresh look at the evidence revealed that a systematic approach using a combination of practices led to a high success rate (Cullen 2013). Sets of practices including treatments tailored to offenders' demographic and risk characteristics, for example, were broadly effective. Whether as single practices or bundles, such interventions typically are evaluated using

various forms of controlled designs, with usual treatment or care as the comparison. Such evaluations form the basis of meta-analyses and systematic reviews to synthesize findings for practitioners, e.g., the meta-analysis of studies contrasting RCTs of EBPs with usual care (e.g., youth psychotherapy, Weisz et al 2013). Although effect sizes of EBP are widely found to be greater than usual care, cost and effort are considerations in justifying change (Weisz et al 2013). Additionally, as Weisz and colleagues noted, studying "usual care" is valuable in understanding its conditions and which of its features already work. Some of its features might become evidence-based practices if studied more systematically.

Intervention compliance (i.e., the fidelity with which evidence-based practices are followed) is another concern when evaluating EBP effectiveness. The effects of fidelity differ from those of implementation. The former reflect controllable compliance with practice requirements, while the latter refer to the circumstances of implementation beyond the practitioner's control (e.g., treatment volume). Drops in effect sizes from research studies to field applications can be due to either (Weisz et al 2013),

Evaluation of both EBP itself and fidelity are essential because a bandwagon effect has led many organizations to adopt the label "evidence-based' while ignoring its key tenets. For example, insurance companies and regulators sometimes impose "evidence-based" reimbursement schedules that are based on out-of-date or low-quality evidence (Steinberg & Luce 2005). In other instances, organizations may attempt to confer legitimacy to programs and policies by invoking the label of EBP (Jacobs & Manzi 2013), or mandate compliance with guidelines based on weak evidence (Knappen 2013). Creating guidelines from weak evidence is a form of early over-adoption since it

occurs in advance of good evidence and risks undermining belief in EBP's benefits, thereby creating reservations and resistance (Ferlie et al 2005). Organizations that seek legitimacy from EBP without making a substantive commitment to its tenets tend to share one feature: they fail to square their purportedly "evidence-based practices" with local evidence. As noted, local evidence is needed to evaluate whether intended effects actually occur and how they impact stakeholders. A full evaluation of EBP, then, must recognize several complexities and controversies, but careful study does begin to suggest that EBP can improve practice in several ways.

IV. Criticisms of EBP

Like any new idea implying fundamental change, EBP has its critics. Many criticisms have been debunked based on underlying misinformation or misunderstandings (Gibbs & Gambrill 2002; Lillienfeld 2014), whereas others have proven more substantial. We summarize the former first. A common claim is that EBP represents a one-size-fits-all approach to practice decisions. Successful adoptions of EBP, however, have shown that EBP instead involves substantial adaption of evidence to fit with local conditions and practitioner judgment (Lilienfeld et al 2013). Additionally, the claim that EBP stifles innovation does not appear to be supported, as reviews describe how EBP helps diffuse effective new practices that might otherwise have spread more slowly (Grol & Grimshaw 2003; Lilienfeld et al 2013). In contrast to the claim that EBP relies solely or primarily on RCTs, its review syntheses and evidence summaries incorporate the diverse array of studies relevant to practice questions (Lilienfeld et al 2013; Petticrew & Roberts 2003). In this regard, EBP has also led to new forms of research, often descriptive in nature, to provide more readily useable evidence to practitioners (e.g., Woolf 2010).

At present, other criticisms appear to have more support. First, despite its emphasis on improving the decisions professionals make, EBP is criticized for its heavy reliance on human judgment. As Knappen (2013) describes in her study of guideline development, evidence search and guideline creation are not automated processes. The choice of which evidence to use may still be influenced by a decision-maker's biases and political interests. Certain evidence may be preferred because of its implications for practice or action (Revkin 2014). The potential political and judgmental influences on evidence choice, however, raises concerns that EBP does not or perhaps cannot provide a fully rational basis for action, which points to the importance of ongoing EBP evaluation.

