FOCAL ARTICLE

Evidence-Based I–O Psychology: Not There Yet

ROB B. BRINER
University of London

DENISE M. ROUSSEAU
Carnegie Mellon University

Abstract

Evidence-based practice is now well established in several fields including medicine, nursing, and social policy. This article seeks to promote discussion of whether the practice of industrial–organizational (I–O) psychologists is evidence based and what is needed to make I–O psychology an evidence-based discipline. It first reviews the emergence of the concept of evidence-based practice. Second, it considers the definitions and features of evidence-based practice, including evidence-based management. It then assesses whether I–O psychology is itself an evidence-based discipline by identifying key characteristics of evidence-based practice and judging the extent these characterize I–O psychology. Fourth, some key strategies for promoting the use of evidence in I–O psychology are considered: practice-oriented research and systematic reviews. Fifth, barriers to practicing evidence-based I–O psychology are identified along with suggestions for overcoming them. Last is a look to the future of an evidence-based I–O psychology that plays an important role in helping consultants, in-house I–O psychologists, managers, and organizations become more evidence based.

Most industrial–organizational (I–O) psychologists would confidently claim that their practice is based on evidence—in particular, psychological research findings. And, in a general sense, that's more or less true. The founders of our field, including James McKeen Cattell and C. S. Myers, originated the application of systematic research to workplace issues and in doing so established psychological science itself in both the United States and Britain. Most of what we do in I–O psychology draws on or is at least informed by some type of evidence whether that be research published in journal articles or workforce facts and metrics collected through practice.

Look a bit deeper, however, and things aren't quite so straightforward. Practitioners of all stripes—from the snake-oil salesperson with a cure-all remedy to the family physician or the personal trainer to the psychic who communicates with the dead—claim to have evidence for what they do. Claims to use evidence are therefore meaningless in themselves. However, the hallmark of any profession is the existence of an agreed-upon core of knowledge and means for its continued generation and refinement (Friedson, 1986). Unlike common sense or general knowledge claims, it's the nature and quality of the particular evidence a profession's practitioners use that distinguishes them from the layperson—or the snake-oil salesperson. In the case of professions such as I–O psychology, medicine, education, or engineering,

Correspondence concerning this article should be addressed to Rob B. Briner.
E-mail: r.briner@bbk.ac.uk
  Address: Department of Organizational Psychology, Birkbeck College, University of London, Malet Street, London WC1E 7HX, United Kingdom.

much of their value and legitimacy depends on the extent a scientific evidence base informs and is used in practice.

In many areas of I–O psychology, large bodies of reasonable quality evidence are continually refined and critically evaluated. The expanded use of meta-analysis in I–O psychology indicates the value it places on systematic evidence, cumulative research findings, and critical analyses (e.g., Judge, Heller, & Mount, 2002; Judge & Illies, 2002). Similarly, the value of the structured interview over its unstructured counterpart has been affirmed repeatedly over decades (McDaniel, Whetzel, Schmidt, & Maurer, 1994); the I–O psychology practitioner is probably one of the more consistent voices in industry to buck the populist tide that continues to favor unstructured techniques. On the other hand, I–O psychology does not always resist more ''pop-psychology'' topics such as emotional intelligence. Although introduced to social science through work by Mayer and Salovey (1997), the type of claims made in Daniel Goleman's (1998) popular book and other popular accounts of the topic are clearly questionable (e.g., Cherniss, 2010; Locke, 2005).

In other areas, the evidence familiar to I–O psychologists may appear more static, taking the form of received wisdom. For example, consider the notion that accurate feedback is good (i.e., at least if task related; cf., Kluger & DeNisi, 1996). Still, uncritical reliance on received wisdom is problematic: Cognitive and educational research demonstrates that feedback too early in the learning process can undermine the mental processes needed to acquire certain skills (Merrill, Reiser, Merrill, & Landes, 1995; VanLehn, Siler, Murray, Yamauchi, & Baggett, 2003). Given that new information replaces or refines existing information, the evidence base we use is inevitably a work in progress.

I–O psychologists have expressed concerns about the existence, relevance, and use of evidence in the profession. A recent survey of SIOP members (Silzer, Cober, Erickson, & Robinson, 2008) revealed that a majority of respondents (who were largely practitioners) held the opinion that practice is ahead of research in 14 content areas, including coaching, talent management, and employee relations, whereas science was ahead in only two (measurement and statistics, and job analysis). In five areas, practitioners and nonpractitioners held opposite views. Practitioners saw practice ahead and nonpractitioners saw science ahead in recruitment, performance management, organizational culture, training and development, and employee engagement. A plurality shared the view that science is behind practice in its choice of research topics and that practice-relevant research was sparse. Finding perceived gaps on both sides is not so surprising. In I–O psychology scientists and practitioners each prize their own knowledge sources over the other's, raising concern regarding the quality of the interface between the two. In turn, these findings raise questions about the extent the science and practice of I–O psychology is synergistic in a fashion that would promote evidence-based practice.

Another expression of this concern can be found in many of this journal's focal articles, as they are precisely about examining the concepts and evidence underlying our practice in a range of areas including the identification of discrimination in workplace evaluations (Landy, 2008), executive coaching (McKenna & Davis, 2009), job performance ratings (Murphy, 2008), employee engagement (Macey & Schneider, 2008), executive selection (Hollenbeck, 2009), and leadership development (McCall, 2010). These articles have created lively, important, and healthy debate.

Many professions have expressed such concerns and pursued ways that evidence can better inform practice. One of the most recent and widespread ideas used to frame solutions to this problem is the subject of this focal article: evidence-based practice. For some years, evidence-based practice has evolved as a way of identifying and developing techniques and processes

that practitioners can use to incorporate evidence from various sources into their everyday work. Our purpose here is to promote discussion and further development of the practice of I–O psychology as an evidence-based discipline.

This article is structured as follows. It reviews the emergence of evidence-based practice in medicine, social policy, and more recently management, and considers the definitions and features of evidence-based practice, including that of evidence-based management (EBMgt). It assesses whether I–O psychology is itself an evidence-based discipline by identifying key characteristics of evidence-based practice and gauging the extent these characterize the practice of I–O psychology. By identifying the key contributions of practice-oriented research and systematic reviews to evidence-based practice, this article details how these applications promote evidence use in practice, and describes barriers to evidence-based approaches to I–O psychology practice along with suggestions to overcome them. Last, we look to the future and consider the prospects for an evidence-based I–O psychology that helps managers and organizations themselves become more evidence based.

Emergence of Evidence-Based Practice and Management

The notion of using scientific evidence to inform professional practice is not new. At the same time, neither is the observation that from medicine to management much practice is not related to evidence in any significant way. This tension found expression in a *British Medical Journal* editorial reporting, ''only about 15% of medical interventions are supported by solid scientific evidence'' (Smith, 1991, p. 798).[1] This article marked a turning point in the development of evidence-based medicine. More than other professions,

medicine and its allied disciplines, such as nursing, have engaged the challenge of using scientific evidence to better inform practice.

