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Evidence-Based Management: Foundations, Development, Controversies and Future

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Annu. Rev. Organ. Psychol. Organ. Behav. 2017.4:235–61

First published online as a Review in Advance on January 23, 2017

The *Annual Review of Organizational Psychology and Organizational Behavior* is online at orgpsych.annualreviews.org

<https://doi.org/10.1146/annurev-orgpsych-032516-113306>

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Keywords

evidence-based management, evidence-based practice, research–practice gap, academic–practitioner relationships, systematic reviews

Abstract

We review the recent development of evidence-based management (EBMgt), tracing its origins to longstanding gaps between research and practice, discrepant findings across studies, and the emergence of evidence-based medicine (EBMed). We provide a definition of EBMgt and review four foundational articles advocating its use. We then review categories of articles that comprise the EBMgt canon: advocacy articles, essays or perspectives, teaching-related, empirical, reviews, and critiques and responses. Critiques include political, epistemological, and methodological issues directly pertinent to EBMgt as well as broader concerns about the scholarly research base on which EBMgt depends. Our suggestions for future research emphasize, first and foremost, increasing the production of high-quality empirical studies in EBMgt. Topics of particular interest include research co-creation by academics and practitioners, process and outcome studies of EBMgt implementations, and practitioners' use of evidence in their working environments. We also call for broader types of systematic reviews (SRs) than have generally been conducted in the organization sciences.

INTRODUCTION

Following early initiatives by Tranfield et al. (2003), Rousseau (2006), and others (e.g., Pfeffer & Sutton 2006a,b), evidence-based management (EBMgt) has arisen as an important area of scholarly, pedagogical, and practical interest over the past 15 years. In this review we situate its historical foundations in longstanding concerns about the academic–practice (A–P) gap, concerns about how to deal with conflicting research results, and the emergence of evidence-based medicine (EBMed) and evidence-based practice (EBP). We describe how EBMgt has been defined, as well as the hopes and objectives of its early proponents. We then review the extant EBMgt literature base in terms of its major categories: introductory/advocacy articles, essays and perspective pieces, empirical studies, teaching-related articles, literature reviews, and critiques and responses. We conclude with implications for future research and practice.

EVIDENCE-BASED MANAGEMENT: HISTORY AND CONTEXT

The Academic–Practice Gap

Management academics have long noted a large gap between academic research and managerial practice. Discussions of the causes of this gap—as well as ways to reduce it—have taken place for decades (Beyer & Trice 1982, Boehm 1980, Campbell et al. 1982). Some have viewed the causes of the gap as lying primarily with academic researchers, who are characterized (perhaps caricatured) as having become overspecialized, self-referential, obsessed with theory, excessively mathematical, jargonladen, unconcerned about practical problems, and dismissive of practitioners (e.g., Bennis & O’Toole 2005, Das 2003, Hambrick 1994, Oviatt & Miller 1989, Trank 2014). Others have focused on practitioners, who are sometimes characterized or caricatured as research phobic, anti-intellectual, susceptible to unproven fads and fashions, and not true professionals (e.g., Abrahamson 1996, Hofstadter 1963, Pfeffer & Sutton 2006a, Shaffer 1977). Still others do not place blame on either group, noting that academics and practitioners work in very different types of environments that cause them to have different logics (e.g., assumptions, belief systems, and ways of tackling and approaching problems; Kieser & Leiner 2009), time frames (e.g., Bansal et al. 2012), communication patterns (e.g., Kuncel & Rigdon 2012), and interests and incentives (e.g., Boehm 1980, Shapiro et al. 2007).

Most (although not all; e.g., Bartunek & Rynes 2014, Dipboye 2014) writers in the gap tradition have described it as a problem that can be narrowed (Banks & Murphy 1985), blended (e.g., Dunnette 1990), integrated (Bartunek 2007), or bridged (e.g., Hodgkinson & Rousseau 2009). Implicitly, at least, the underlying ideal type behind this perspective may be a version of the scientist-practitioner model in which professionals [such as industrial and organizational (I/O) psychologists] would be trained as both scientists and practitioners. However, in a world of growing specialization and rapid change, it is increasingly difficult for both practitioner and research skills to be found in the same person (Thayer et al. 2011). Still, the ideal might nevertheless be largely attained to the extent that scientific studies are motivated and informed by practical problems, and practitioners seek to address those problems by blending the insights of scientific evidence “with years of accumulated wisdom gained in the field—art and science in harmony” (Hodgkinson 2011, p. 51). However, this rarely seems to happen (Rynes et al. 2001).