Second, the guidelines that began as supports for EBP can become ends in themselves. Authorities may demand that guidelines be written when scientific evidence does not exist or is relatively weak (Knappen 2013). Such demands can result in guidelines based purely or primarily on opinion. Transparency regarding the search and selection criteria used in guideline development provides some protection from arbitrariness, as does the regular evaluation of outcomes resulting from their use. Conversely, one danger in opaque guidelines is that they can undermine the decision processes they were originally intended to support. The routine use of checklists in aviation, for example, has revealed that their effectiveness can be impeded by memory problems and workarounds. For guidelines and other decision supports to be effective, they need to be evidence-based and integrated into the sociotechnical system in which the practitioner works (Degani & Weiner 1990). We regard these and other criticisms of EBP as important areas for future EBP research.

V. Patterns Observed in EBP Research

Our review of research on EBP implementation leads us to describe a number of broad patterns we observe in the literature. These patterns highlight both "lessons learned" from the past and important issues to investigate in the future.

Practitioners Need Guidelines for Appraising All Forms of Evidence

Appraising the quality of local evidence, stakeholder concerns, and practitioner judgment remains difficult. As noted, EBP's initial (~1990s) focus on scientific evidence has broadened to take on-going practice evaluation, local evidence, and stakeholder perspectives more seriously. How practitioners should evaluate these forms of evidence, however, remains largely ignored. The development of guidelines for appraising the quality of non-science-based evidence is particularly important given the limited availability of scientific knowledge in some domains. In addition to needing frameworks to evaluate whatever kinds of evidence they use, practitioners need to learn how to make decisions effectively when evidence is limited or absent.

EBP Implementation Occurs Both Top/down and Bottom/up

EBP typically evolves over the course of its implementation. From a top/down perspective, the initial emphasis tends to be on formal programs for developing individual practitioner knowledge and skills, particularly regarding the use of scientific evidence. If sustained, engagement in EBP tends to lead to greater codification of decisions and practices where high-quality information is available. As EBP becomes even more widespread, collectives like professional groups tend to advocate for greater use of guidelines, perhaps reflecting the greater capacity of collectives than individuals for overcoming decision-making biases (Heath et al 1998). As practice outcomes become more salient, stakeholder demands for accountability can promote a transparency that

improves both the quality of individual practice decisions and the available evidence (Dogherty et al 2013). In addition, as a field's use of EBP evolves, new resources and supports emerge; institutional supports like training programs and summaries of pre-appraised scientific evidence, for example, create further opportunities and reduce barriers for practice.

From a bottom/up perspective, opportunities for practitioners to engage in EBP increase both as they become more skilled and as EBP becomes more familiar to the people with whom they work. Similarly, as work groups address recurrent problems through evidence-based routines and guidelines, more time becomes available to seek proactive solutions for novel problems (Goodman & Rousseau 2007). These are just a few examples of the general point that EBP implementation is a long-term developmental process involving both bottom/up and top/down components.

Effective EBP Implementation Requires Evidence-based Change Management

As noted, the successful implementation of EBP requires the adoption of a constellation of new tools, practices, and behaviors. In other words, it involves organizational change and benefits from effective change management. Some efforts to implement EBP such as the proliferation of guidelines without appropriate training and support have not fully recognized the need for change management, prompting the same kinds of implementation barriers observed for other organizational changes (Goodman & Rousseau 2007; Shortell et al 2007). These barriers are surmountable, however, as attention to organizational variables like leader support and organizational climate contribute to effective EBP implementation across fields (Aarons & Sawitzky 2006; Sherman 2002). Practitioners can learn from past implementation successes and failures.

Interventions targeting the development of leader and practitioner commitment to EBP are particularly likely to help (Aarons 2006; Wakefield et al 2003).