In medicine and nursing, the notion of being evidence based is now well established. It forms part of the basic training of nurses, physicians, and other professions allied to medicine. Medical research and its funders, in addition to producing new basic science, also put considerable resources into research on effective practice, including how to best treat specific types of patients, as well as in conducting systematic reviews of research literature to answer practice-relevant questions. Systematic reviews are essentially literature reviews that address a very specific review question using an explicit, systematic methodology to identify, select, and pull together findings from a range of studies to draw conclusions about what is known and not known about the question. (Meta-analyses are one type of systematic review.) Systematic reviews are in essence pieces of research on existing research.

The findings of both patient-oriented studies and systematic reviews are then translated into tools and decision-making aids such as checklists and patient-care protocols used by medical clinicians. Later, we will talk about how the ''functional I–O psychology equivalents'' of these can promote our own evidence-based practice.

In the late 1990s, the term ''evidence based'' became paired with other nonmedical disciplines and practice areas, including education, social work, criminology, and government policy making. Over a decade ago, Briner (1998) made what appears to be the first attempt to suggest that some ideas from evidence-based medicine could be adapted to the practice of organizational psychology. These same ideas have been applied more recently to the practice of management. In 2006, two key publications (Pfeffer & Sutton, 2006; Rousseau, 2006) stimulated discussions of EBMgt and how it might be used in business school teaching (Rousseau & McCarthy, 2007), its limitations and potential dangers (Learmonth &

---

1. It may be possible and potentially useful to make a similar estimate of the percentage of I–O psychology practices that are based on solid scientific evidence.

Harding, 2006; Morrell, 2008), the evidence for EBMgt (Reay, Berta, & Kohn, 2009), and its meaning and definition (Briner, Denyer, & Rousseau, 2009).

In the last 2 decades, considerable soul searching by management scholars over the research–practice ''gap'' or ''divide'' has raised difficult questions about why the gap exists, how to bridge it, and the value and purpose of management research itself (Hambrick, 1994; Rynes, Brown, & Colbert, 2002). Although I–O psychology is not immune to such concerns, in other respects I–O psychology would seem to have avoided the criticisms levied on other social sciences (Anderson, Herriot, & Hodgkinson, 2001). Anderson and colleagues used the label ''pedantic science'' to describe those research domains driven by theoretical concerns and fastidious analytics while ignoring real-world issues.

I–O psychology might seem an unlikely candidate for the pedantic label. Even when conducted by university-based scholars, I–O psychology research is rooted in issues and problems arising in organizational settings. Given that its graduates work in industry as consultants or in-house I–O psychologists, our discipline would seem to be an exemplar of ''evidence-based'' practice. The research-intensive training of I–O psychologists and our often close-to-practice research should make reliance on research evidence almost second nature. Indeed, it is probably no coincidence that many advocates of EBMgt (including the present authors) are also I–O psychologists (e.g., Wayne Cascio, Edwin Locke, and Ed Lawler).

So how can we explore the truth of I–O psychology's claim to engage in evidence-based practice? On one hand, I–O psychology seems to embody Anderson et al.'s (2001) ideal of a ''pragmatic science,'' addressing questions of theoretical and practical relevance in a methodologically sound manner. Yet, if we use the nature of evidence-based practice as the starting point in specifying our criteria, we would draw a different conclusion.

What Is Evidence-Based Practice?

As mentioned, all practitioners claim to have evidence for their practice. Nonetheless, evidence-based practice is a particular approach or more accurately a set of approaches to incorporate evidence into practice decisions. In medicine, for example, this means ''integrating individual clinical expertise with the best available external clinical evidence from systematic research'' (Sackett, Richardson, Rosenburg, & Haynes, 1997, p. 2) in making decisions about patient care. Three aspects of this definition need to be highlighted.

First, evidence-based practice integrates the practitioner's expertise and external evidence from research. Both sources of knowledge are vital. Second, it is about trying to obtain and use the best available evidence even if ultimately determined to be inconsistent or rejected as irrelevant. Using evidence does not mean slavishly following it, acting only when there is good evidence or doing nothing if there is none. Rather, it is a more active process of examining and evaluating the best of what is there and applying it along with other sources of information, such as situational facts, to decision making. Some research evidence may be more readily converted into practical knowledge, although both basic scholarly and more applied evidence can contribute to evidence-based practice. Third, it uses systematic reviews to assess all available and relevant evidence rather than relying on single studies.

EBMgt has been defined in several different ways but most definitions draw on ideas of evidence-based practice found in medicine and elsewhere. One recent definition of EBMgt (Briner et al., 2009, p. 19) is as follows:

Evidence-based management is about making decisions through the conscientious, explicit, and judicious use of four sources of information: practitioner expertise and judgment, evidence from the local context, a critical evaluation of the best available research evidence,

and the perspectives of those people who might be affected by the decision.

The conscientious use of the four sources of information means that an EBMgt approach involves paying careful and sustained attention to sources of what can be potentially different, conflicting, and sometimes difficult-to-interpret information. Being explicit means using information from each source in a clear, conscious, and methodical way such that the roles played by all the information in the final decision are understood. And being judicious involves using reflective judgment to evaluate the validity and relevance of the information from each source. Evidence and information is critically evaluated in relation to the practice context and problem.

Take the example of a senior HRM practitioner in a large firm who believes the organization has a problem with high absence levels and wants to intervene to reduce the absence rate. Table 1 provides examples of the sorts of information that the practitioner may compile and critically evaluate to decide on what kind of intervention, if any, is likely to be most effective. After this information and evidence is compiled, the next stage is to *integrate* the different sources of evidence. The decision takes place at the intersection of these four information sources. Exactly how these sources of information are integrated depends on the context and who is making the decision. It is likely that they will vary in several ways.

First, varying quantities of information are available from each source. For example, little may be known about the perspectives of those who may be affected by the intervention, but the practitioners involved may have much expertise in and experience with the problem. Very strong asymmetries may lead to decisions biased toward those sources of information of which there simply are more. A second way in which these sources of information will vary is in relation to their quality, validity, and reliability. Although there may be plenty of information from one of these

sources, it may be judged to be of poor quality and therefore not that usable or relevant. Third, even where the quantity and quality of information is relatively balanced across sources, it may be that one highly pertinent piece ''trumps'' others. In a safety-critical organization, for example, even where nearly all the information suggests that a particular intervention may be effective, a very small piece of information implying that it also increases errors may be enough to push the decision away from what most of the evidence would suggest.

Evidence-based practice across various fields uses similar approaches intended to improve the process and consequences of decision making by collecting and critically analyzing evidence from a number sources and then integrating it to make a practical decision or solve a problem (e.g., Gough, Kiwan, Sutcliffe, Simpson, & Houghton, 2003; Soukup, 2000).

How Evidence-Based Is I–O Psychology?

So, how evidence based are we? To be asked this question can feel a bit unnerving or even insulting. I–O psychology is a science after all. We all know how to read journals and do research. We understand scientific principles and can distinguish good research from bad. We can interpret and apply findings from studies. We evaluate, measure, and assess what we do as we go along. Although all these statements may be broadly true, they don't reveal how evidence based we actually are as professionals. Instead, these statements express some of our principles and aspirations. Such statements may be our expectations, but they can differ from what we actually do.