Although the A–P gap and ways to bridge it have drawn sporadic concern for a long time, there has been a rather dramatic increase in attention paid to this issue in the past 15 years. As Bartunek & Rynes (2014) showed, there was a notable spike in scholarship relating to the A–P gap between 2000 and 2005, predating by a few years the advent of EBMgt in the United States (Pfeffer & Sutton 2006a,b; Rousseau 2006). However, they also showed that the vast majority of these articles

have been neither empirical nor theoretical in nature; most would be more accurately characterized as essays or perspective pieces. Still, the number of empirical pieces has risen appreciably since special issues on the A-P gap were published by the *British Journal of Management* and *Academy of Management Journal* in 2001 (Hodgkinson 2001, Rynes et al. 2001) and *Organization Studies* in 2010 (Jarzabkowski et al. 2010).

A few tentative conclusions can be drawn from this relatively small amount of empirical work (Bartunek & Rynes 2017). Most studies that have compared topic interests between academics and practitioners have shown considerable differences in interests (e.g., Banks et al. 2016, Cascio & Aguinis 2008, Rynes 2012), although there are a few commonalities as well (Banks et al. 2016). Furthermore, practitioners' topical interests appear to influence academic researchers more than academic research topics influence practitioner interests; that is, academics lag in studying what practitioners find interesting and rarely lead practitioners to attend to what they (academics) find important (e.g., Barley et al. 1988, McWilliams et al. 2009, Schulz & Nicolai 2015). A further impediment to practitioner use of academic research is that practitioner and bridge journals do not do a good job of covering and accurately representing academic research findings (Rynes et al. 2007, McWilliams et al. 2009). Additionally, a recent large-scale survey suggests that academics are more interested than practitioners in seeing additional research about implementing management best practices and narrowing the A-P gap (Banks et al. 2016). In sum, longstanding awareness of the A-P gap provides part of the historical backdrop to the current EBMgt movement in that it has revealed the existence of numerous differences between scholarly findings and practitioner actions, illuminated their possible causes, and suggested possible solutions.

Conflicting Results in Research Studies

Another backdrop to the rise of EBMgt and EBMed has been the reality in many fields that as research findings have proliferated, they have rarely seemed to cumulate in a consensus. Rather, for most important research questions, some studies have shown positive results, others negative, and still others contingent or moderator effects. This has produced a belief that research findings are not cumulative or generalizable, but rather situationally specific. However, as Schmidt (1992) and Hunter et al. (1982) argued some time ago, the belief in situational specificity emerged partly from faulty analytical procedures, which meta-analysis could overcome: "Many believe that traditional data interpretation procedures based on statistical significance tests reduce the impact of sampling error on scientific inference. Meta-analysis shows that the significance test actually obscures underlying regularities and processes in individual studies and in research literatures, leading to systematically erroneous conclusions. Meta-analysis methods can solve these problems—and have done so in some areas" (Schmidt 1992, p. 1173). More specifically, meta-analysis can reveal when variations in effect sizes across primary studies are due simply to artifacts such as sampling error and when they are due to true contextual or moderator effects (Aguinis et al. 2011).

Eventually, researchers in organization science (OS)¹ began to produce more meta-analyses, some of which have become extremely influential (e.g., Barrick & Mount 1991, Mathieu & Zajac 1990). However, this did not occur easily, or without a great deal of controversy and resistance. Resistance occurred partly because of the complexity of learning meta-analytic methods, but as much or more so because meta-analysis was much more than a new method for conducting reviews. Specifically, the advent of meta-analysis changed the relative prestige of different kinds of studies

¹EBMgt literature is dispersed across various subfields of management and psychology, including I/O psychology, organizational behavior (OB), human resource management (HRM), and strategy. For simplicity, we use the term organization science (OS) throughout.

and, concomitantly, different types of researchers. Meta-analyses (frequently in combination with path analyses) became highly regarded as sources of theory building and testing, while the relative prestige (and citation rates) of individual studies and qualitative reviews diminished (Judge et al. 2007). Meanwhile, a similar movement was occurring in medicine, which zeroed in on systematic reviews (SRs) as its main method of cumulating research findings.