EBP Creates New Knowledge

EBP has prompted more attention among scientists to synthesis and conditions of use. Synthesis involves both integrating findings across research areas and transforming information into intervention guidelines. For example, a synthesis of over 50 elements in various EBP protocols for children with anxiety revealed that seven key elements effectively summarized them (e g., exposure, cognitive restructuring, modeling, etc.; Chorpita et al 2011). Additionally, many of the problems that practitioners face across disciplines have commonalities, allowing evidence-based, problem-specific guidelines to be used in multiple professions (Thyer 2002). Although new processes may be needed to test the applicability of guidelines across practice domains, such synthesis offers the potential for accelerating the transition of science-based knowledge into practice across professions (Watson & Hewitt 2006).

EBP has also led to a new kind of research, prompted by increased collaboration between producers and users of evidence. Practice-oriented research examines the application of scientific evidence in everyday clinical practices. For example, it investigates how much an intervention's effectiveness depends on practitioners' compliance with its specific features. Practice research has led to some important findings, e.g., that tight control over blood pressure is important to diabetics' health, while tight control over blood glucose is not (Giménez Pérez et al 2005). Such findings help practitioners direct patients' health management efforts.

Another area of practice research concerns the practice conditions that can facilitate or impede the effective use of EBP. For example, physicians who are aware of research highlighting the dangers of overprescribing antibiotics might still tend to overprescribe to patients at risk for infections. Practice-oriented research (e.g., Kumar et al 2003) has shown that they do so with patients they are unable to follow up. This research led to the development of a blood test to determine on-the-spot whether antibiotics were appropriate (Aabenhus et al 2014). Such research makes it easier for practitioners to act on and comply with evidence-based practices and guidelines (Castonguay et al 2013). In doing so, it can help resolve some of the uncertainty that emerges when translating scientific evidence into practice and help overcome practitioners' skepticism of academically-oriented research (Lilienfeld et al 2013). Practice-oriented research is part of a zeitgeist anticipated by Simon (1996) in his book *The Sciences of the Artificial*, explicating how theory and practice can be considered together to generate both better-informed science and more effective practice. Given institutional constraints in both academia and the professions, we encourage systematic study of the conditions that facilitate or impede practice-oriented research.

VI. Future Research

Many issues surrounding EBP could benefit from additional research. The first issue that we note here concerns practitioner judgment, where research has raised more questions than answers. EBP advocates argue that the strength of EBP is the complementarity between judgment and systematically gathered evidence, with neither replacing the other (Sackett 2000). As noted, however practitioner knowledge and effectiveness in several EBP fields does not seem to improve with experience (Dawes

2008; Clement 2013; Choudhry et al 2005). Yet, we do not know how evidence-based the practice of these practitioners has been. Since experience coupled with feedback can lead to improved performance, the expanded use of feedback in EBP, as well as its impact on practitioner judgment over time, warrant study to evaluate feedback's effect on the knowledge and effectiveness of individual practitioners as well as their organizations. In sum, it would be helpful to better understand the conditions under which feedback increases the complementarity between professional judgment and systematically gathered evidence.

We also need to better understand how practitioners can make high-quality decisions under uncertainty. It is ironic that EBP calls attention to indeterminancy, i.e., the unknowns and uncertainty characterizing many real-world situations. Strictly speaking, incompleteness characterizes almost all knowledge—from human medicine, to veterinary science, to clinical psychology, to management. Indeterminacy in the context of EBP can result from gaps in the evidence base (Knaapen 2013), existing evidence that does not specifically address the current situation (Goodman 1998: 13), or an imperfect mastery of available evidence (Groopman, 2008: 152). Langer's (1989) research suggests that incomplete knowledge is not a void about which nothing can be said, however. Rather, identifying unknowns can help to make decisions more mindful. Psychological research could focus more attention on how decision-makers and practitioners might cope with indeterminacy more effectively. Research is also needed on decision-making under circumstances of true novelty: a previously unknown disease, a drastic change in climate, or a set of challenging conditions with unknown interactions (e.g., patients with complex diagnoses). Trial-and-error (or-learning-by-doing) has been suggested as an appropriate

response to these “unknown unknowns,” and organizational researchers have begun to look at how people do that (Weick & Sutliffe 2011). Nevertheless, much remains unknown about how to cope effectively with true novelty.