We now turn to examine the extent to which characteristics of evidence-based practice identified above are present in the practice of I–O psychology. Note that no systematic study exists on the actual practice of I–O psychologists, that is, the consultants, in-house psychologists, and others working in industry who hold I–O psychology degrees either at the master's or

Table 1. *Examples of Information From Each of the Four Sources Relevant to Intervening in the Presenting Problem of High Absence*

Practitioner expertise and judgment
- Have I seen this before?
- What happened?
- What are my beliefs about the causes of absence?
- What's worked in the past and why?
- What are my hunches?
- What do I think are the causes and possible solutions?
- Is this situation occurring elsewhere?
- How relevant and applicable is my experience?

Critical evaluation of best available research evidence
- What are the average rates of absence in my sector and location—Is the absence rate here ''high''?
- What does systematically reviewed research evidence suggest to be the major causes of absence?
- How relevant and applicable is that evidence here?
- What does research evidence from systematic reviews suggest as effective interventions?
- How well might the interventions the research describes work here?

Evidence from the local context
- What actually is the absence rate?
- What type of absences and where?
- What are local explanations for absence?
- Internal research (e.g., surveys)
- What absence management is currently in place, and is it working?
- What do managers think is going on?
- What are the possible costs and benefits of interventions? Is it worth intervening here?
- What is happening or what is going to happen in the organization or outside it that might be affecting absence?

Perspectives of those who may be affected by intervention decision
- How do employees feel about the proposed interventions?
- Do they see downsides or unintended negative consequences?
- How do managers feel about these interventions?
- How practical or workable do those responsible for implementing the interventions feel?
- What alternative explanations and proposed solutions do others have?

doctoral level. So, our starting point is this question: If I–O psychology were strongly evidence based in the ways defined and described above, what would we expect to observe?

Table 2 describes some of the characteristics we would expect in an area of practice if it were also evidence-based per the above definitions. It describes our current judgment of the extent these characteristics are observable in I–O psychology. Others will have different experiences and observations, which we hope will be expressed in the responses to this focal article. Our judgments are based on observations from a number of sources, including our recent participation in the first evidence-based practice workshop at SIOP (attended by dozens of practitioners

to obtain continuing education credit), our interpretations of results from the recent surveys of the I–O psychology profession and practitioner–research connections discussed briefly above (Silzer et al., 2008), and also decades of teaching in I–O psychology programs. Our assessments of I–O psychology practice are discussed below, each accompanied by an explanation.

1. *The term ''evidence based'' is used or known.* Although the general notion of using evidence is well established, the specific term ''evidence-based'' and what it entails is not widely used or well known. It is rare to find the term ''evidence based'' paired with I–O psychology or organizational psychology. However, the 2009 SIOP

Table 2. *Some Key Characteristics of Evidence-Based Practice and an Estimate of the Extent to Which They Are Found in I–O Psychology*

Some characteristics of evidence-based practice	Found in I–O psychology?
1. *The term ''evidence based'' is used or well known.* Given evidence-based practice exists in many other fields and the term is widely used, it is unlikely that any field adopting an evidence-based approach would not know of and use the term, even though definitions might vary across practice fields.	To a very limited extent?
2. *The latest research findings and research summaries are accessible.* It is difficult to do evidence-based practice without access to evidence in research journals and research summaries. A fundamental principle of evidence-based practice is that systematic reviews of the best available external evidence need to be available.	To a very limited extent?
3. *Articles reporting primary research and traditional literature reviews are accessible to practitioners.* For many reasons systematic reviews may not be available or produced in an area of interest. When this is the case, primary research and traditional reviews published in journals can be used.	To some extent?
4. *''Cutting-edge'' practices, panaceas, and fashionable new ideas are treated with healthy skepticism.* One characteristic of areas of practice that are *not* particularly evidence based is the constant search for and promotion of the newest solution or cure. This characteristic is found in popular books on topics such as dieting, self-help, and indeed management.	To some extent?
5. *There is a demand for evidence-based practice from clients and customers.* If the clients or customers of a particular practice do not want or even reject evidence-based practice then it is simply impossible to practice in an evidence-based way.	To some extent?
6. *Practice decisions are integrative and draw on the four sources of information and evidence described above.* As emphasized, evidence-based decision making is more than looking at external published evidence. Rather, it is about combining evaluated external evidence, the perspectives of those who may be affected by the decision, information from the local context, and practitioner experience and expertise.	To some extent? (Difficult to judge.)
7. *Initial training and continuing professional development (CPD) adopt evidence-based approaches.* From an evidence-based perspective, initial training and CPD focus on developing evidence-based approaches to practice. This involves training practitioners to identify and critically evaluate external and contextual evidence relevant to a specific practice problem to help inform a practice decision. This approach creates an active need to obtain and use relevant evidence, as it is being used directly to help solve a problem.	To a very limited extent?

annual conference did have EBMgt as one of its themes.

2. *Systematic reviews are produced and made accessible.* Although we have plenty of traditional reviews and meta-analyses, there are very few systematic reviews in I–O psychology. SIOP is currently developing its *Science You Can Use* series, which will contain reviews that are not systematic as such but will go some of the way to summarizing research

findings that I–O practitioners can use.

3. *Articles reporting primary research and traditional literature reviews are accessible to practitioners.* We have found that this is a difficulty for many I–O psychology practitioners unless they are still attached in some way to a university. Although abstracts are easily accessible, purchasing single articles from publishers can be costly. In addition, to build up even limited knowledge of the evidence in a particular area can require access to dozens of articles, which may be prohibitively expensive. It also appears to be the case that not all I–O psychology practitioners, depending somewhat on where they trained, are highly skilled in reading and digesting (sometimes rather indigestible) journal articles.

4. *"Cutting-edge" practices, panaceas, and fashionable "new" ideas are treated with healthy skepticism.* As a consequence of our training as psychologists, we should be inclined to be quite skeptical or at least are inclined to ask about evidence and empirical support. At the same time, however, we are also somewhat drawn to what might be called management fads and fashions. Some of the recent focal articles in this journal demonstrate that we are sometimes inclined to pick up and run with the Next Big Thing even where evidence does not yet exist or is questionable. In addition, next time you attend the SIOP annual conference, check out the products and services for sale in the exhibit hall. In our experience, many of these feel more like fads than evidence-based interventions (and often no supporting evidence is presented). One reason we pay attention to fads is that clients often demand the latest thing, and if we don't deliver it, then some one

else will. However, as I–O psychologists, we may at the same time try to rework the fad into something closer to our own practice and to established and evidence-based techniques.[2]

5. *There is a demand for evidence-based practice from clients and customers.* Many of our major clients are those working at mid to senior levels in HRM. HRM is not a field that has embraced the notion of evidence-based practice in any significant way. Although, of course, managers do not actively seek to purchase ineffective I–O psychology products or services, they are under pressure to meet certain shorter term goals. They may therefore come to depend on a general impression that particular products or techniques "work" rather than whether they will work in their specific context given the problem they are trying to solve. HRM departments may also lean on benchmarking or mimicry by adopting the same I–O psychology practices already used by their more successful competitors. The authors have also heard many times from I–O psychologists who say they wish to practice in an evidence-based way but that clients have often already decided what they want (e.g., assessment centers, training programs, and employee attitude surveys) and are asking the I–O psychologist as a technical specialist to deliver it. This situation suggests that our clients are not demanding an evidence-based approach in the sense discussed here, although they are of course interested in adopting practices *they believe* to be effective.