Evidence-Based Medicine and Evidence-Based Practice

The term “evidence-based medicine” (EBMed) was first coined by Gordon Guyatt and colleagues in 1992 (Evidence-Based Medicine Working Group 1992). According to several founders of this movement, “evidence based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research” (Sackett et al. 1996, p. 71).

The “complete practice of EBMed” (Straus et al. 2011, p. 3) involves five steps. These include (a) converting practicing physicians’ need for information into an answerable question; (b) finding the best evidence to answer that question; (c) critically appraising that evidence for its validity, impact (i.e., effect size), and applicability; (d) integrating the critical appraisal with clinical expertise and with patients’ unique biology, values, and circumstances; and (e) evaluating the effectiveness and efficiency in executing steps a–e and seeking ways to improve them the next time around.

Although EBMed started as a teaching innovation, it increasingly has become a practice-based innovation supported by multiple databases. Principal among these is the Cochrane Collection, a collection of systematic research reviews generated by more than 30,000 volunteers in over 100 countries (Barends & Briner 2014). These SRs provide “pre-appraised” evidence, meaning that the relevance and quality of the included studies (as well as decisions about which studies to include or exclude) have been assessed and explicitly addressed by the authors of the review. Another pre-appraised database is McMaster PLUS, which systematically scans and critically appraises 30,000 medical articles per year [only ~12% of articles meet their criteria for validity and relevance (Barends & Briner 2014)]. Other databases also exist that provide non-pre-appraised medical evidence, such as PubMed.

The practice of EBMed has spread rapidly since 1992 and has not stopped at the boundaries of the medical professions. In fact, by the time EBP first garnered serious attention in psychology (APA Presidential Task Force on Evidence-Based Practice 2006) and management (Pfeffer & Sutton 2006a,b; Rousseau 2006; Tranfield et al. 2003), it had gained inroads into numerous other fields such as education, nursing, health care, and policing. Indeed, by 2006, the term EBP was already being used by many professionals, even in medicine, given that evidence-based principles were being applied in largely the same way across different professions (Barends & Briner 2014). In fact, the 2005 Sicily Statement on Evidence-Based Practice (Dawes et al. 2005) posited that “evidence-based practitioners may share more attitudes in common with other evidence-based practitioners [i.e., from other fields] than with non-evidence-based colleagues from their own profession who do not embrace an evidence-based paradigm” (p. 3). We turn now to how EBMed and EBP more generally were introduced to the field of management.

EVIDENCE-BASED PRACTICE COMES TO MANAGEMENT

Defining Evidence-Based Management

Defining EBMgt is an important and challenging task. Although EBP had diffused across several professions by the time it reached management, from the very beginning there was recognition

that applying EBP in management was likely to prove more challenging than doing so in medicine (Tranfield et al. 2003). Several factors made this likely. First, management is a less developed research field than medicine, with a far less consistent agenda and lower agreement as to what the key research questions are or how they should be studied (e.g., Pfeffer 1993, Rousseau 2012b, Rousseau et al. 2008). Another challenge is that management, unlike medicine, is not a profession. As such, managers do not receive a standardized education based on an agreed upon body of knowledge, do not need to be accredited to practice, and cannot be sued for professional malpractice. A third challenge is that the management research base is less objective and less concerned with cumulating reliable and replicable knowledge than fields more closely aligned with the “hard” sciences, such as medicine (e.g., Fanelli 2011, Starbuck 2016). For all these reasons, nearly all proponents of EBMgt argue that some degree of “translation” and adaptation is required in moving from EBMed to EBMgt.