Psychological research is needed to better develop tools that can overcome the limitations of human judgment. Fields using EBP have increasingly adopted decision supports, despite relatively little psychological research to inform their features, structure, modality, or delivery. As Heath, Larrick and Layman (1998) have noted, organizations may do a better job of debiasing decisions than individuals can. Attention to work setting decision practices provides opportunities for psychologists to investigate the routines and protocols that can improve decision quality (e.g., Mannes et al 2014). In sum, it would be helpful to know more about the potentially beneficial connections between psychological research and the decision supports, tools, and routines that facilitate EBP.

EBP research is increasingly focusing on levels of analysis higher than the individual (Stevens 2013). For example, our review of the existing empirical literature highlights the critical importance of leadership support and psychological safety to EBP’s effectiveness in organizations. Many other organizational differences may also contribute to EBP’s effectiveness, e.g., the Magnet status of hospitals (Melnyk et al 2004). However, systematic organization-level research on factors that facilitate or impede EBP is limited. One important condition that research might consider is the uniformity of the problems or patient conditions that an organization faces. Hospitals with higher volumes of patients with certain conditions, for example, tend to be more effective in treating them than hospitals with lower volumes (Halm et al 2002), perhaps in-part because the former have more often established evidence-based protocols for their treatment. Similar effects

of problem familiarity may be important in other applications of EBP. Thus, understanding organization-level contributors to EBP remains a priority.

Research is also needed to advance understanding on the role of professions in encouraging EBP. Professions provide both the training and the infrastructure that facilitates practice, and they contribute to the formation of professional identities that incorporate systematic use of evidence and attention to its quality. Indeed, professions could contribute to the diffusion of EBP in multiple ways, shaping practitioners' knowledge base, providing them with tools (e.g., pre-appraised evidence, summaries, guidelines), and cultivating their professional identities as evidence-based practitioners. The last may be particularly important, as identities can help individuals persist at difficult behaviors in unsupportive environments (Trope & Lieberman 2010). Specifically, identity leads to the pursuit of specific goals that sustain the identity, and contribute to what Thompson and Bunderson (2003) have referred to as an ideological contract, a mental model regarding a valued aspect of people's employment. Professions that cultivate EBP-supportive identities in their members may be more likely to foster EBP despite challenges in local organizational conditions. At this point, however, these possibilities are just that; further psychological research could greatly enhance our understanding of how professions influence EBP.

A final, fruitful research area is the complex relationship between values and EBP. Critics have argued that EBP is not entirely evidence-based; rather, it involves the commitment to a particular set of values (e.g., rationality, empiricism, transparency; e.g., Webb, 2001). This claim raises important research questions that have received scant attention. First and most obviously, which values contribute to practitioners' adoption

and use of EBP? Which values contribute to its rejection? Research that tackles these questions could study individuals engaged in the EBP process or whole disciplines that have collectively embraced or resisted EBP. Second, how do a practitioner's values interact with the evidence during an evidence-based decision? Do particular values lead to the use of particular evidence? How do values adjudicate when the evidence is contested? How do values contribute to the tradeoffs that practitioners must make between evidence high in internal versus external validity? Finally, research could fruitfully investigate the opposite causal path: the influence of EBP on values. Empirical research on value-based decisions (e.g., the choice between honesty and deception) has grown exponentially in the past few decades (Tenbrunsel & Smith-Crowe 2009). How has the evidence contributed to our understanding of values? Finally, can evidence really change values, or are values somehow resistant to evidence (Skitka et al 2005)? These and many other questions about the complex relationships between values and evidence await future research.

VII Conclusion

EBP has emerged in diverse fields over the past thirty years. We have good evidence that effective EBP adoption depends on the ability, motivation, and opportunity of the individual practitioners involved and the support their professions and work settings provide. At the same time, experience with EBP highlights the critical contributions psychology has made and still needs to make so that the growing body of available evidence can be mindfully used, and so practitioners can respond mindfully even when evidence is absent.

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