6. *Practice decisions are integrative and draw on the four sources of information and evidence described above.*

---

2. We thank an anonymous reviewer for these observations.

This is the most difficult characteristic of evidence-based practice to assess without access to numerous observations of what practicing I–O psychologists actually do. In addition, it may be that as discussed above, we are not the decision makers; instead, we play an advisory role, providing information and interpretations to the decision makers. However, taking each source of information in turn, I–O psychologists do, as discussed above, draw to some extent on *evaluated external evidence* when making decisions, even though few systematic reviews are available and access to primary research can be difficult. The *perspectives of those who may be affected by the decision* are likely to be taken into account at least to some extent because of the APA's Ethics Code (2002; assuming we are complying with the code)[3] and also because of the broader awareness we should have as psychologists about our responsibilities to organizational and individual clients. We are likely to look for and use *evidence from the local context* and attempt some initial assessment of the problem or situation and seek out organizational data that might help with problem diagnosis. The use of *practitioner experience and judgment* seems highly likely, particularly if the problem or technique is one we have encountered frequently before.

7. *Initial training and continuing professional development (CPD) in evidence-based approaches.* Training in I–O psychology master's degrees and doctorates tends to be of the fairly traditional academic variety where students are expected in a relatively passive way to learn and retain information. We note that in both the United States and Britain, the majority of practicing I–O psychologists have terminal master's degrees. The typical master's program in the field has no required supervised internships and does not train its students to conduct literature searches on practice topics let alone systematic reviews. The forms of CPD used by SIOP and other I–O psychology professional bodies also tend to be fairly traditional. In fact, some of these forms of CPD reverse the approach adopted by evidence-based practice in that they present participants with recent research findings, evidence, or new techniques and then discuss how they might be used in practice rather than starting with practice problems and then searching for and evaluating the evidence that may help solve the problem.

So, what is it possible to conclude from this analysis of the extent to which I–O psychology shares some of the characteristics of evidence-based practice? First, we suggest that I–O psychology is not strongly evidence based in the sense that the term is used in other professions. But, we can say with some confidence that we are as a profession extremely well positioned to adopt, should we wish to do so, many of these characteristics. Next, I–O psychologists in many instances are *not* the key decision makers but, rather, sources of information and advice to managers making the decision (see below). Last, it is clear that there are many barriers to the adoption of evidence-based practice, some within and others outside our control. Having evaluated I–O psychology as falling somewhat short on evidence-based practice and supports for it, we turn to two important means for bridging I–O psychology's own research–practice gap: practice-oriented evidence and systematic reviews.

---

3. Ethical I–O psychology and evidence-based I–O psychology are similar in other respects including the focus on being concerned and explicit about the evidence for the benefits of interventions and the evidence that interventions are not harmful.

Key Strategies for Promoting Evidence-Based Practice

I–O psychologists are not one seamless community of comembers of the same discipline. Practitioners and scholars in I–O psychology are largely distinct communities of interest, knowledge, and social ties. In promoting evidence-based practice, it is advantageous in such circumstances to design ways of communicating and sharing ideas that serve the interests of both. Although evidence-based practice involves the better use and integration of evidence and information from all four sources described above, we focus here on improving the use of critically evaluated research evidence.

Between the research and practice domains of I–O psychology, we need devices for translating back and forth information and knowledge, promoting better quality communication and learning. We note that in the SIOP practitioner survey described above, a frequent practitioner request to SIOP was for clarification of standards for I–O practice and better ways of differentiating I–O psychologists from other practitioners in the marketplace. Such clarification and professional differentiation can come from creating the evidence-oriented products and associated processes proposed here. Such products can simultaneously meet the needs of I–O psychology's practitioners and scholars, adding value to both. The two products we suggest as critical to evidence-based practice in I–O psychology are practice-oriented evidence and systematic reviews.

Practice-Oriented Evidence

Most research published in I–O psychology's premier journals, including *Journal of Applied Psychology* (*JAP*), *Personnel Psychology*, and *Journal of Occupational and Organizational Psychology* is theory-oriented investigations authored by academy-based I–O psychologists answering questions of interests to other academics. This was not always the case.

Anderson et al. (2001) noted that between 1949 and 1965, practitioners authored a full 36% of *JAP* articles (31% by practitioners alone). From 1990 to 2000 (the terminal year of their survey), practitioners authored only 4% of *JAP* articles (1% by practitioners alone). The other I–O journals manifest a similar decline. Many factors may account for this decline in practitioner research publication in our field's journals, including a shift in journal focus to more academic topics of rigor, greater corporate concern for protecting intellectual property, as well as ramped-up global competition and its accompanying time and resource crunch, which in turn limited practitioner opportunity for research let alone publication. One conclusion is apparent: I–O psychology's academics and practitioners are not mingling with each other in our journals. Regardless of the underlying reasons, there is one serious consequence of the decline in practitioner conducted research publication: Academics are the ones asking the research questions and interpreting the answers.

If the gap between research and practice in I–O psychology is at least partly attributable to lower participation by practitioners in research, the problem may be exacerbated by omission in current research of the kinds of complex problems in complex settings faced by practitioners in their work. An antidote to the latter has been suggested in the form of engaged scholarship (Van de Ven, 2007) and scholar–practitioner collaboration (Lawler & Mohrman, in press), where academics and practitioners work together to formulate research questions, investigate them, and draw conclusions.

If indeed I–O psychology research is now academic centric, the gap between research and practice entails problems in knowledge transfer. It takes two to tango, and difficulties transferring knowledge can be because of communication issues on both sides (what's readable, accessible, understandable, and interesting?). Barriers to transfer may also reside in the nature of the knowledge itself. As a case in point,

meta-analysis and literature reviews in I–O psychology have led to the formulation of general knowledge principles based on scientific evidence (*The Handbook of Principles of Organizational Behavior: Indispensable Knowledge for Evidence-Based Management*; Locke, 2009). *The Handbook* has over 30 chapters summarizing several hundred evidence-based principles, the vast majority of them derived from I–O psychology research and all intended to guide the practice of current and future managers and other practitioners. This book provides many examples and is written in plain English. It represents, perhaps at its best, knowledge (principles) based on what might be called ''researcher-oriented evidence,'' that is, evidence from rigorous tests of theory, replicated and found to be relatively generalizable over time and context.

So, what's wrong with that? In many ways, these research-based principles achieve our ideal as scientists: to understand the world well and disseminate this knowledge. The downside is this: It is not always obvious to practitioners, certainly not to the least experienced or less reflective, how exactly to apply the principles identified in such research. Let's take the classic example of the finding that general mental ability (GMA) is positively related to individual performance (Schmidt, 2009). A well-established finding over several decades, one practice implication is that if an organization seeks to improve the quality of its workforce and the performance of individual members, it should select on intelligence. For a host of reasons, this principle is not widely promoted by I–O psychology practitioners and is soundly rejected by even experienced HR managers (Rynes et al., 2002). Practitioners think about the educated idiot who is book smart, tests fantastically well, and can't match socks. Managers fear being labeled elitist and perhaps wonder whether they would have gotten their own jobs if their company used IQ tests. Or, they use a test of GMA and find that it doesn't improve performance levels over the biographical information they already rely on like grade point

average and college reputation. Another reason for caution in using tests of GMA is concern over adverse impact, even though some methods have relatively low adverse impact (Schmidt, 2009).