Not surprisingly, the definition of EBMgt has become more elaborated over time (Hornung 2012). **Table 1** lists the main definitions that have been offered by various authors over the first years of EBMgt. These show numerous variations, particularly in terms of which factors are presumed necessary for evidence-based decision making. The first definition, by Rousseau (2006, p. 256), was “translating research principles based on best evidence into organizational practice.” However, subsequent definitions tended to add other factors to be used in combination with research principles or the best evidence. These included logic (Pfeffer & Sutton 2006a), surrounding circumstances or local context (Briner et al. 2009), ethical concerns (Rousseau & McCarthy 2007), practitioner expertise and judgment (Briner et al. 2009), systematic attention to organizational facts (Rousseau 2012b), perspectives of people who might be affected by the decision (Briner et al. 2009), and decision aids that reduce bias and enable fuller use of information (Rousseau 2012b).

The most recent definitions [Barends et al. 2014b; see, also, the Center for Evidence-Based Management (CEBMA; <https://www.cebma.org/>)²] employ not only the sources of evidence (scientific literature, organization/local context, practitioners and stakeholders), and factors deemed necessary for evidence-based decision making (e.g., critical thinking, values, and concerns), but also the steps required for a “complete application” of EBP (see, also, Straus et al. 2011). CEBMA’s comprehensive definition is that “Evidence-based practice is about making decisions through the conscientious, explicit and judicious use of the best available evidence from multiple sources by: asking an answerable question; acquiring research evidence; appraising the quality of the evidence; aggregating the evidence; applying the evidence in decision-making, and assessing the outcomes of the previous steps” (these are known as the “6 A’s”). For the purposes of this review, we use CEBMA’s comprehensive definition, which is visually depicted in **Figure 1**.

The Foundational Articles: Introducing and Advocating for Evidence-Based Management

For many OS scholars in North America, the first awareness of EBP probably came in 2005 with Denise Rousseau’s Academy of Management Presidential Address (Rousseau 2006). However, her presidential address was preceded by a 2003 article in the *British Journal of Management* by David Tranfield, David Denyer, and Palminder Smart (Tranfield et al. 2003). These two publications

²CEBMA (<https://www.cebma.org/>) is an independent nonprofit member organization. It grew out of meetings of the EBMgt Collaborative, which first met at Carnegie Mellon University in 2007. CEBMA was founded by an international group of management scholars and practitioners to promote evidence-based decision making and practices in the fields of management and leadership.

Table 1 Definitions of evidence-based management (EBMgt) in the previous literature

Source	Definition
Rousseau 2006 (p. 256)	EBMgt means translating research principles based on best evidence into organizational practice.
Pfeffer & Sutton 2006a (p. 63; <i>paraphrased</i>)	(Being) routinely guided by the best logic and evidence, relentlessly seeking new knowledge and insight from both inside and outside (one's) company, and continually updating (one's) assumptions, knowledge, and skills
Rousseau & McCarthy 2007 (p. 84)	EBMgt means managerial decisions and organizational practices informed by the best available scientific evidence. . . . The judgments EBMgt entails also consider the circumstances and ethical concerns managerial decisions involve.
Briner et al. 2009 (p. 19)	EBMgt 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.
Briner & Rousseau 2011 (p. 6)	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. Third, it uses systematic reviews to assess all available and relevant evidence rather than relying on single studies.
Rousseau 2012a,b (p. 3)	EBMgt . . . practice incorporates: (a) use of scientific principles in decisions and management processes, (b) systematic attention to organizational facts, (c) advancements in practitioner judgment through critical thinking and decision aids that reduce bias and enable fuller use of information, and (d) ethical considerations including effects on stakeholders.
Rynes et al. 2014 (p. 305)	EBMgt is a professional form of managerial practice. It is about making decisions through the conscientious, explicit, and judicious use of the best available evidence from multiple sources to help managers choose effective ways to manage people and structure organizations.
Barends et al. 2014a,b; Morrell & Learmonth 2015	Evidence-based practice in management is about making decisions through the conscientious, explicit, and judicious use of the best available evidence from multiple sources by <ol style="list-style-type: none"> 1. <i>Asking</i>: translating a practical issue or problem into an answerable question 2. <i>Acquiring</i>: systematically searching for and retrieving the evidence 3. <i>Appraising</i>: critically judging the trustworthiness and relevance of the evidence 4. <i>Aggregating</i>: weighing and pulling together the evidence 5. <i>Applying</i>: incorporating the evidence into the decision-making process 6. <i>Assessing</i>: evaluating the outcome of the decision taken to increase the likelihood of a favorable outcome.

were followed shortly by a *Harvard Business Review* article and book on EBMgt by Pfeffer & Sutton (2006a,b), as well as another foundational paper in the *Academy of Management Annals* (Rousseau et al. 2008). Here we briefly review these introductory pieces before proceeding to a review of the extant EBMgt literature.