This debacle may be tied to what Van de Ven and Johnson (2006) refer to as a knowledge production problem, arguing that the research–practice gap is best bridged by producing practice-oriented scientific knowledge via research approaches engaging both academics and researchers collaboratively. This approach calls for combining the knowledge of practitioners and the knowledge of academics at all stages of the research process. This knowledge production problem has been encountered, and addressed, in other evidence-based practice fields.

Medical researchers and clinicians distinguish between two kinds of research evidence: disease oriented and patient oriented. ''Disease-oriented evidence'' (DOE) focuses on the causes of disease providing evidence of pathology and ways of altering the condition (e.g., drugs and surgery). In I–O psychology, our version of DOEs might take the form of phenomena-oriented evidence, such as the origins of job stress or job satisfaction. The second kind of research evidence in medicine is ''patient-oriented evidence that matters'' (POEMs), evidence gathered from studies of real patients about issues such as mortality, morbidity, and quality of life. An example of a POEM is a study comparing one antihypertensive drug to another to determine which reduced mortality from hypertension over a 10- to 20-year period. In I–O psychology, our version of POEMs might take the form of studies contrasting two interventions to reduce job stress that assess the types of individuals, work settings, and job strains they best ameliorate.

There is a growing trend in the practice of medicine to value patient-oriented data more highly than DOE. However, because practice-oriented evidence does not yet exist to inform every clinical need, practitioners must use other ways of making decisions too, including relying

on their knowledge of basic physiological processes. We expect much the same alternative forms of decision making in an evidence-informed practice of I–O psychology.

An example of practice-oriented evidence in I–O psychology are the reports by Robert Pritchard and his team, developing and investigating the use of the Productivity Measurement and Enhancement System (ProMES) system for job analysis and strategic planning (e.g., Pritchard, Harrell, DiazGranados, & Guzman, 2008). Differences identified between studies in how thoroughly the ProMES system was applied suggested that several implementation-related factors, including the extent users adhered to the ProMES process and the quality of the feedback provided, affected the overall productivity gains associated with ProMES. Pritchard and colleagues then address the circumstances under which there are differences in implementation or compliance with standard practices and the sensitivity of outcomes to these variations (see Pritchard et al., 2008). In the context of widespread variation in organizational and management practice (from performance appraisals to quality programs) as well as in individual implementers, evidence regarding the effects of such variability on outcomes has considerable practical and scholarly value.

Consider what practice-oriented evidence might mean for some of the stickier problems in I–O psychology. We know that GMA is predictive of individual performance, but organizations are reluctant to accept or act on this knowledge (Rynes et al., 2002), often preferring intuitive selection methods (Highhouse, 2008). Practice-oriented evidence could be developed from investigations into conditions making use of GMA as a selection criterion more readily useful. Looking into conditions of use could identify, for example, whether the backlash is to written IQ-type tests, where structured interview questions that tapped GMA would be more acceptable, or how the concerns over adverse impact could be better balanced with the predictive validity

of GMA. Practice-oriented research could look into whether performance criteria in use affected the value and usefulness practitioners attach to indicators of GMA. Perhaps settings where innovation and creativity are important performance metrics place more value on mental ability than those where more routine performance is involved. Academically oriented evidence indicates that GMA is likely to predict performance in either case. Practitioners may only find GMA useful where mental ability is an organizationally valued contributor to performance.

Systematic Reviews

Systematic reviews are fundamental to evidence-based practice. As such, much is written about them in other fields (Gough et al., 2003; Soukup, 2000; Tranfield, Denyer, & Smart, 2003). Experience indicates that it is impossible to fully engage in evidence-based practice without them: Such reviews provide one of the four sources of information required when making evidence-based decisions. Applied to the example in Table 1, a systematic review's purpose would be to search for, collect, critically appraise, and pull together research evidence relevant to the causes and possible solutions to the problem of high absence. I–O psychologists are avid producers and consumers of literature reviews. However, systematic reviews are very different from nearly all those published in I–O psychology.

> Systematic reviews are literature reviews that adhere closely to a set of scientific methods that explicitly aim to limit systematic error (bias), mainly by attempting to identify, appraise and synthesize all relevant studies (of whatever design) in order to answer a particular question (or set of questions). In carrying out this task they set out their methods in advance, and in detail, as one would for any piece of social research. In this respect . . . they

are quite unlike most "traditional" narrative reviews (Petticrew & Roberts, 2006, pp. 9–10).

Systematic reviews are, essentially, a way of analyzing existing research using explicit and replicable methods, allowing conclusions to be drawn about what is known and what is not known in relation to the review question (and within the limitations of the method). Similar, but not identical to the traditional meta-analysis, systematic reviews are studies of studies. Meta-analyses are a type of systematic review but one that uses only quantitative data and statistical synthesis and focuses on a question repeatedly addressed in the same way by researchers rather than a practice question or problem. As with meta-analyses, systematic reviews are conducted out of recognition that single empirical studies, although useful and sometimes informative, should not be emphasized because their biases and limitations cannot be fully accounted for. Looking at all relevant studies, systematically gathered, constitutes more reliable evidence.

Thus, in the context of evidence-based practice, neither traditional literature reviews nor meta-analyses are especially useful. First, traditional literature reviews are open to many forms of bias. For example, reviewers do not make clear how they have selected the studies they have included, do not critically appraise them in an explicit or systematic way, and do not usually pull them together or synthesize findings across studies. Second, traditional reviews do not usually focus on a specific research, practice question, or problem. It is this latter point that also differentiates a systematic review from the quantitative meta-analysis used traditionally in I–O psychology. The process of making evidence-based decisions requires more focused and tailored reviews of evidence where both a practice question or problem and the conditions to which the evidence might be applied are taken into account. Returning to the case of high absence in Table 1, a systematic review

would attempt to find evidence about the relative effectiveness of different forms of absence management interventions given the current and desired absence rates and taking into account as much as possible aspects of the context such as the type of employees involved, the sector, and the existing work arrangements and absence policies. In the context of evidence-based practice, systematic reviews can take forms akin to phenomena-oriented evidence or practice-oriented evidence, depending on the review questions and their intended use as well as the kinds of research available. In evidence-based fields, an important result of systematic reviews is guidelines for practice.

Systematic reviews can be useful for purely academic research purposes too. We may, for example, be interested in collecting all available evidence about absence-management interventions to provide a more general overview about what is known, and not known, about the efficacy of such interventions. In this respect, a systematic review might differ from the traditional meta-analysis in that it would also consider qualitative information and descriptions, not being limited to effect sizes alone depending on the review question (Rousseau, Manning, & Denyer, 2008). All systematic reviews follow a process of clearly specified stages. One example of this process (adapted from Petticrew & Roberts, 2006) contains seven stages.

1. *Identify and clearly define the question the review will address.* The question needs to be sufficiently specific so that it is clear, in principle, what types of data would be relevant. Aspects of the context (e.g., population, sector, and organizational type), the interventions (what qualifies as a relevant intervention?), the mechanisms linking intervention to outcomes (e.g., processes, mediators, and moderators), and the outcomes themselves (which data are the outcomes of interest) are also clearly specified.

2. *Determine the types of studies and data that will answer the question.* The criteria used to decide which studies will be selected or excluded from the review are identified. For example, a review that addresses a causal question might exclude studies with cross-sectional designs. The aim is to increase the chances that all relevant studies are included and all those that are irrelevant are excluded.

3. *Search the literature to locate relevant studies.* A clear search strategy is used specifying, for example, key words, the databases to be searched, and how, and whether unpublished data will be found and included.

4. *Sift through all the retrieved studies to identify those that meet the inclusion criteria (and need to be examined further) and those that do not and should be excluded.* Each study is examined, usually by two review team members, and checked against the inclusion and exclusion criteria. Where agreement is not possible, a third reviewer assesses the study. At this stage, it is not uncommon to find that only a fraction of the initial pool of studies can be included.

5. *Critically appraise the studies by assessing the study quality determined in relation to the review question.* The quality of each study is critically appraised or evaluated in relation to the review question as research quality can only be judged in relation to the question. Even where studies meet the inclusion criteria, they are still likely to vary in terms of quality. Assessing quality allows the review conclusions to clearly state how many of the studies included were, for example, of very high, medium, and low quality.

6. *Synthesize the findings from the studies.* A key part of any systematic review is the pulling together of findings from across the studies to represent what is known and not known.

Synthesis may be quantitative, qualitative, or both. Review findings are often described in terms of the overall number of studies found, the quality profile of this group of studies, and the number of studies that obtained particular results.

7. *Disseminate the review findings.* A full report of a systematic review can be quite large. In addition, shorter journal article length versions or even shorter summaries may be produced. Dissemination is often planned at the outset of a systematic review given the aim is often to inform practice.

Although systematic review is rare in I–O psychology at present, I–O psychologists are certainly familiar with its general approach. The underlying logic of systematic review is similar to that of many psychological research methods and is similar to meta-analyses. Meta-analysis' exclusive use of quantitative data and statistical rather than other forms of synthesis sets it apart from a systematic review, which often uses different types of data and different forms of synthesis. In addition, meta-analyses can only address questions that have been addressed many times in more or less the same way by researchers (e.g., the correlation between job satisfaction and performance) rather than questions that arise from practice problems, where an array of data types may be required to formulate an answer.

An example of a structured abstract from a systematic review particularly relevant to I–O psychology is presented in Table 3. This demonstrates much of the underlying methodology and shows the explicit and systematic nature of the method. Joyce, Pabayo, Crichley, & Bambra's (2010) review clearly states the review objectives, search strategy, criteria for including studies, method of analysis (in this case, a narrative synthesis as the studies were dissimilar), the number of studies found, and the findings of each.

A few aspects of systematic reviews and their differences from traditional I–O

Table 3. *Example of a Systematic Review Abstract*

Flexible working conditions and their effects on employee health and well-being (Joyce et al., 2010)

Background: Flexible working conditions are increasingly popular in developed countries, but the effects on employee health and well-being are largely unknown

Objectives: To evaluate the effects (benefits and harms) of flexible working interventions on the physical, mental, and general health and well-being of employees and their families

Search strategy: Our searches (July 2009) covered 12 databases including the Cochrane Public Health Group Specialized Register, CENTRAL, MEDLINE, EMBASE, CINAHL, PsycINFO, Social Science Citation Index, ASSIA, IBSS, Sociological Abstracts, and ABI/Inform. We also searched relevant Web sites, hand searched key journals, searched bibliographies, and contacted study authors and key experts

Selection criteria: Randomized controlled trials, interrupted time series, and controlled before and after studies (CBA), which examined the effects of flexible working interventions on employee health and well-being. We excluded studies assessing outcomes for less than 6 months and extracted outcomes relating to physical, mental, and general health/ill-health measured using a validated instrument. We also extracted secondary outcomes (including sickness absence, health service usage, behavioral changes, accidents, work–life balance, quality of life, health and well-being of children, family members, and coworkers) if reported alongside at least one primary outcome

Data collection and analysis: Two experienced review authors conducted data extraction and quality appraisal. We undertook a narrative synthesis as there was substantial heterogeneity between studies

Main results: Ten studies fulfilled the inclusion criteria. Six CBA studies reported on interventions relating to temporal flexibility: self-scheduling of shift work ($n = 4$), flexitime ($n = 1$), and overtime ($n = 1$). The remaining four CBA studies evaluated a form of contractual flexibility: partial/gradual retirement ($n = 2$), involuntary part-time work ($n = 1$), and fixed-term contract ($n = 1$). The studies retrieved had a number of methodological limitations, including short follow-up periods, risk of selection bias, and reliance on largely self-reported outcome data. Four CBA studies on self-scheduling of shifts and one CBA study on gradual/partial retirement reported statistically significant improvements in either primary outcomes (including systolic blood pressure and heart rate; tiredness; mental health, sleep duration, sleep quality, and alertness; and self-rated health status) or secondary health outcomes (coworker social support and sense of community), and no ill-health effects were reported. Flexitime was shown not to have significant effects on self-reported physiological and psychological health outcomes. Similarly, when comparing individuals working overtime with those who did not, the odds of ill-health effects were not significantly higher in the intervention group at follow-up. The effects of contractual flexibility on self-reported health (with the exception of gradual/partial retirement, which when controlled by employees improved health outcomes) were either equivocal or negative. No studies differentiated results by socioeconomic status, although one study did compare findings by gender but found no differential effect on self-reported health outcomes

Authors' conclusions: The findings of this review tentatively suggest that flexible working interventions that increase worker control and choice (such as self scheduling or gradual/partial retirement) are likely to have a positive effect on health outcomes. In contrast, interventions that were motivated or dictated by organizational interests, such as fixed-term contract and involuntary part-time employment, found equivocal or negative health effects. Given the partial and methodologically limited evidence base, these findings should be interpreted with caution. Moreover, well-designed intervention studies are needed to delineate the impact of flexible working conditions on health, well-being, and health inequalities

psychology reviews are worth noting. First, the exact methods used by the reviewers to find, select, and exclude studies are open to examination and scrutiny. Readers are thus able to reach their own judgments about the efficacy and appropriateness of the method and also how much confidence they can place in the findings.

Second, whether we are I–O practitioners, researchers, or both, as we have little access to systematic reviews, we tend to develop an implicit though somewhat inaccurate sense of the quantity and quality of research about a particular technique or intervention. We tend to assume that the research is ''out there'' somewhere and have vague recollections of particular studies and their findings. As mentioned, one common finding from systematic reviews is that they reveal far fewer studies directly relevant to a given question than commonly assumed. In the case of the flexible working review by Joyce et al. (2008), the large number of possibly relevant studies that were identified was substantially reduced as the review team applied their inclusion criteria:

- 11,954 articles initially identified as possibly relevant from key word searches on databases, citation searches, hand searching, and contacting experts;
- 11,740 articles then *excluded* on basis of title and/or abstract;
- 214 full-text articles obtained and then screened using inclusion criteria; and
- 10 studies included in the final review.

As we will discuss further below, one hallmark of being an evidence-based practitioner or researcher is having a quite well-developed, specific, and explicit awareness of what evidence is ''out there,'' the quality of that evidence, and what, when taken as a whole, it might mean.

Third, unlike traditional reviews, the processes through which reviewers reach their conclusions are explicit and transparent. Whether the synthesis is statistical or narrative (as in Joyce et al., 2008), the basis on which the data were summarized or pulled

together is clear to the reader, as the findings of each study are extracted and presented.

Fourth, and again unlike traditional reviews, systematic reviews also allow us to identify the quantity and quality of studies and many aspects of study heterogeneity (method, population, design, findings, etc.). This information is essential if we want to draw conclusions about what is known and not known in relation to the review question, the basis of these claims, and the confidence with which they can be made.

In addition to full-blown systematic reviews of the sort described in Table 2, there are other quicker and more focused ways of doing systematic reviews that share many of their qualities. Although they may not be as thorough and therefore not as informative as systematic reviews, they can still provide important information and practice insights, especially where time is of the essence. These go by various names, including rapid evidence assessment and best evidence topics and can be completed more quickly by restricting the parameters in various ways, such as using fewer search terms, using a smaller date range, and searching in fewer databases or across fewer journals.

We believe that systematic reviews can be and will become an essential part of the I–O psychologist's toolkit. Not only do they allow practitioners to provide more evidence-based advice and share with their clients and customers the basis of that advice, they also allow researchers in a more structured way to identify important gaps in knowledge. Also importantly, systematic reviews can highlight where conducting more research on the same question using a particular method is unlikely to yield any new information.

Barriers to Evidence-Based Practice in I–O Psychology

There are numerous barriers to the adoption of evidence-based practice and numerous ways in which they can be overcome. Here, we focus on just a few. First is the apparent lack of demand from our

clients for evidence-based I–O psychology. It is readily apparent from looking at the rapid adoption of some new and "cutting-edge" practices that such decisions are not made in an evidence-based way. If individual managers are mostly rewarded for achieving short-term goals as fast as possible rather than doing what works in the longer term, why would they be interested in evidence-based practice? Perhaps, the only way to overcome this barrier is by working with organizations to demonstrate that approaching problems in an evidence-based way is more likely to produce effective and sustainable solutions. It is also important to emphasize that evidence-based practice constitutes a family of approaches to making decisions and is not intended to provide the answer to every problem but rather improve the process and outcome of decision making.

A second barrier is the predominance of master's-level practitioners who have learned to practice I–O psychology in unsupervised ways. Because of the level of such programs, such practitioners have a limited understanding of research, a limited capacity to access new evidence, and lack the skills to conduct their own systematic reviews let alone primary research. Collectively, we currently do not have enough of the necessary skills to widely undertake evidence-based practice, even though our background as psychologists gives us a strong foundation on which to build. CPD that enables evidence-based practice and helping I–O practitioners to access research evidence are two possible ways to overcome this barrier. It may also help to increase the opportunities for those qualified at the master's level to go on to complete doctorates.

As a consequence of our desire to market I–O psychology, we may be reluctant to acknowledge the limitations of our knowledge where evidence is mixed or where there are grounds for uncertainty. It can be difficult to achieve a balance between promoting a profession while at the same time acknowledging its limitations as clients may find this unnerving or see it as a sign of competence. I–O psychologists are especially challenged because other organizational consultants outside the discipline can be extremely bullish about their products and services despite their own absence of evidence.

As skepticism is a key ingredient of evidence-based practice, its limited popularity in I–O psychology is something of a barrier. One way this can be overcome is to remind ourselves that skepticism is fundamental to scientific inquiry and to any area of practice based on science. It also has the potential to clearly differentiate us from other organizational practitioners and consultants, particularly if the discipline supports practice through systematic reviews, evidence-based guidelines, and practice-oriented research that contribute to more effective practice.

A fourth barrier concerns the politics of evidence in organizations. Power and politics are fundamental to decision making and also surround the identification and use of evidence in organizations. Senior leaders may feel they have the right or even responsibility to make decisions based on their experience and judgment that seem to fly in the face of the available evidence. The need to be explicit in evidence-based decision making means that those with vested interests in a particular course of action may find it more difficult to hide such interests. In general, an evidence-based approach may prove challenging particularly in organizations with highly political cultures. Although it is impossible to remove politics from evidence and decision making, evidence-based approaches do at least offer the possibility of making clearer distinctions among politics, values, interests, and other forms of information such as research evidence. The more decision makers are held accountable for their decisions, the more likely they are to welcome such distinctions.

Prospects for Evidence-Based I–O Psychology

This article concludes that I–O psychology cannot yet claim to be fully evidence

based. Our analysis suggests that we have some way to go before we can reasonably claim to be an evidence-based area of research and practice in the sense it is used in other areas of evidence-based practice. At the same time, I–O psychologists are uniquely qualified to undertake the key activities required by evidence-based practice such as evaluating external research evidence and collecting and using internal evidence for organizational diagnosis. In evidence-based practice, I–O psychologists as trainers and consultants, in-house management and staff, are positioned to enable an array of approaches. These include, various combinations as warranted, using evidence-based *processes* for making decisions, giving feedback, as well as incorporating evidence-based *content*, that is, research findings, into their decisions and practices (Briner et al., 2009).

Beyond making our own practice more evidence based, we also have an important part to play in helping organizations and those who manage them become more evidence based. We envisage this could happen in several ways. First, we could provide systematic review services (or their briefer and quicker versions) to managers and organizations. These might be seen as particularly useful where the organization is trying to decide whether to invest a large sum of money in a particular intervention or program. For a fraction of the proposed program budget, we would be able to provide an objective and reasonably comprehensive review of what the published and (where available) unpublished research tells us about how effective the intervention is known to be and whether it might work here.

Second, we have the skills to help organizations either make sense of their existing internal data or collect new data that might diagnose problems or show what is working and why. We believe it is not unusual, even where organizations have large quantities of data about, for example, employee behavior, performance, and attitudes, for those data to remain largely unanalyzed or subject only to the simplest and least informative analyses such as cross tabs and zero-order correlations. I–O psychologists should be able to work with organizations to help them get the most out of the data they already have and where appropriate suggest additional data collection to develop a fuller picture of what is happening in the organization.

Our roles as organizational knowledge brokers as well as our own evidence-based practice would be facilitated by the use of systematic reviews on practice questions. Systematic reviews need to be part of the professional training of I–O psychologists. A professional activity accessible to both master's-prepared and doctoral-level I–O psychologists, systematic reviews, and briefer versions are important ways of helping would-be practitioners learn to gather and use evidence while at the same time developing their skills in formulating questions, structuring reviews, and synthesizing findings.

Third, I–O psychologists have the background to enable us to work as facilitators and coaches for managers and management teams seeking to engage in evidence-based management as well as helping organizations collect the external and internal evidence they may need (described above). We can also help collect information about the perspectives of those who may be affected by a decision and help make explicit managers' own expertise and experience and how it is shaping a decision. In effect, we can support organizations to make decisions in a conscientious, explicit, and judicious way—in short, to help organizations to practice EBMgt.

Evidence-based practice is not about perfection. Rather, it is about on-going pursuit of mindful improvement in our uptake and use of both scholarly research and practice-related facts and assessments. We hope this article and the responses that follow help move I–O psychology in an evidence-based direction.

References

Anderson, N., Herriot, P., & Hodgkinson, G. P. (2001). The practitioner-researcher divide in industrial,

work and organizational (IWO) psychology: Where are we now and where do we go from here? *Journal of Occupational and Organizational Psychology*, *74*, 391–411.

Briner, R. B. (1998). What is an evidence-based approach to practice and why do we need one in occupational psychology? *Proceedings of the 1998 British Psychological Society Occupational Psychology Conference*, pp. 39–44.

Briner, R. B., Denyer, D., & Rousseau, D. M. (2009). Evidence-based management: Concept clean-up time? *Academy of Management Perspectives*, *23*, 19–32.

Cherniss, C. (2010). Emotional intelligence: Toward clarification of a concept. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *3*, 110–126.

Friedson, E. (1986). *Professional powers: A study of the institutionalization of formal knowledge.* Chicago: University of Chicago Press.

Goleman, D. (1998). *Working with emotional intelligence.* New York: Bantam Books.

Gough, D. A., Kiwan, D., Sutcliffe, S., Simpson, D., & Houghton, N. (2003). A systematic map and synthesis review of the effectiveness of personal development planning for improved student learning. Retrieved from http://eppi.ioe.ac.uk/EPPIWeb Content/reel/review_groups/EPPI/LTSN/LTSN_June03.pdf

Hambrick, D. C. (1994). What if the academy actually mattered? *Academy of Management Review*, *19*, 11–16.

Highhouse, S. (2008). Stubborn reliance on intuition and subjectivity in employment selection. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *1*, 333–342.

Hollenbeck, G. (2009). Executive selection—What's right . . . and what's wrong. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *2*, 130–143.

Joyce, K., Pabayo, R., Critchley, J. A., & Bambra, C. (2010). Flexible working conditions and their effects on employee health and wellbeing. *Cochrane Database of Systematic Reviews*, Art. No. CD008009. doi: 10.1002/14651858.CD008009.pub2.

Judge, T. A., Heller, D., & Mount, M. K. (2002). Five factor model of personality and job satisfaction: A meta-analysis. *Journal of Applied Psychology*, *87*, 530–541.

Judge, T. A., & Illies, R. (2002). Relationship of personality to performance motivation: A meta-analytic review. *Journal of Applied Psychology*, *87*, 797–807.

Kluger, A. N., & DeNisi, A. (1996). The effect of feedback intervention on performance: A historical review, a meta-analysis, and a preliminary feedback intervention theory. *Psychological Bulletin*, *119*, 254–284.

Landy, F. J. (2008). Stereotypes, bias, and personnel decisions: Strange and stranger. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *1*, 379–392.

Lawler, E. E., & Mohrman, S. A. (in press). *Doing research that is useful for theory and practice–25 years later* (2nd ed.). San Francisco: Berrett Koehler.

Learmonth, M., & Harding, N. (2006). Evidence-based management: The very idea. *Public Administration*, *84*, 245–266.

Locke, E. A. (2005). Why emotional intelligence is an invalid concept. *Journal of Organizational Behavior*, *26*, 425–431.

Locke, E. A. (2009). *Handbook of principles of organizational behavior: Indispensable knowledge for evidence-based management* (2nd ed.). New York: Wiley.

Macey, W. H., & Schneider, B. (2008). The meaning of employee engagement. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *1*, 3–30.

Mayer, J. D., & Salovey, P. (1997). What is emotional intelligence? In P. Salovey and D. Sluyter (Eds.), *Emotional development and emotional intelligence: Educational implications* (pp. 3–34). New York: Basic Books.

McCall, M. W. (2010). Recasting leadership development. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *3*, 3–19.

McDaniel, M. A., Whetzel, D. L., Schmidt, F. L., & Maurer, S. D. (1994). The validity of employment interviews: A comprehensive review and meta-analysis. *Journal of Applied Psychology*, *79*, 599–616.

McKenna, D. D., & Davis, S. L. (2009). Hidden in plain sight: The active ingredients of executive coaching. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *2*, 244–260.

Merrill, D. C., Reiser, B. J., Merrill, S. K., & Landes, S. (1995). Tutoring: Guided learning by doing. *Cognition and Instruction*, *13*, 315–372.

Morrell, K. (2008). The narrative of ''evidence based'' management: A polemic. *Journal of Management Studies*, *45*, 613–635.

Murphy, K. R. (2008). Explaining the weak relationship between job performance and ratings of job performance. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *1*, 148–160.

Petticrew, M., & Roberts, H. (2006). *Systematic reviews in the social sciences: A practical guide.* Oxford: Blackwell.

Pfeffer, J., & Sutton, R. I. (2006). Evidence-based management. *Harvard Business Review*, *84*, 62–74.

Pritchard, R. D., Harrell, M. M., DiazGranados, D., & Guzman, M. J. (2008). The productivity measurement and enhancement system: A meta-analysis. *Journal of Applied Psychology*, *93*, 540–567.

Reay, T., Berta, W., & Kohn, M. (2009). What's the evidence on evidence-based management? *Academy of Management Perspectives*, *23*, 5–18.

Rousseau, D. M. (2006). Is there such a thing as evidence-based management? *Academy of Management Review*, *31*, 256–269.

Rousseau, D. M., Manning, J., & Denyer, D. (2008). Evidence in management and organizational science: Assembling the field's full weight of scientific knowledge through reflective reviews. *Annals of the Academy of Management*, *2*, 475–515.

Rousseau, D. M., & McCarthy, S. (2007). Evidence-based management: Educating managers from an evidence-based perspective. *Academy of Management Learning and Education, 6*, 94–101.

Rynes, S. L., Brown, K. G., & Colbert, A. E. (2002). Seven common misconceptions about human resource practices: Research findings versus practitioner beliefs. *Academy of Management Executive, 16*, 92–103.

Sackett, D. L., Richardson, W. S., Rosenburg, W., & Haynes, R. B. (1997). *Evidence-based medicine: How to practice and teach EBM.* London: Churchill Livingstone.

Schmidt, F. L. (2009). Select on intelligence. In E. A. Locke (Ed.), *Handbook of principles of organizational behavior: Indispensable knowledge for evidence-based management* (2nd ed., pp. 3–18). New York: Wiley.

Silzer, R., Cober, R., Erickson, A., & Robinson, G. (2008). *Practitioner needs survey: Final survey report.* SIOP Professional Practice Committee. Retrieved from www.siop.org/Practitioner%20 Needs%20Survey.pdf

Smith, R. (1991). Where is the wisdom . . .? The poverty of medical evidence. *British Medical Journal, 303*, 798–799.

Soukup, S. M. (2000). The center for advanced nursing practice evidence-based practice model. *Nursing Clinics of North America, 35*, 301–309.

Tranfield, D., Denyer, D., & Smart, P. (2003). Toward a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management, 14*, 207–222.

VanLehn, K., Siler, S., Murray, C., Yamauchi, T., & Bagget, W. B. (2003). Why do only some events cause learning during human tutoring? *Cognition and Instruction, 21*, 209–249.

Van de Ven, A. H. (2007). *Engaged scholarship: A guide for organizational and social research.* New York: Oxford University Press.

Van de Ven, A. H., & Johnson, P. E. (2006). Knowledge for theory and practice. *Academy of Management Review, 31*, 802–821.