Tranfield et al.'s (2003) article was the first article in the EBMgt canon and is also the most frequently cited. In it, the authors introduced the concept of the SR and argued its merits as a useful means of cumulating knowledge in management. They noted that it had become harder and harder for practitioners to make sense of the often contradictory evidence in both management and medicine. In response to this problem, medicine developed the SR process to counteract perceived biases and other shortcomings of narrative literature reviews. The process of conducting an SR consists of the first four A's of CEBMa's current definition: asking an answerable question, acquiring the research evidence, appraising the quality of the evidence, and aggregating the evidence. Tranfield et al.'s basic premise, similar to that of Hunter et al. (1982), was that applying

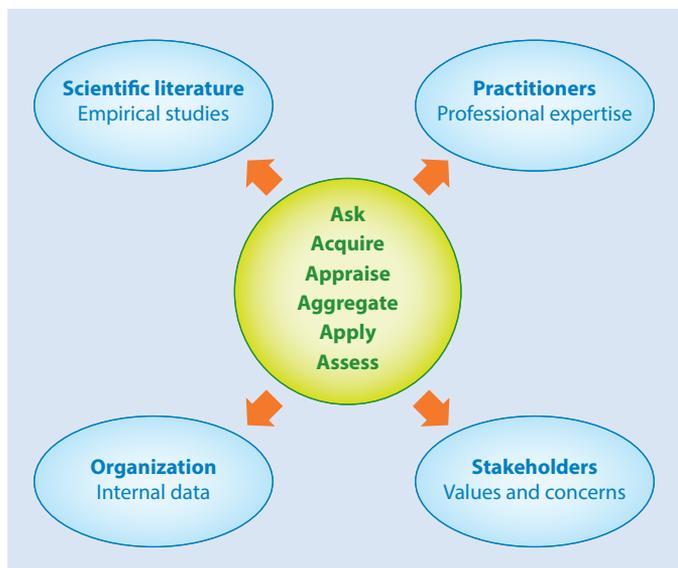


Figure 1

Sources of available evidence. Reprinted from Barends et al. (2014b) with written permission from Barends.

SRs in management would enhance the legitimacy of the field’s evidence base and thereby “provide practitioners and policy-makers with a reliable basis to formulate decisions and take action” (Tranfield et al. 2003, p. 207).

Tranfield et al. (2003) positioned SRs between traditional narrative reviews and meta-analyses. Although they criticized narrative reviews as selective and frequently biased in terms of the articles included and interpretations given, they characterized meta-analyses as being limited because they rely on quantitative assessments of commensurable studies addressing the same question. Given the diversity of methods, questions, and epistemologies in management, Tranfield et al. believed that only a relatively narrow subset of questions in management could be adequately summarized by meta-analysis alone.³ They did, however, characterize meta-analysis as one form of SR.

Tranfield et al. (2003, p. 219) deliberately used the term “evidence-informed” rather than evidence-based because “within management there is a need to recognize that evidence alone is often insufficient and incomplete, only informing decision-making by bounding available options. Therefore, the terms ‘evidence informed’ or even ‘evidence aware’. . . may be more appropriate” in management. As such, Tranfield et al. clearly communicated that scientific research evidence was not the only factor to be used in EBMgt.

Two years after Tranfield et al.’s (2003) publication, Denise Rousseau delivered the 2005 Academy of Management presidential address, “Is There Such a Thing as Evidence-Based Management?” (Rousseau 2006). The overall theme of her address was that many people suffer from poor management—not only employees, but also their families and their communities—and that application of research principles could improve the quality of management and life for various organizational stakeholders. She talked about how management was a dirty word growing up in

³Many management questions have been examined via meta-analyses, although these analyses have tended to ignore qualitative primary studies addressing the same issues as quantitative ones.

her blue collar family, and how most of her students complain in great detail about their worst bosses while few can describe having had a really great one.

Many of the themes in Rousseau's talk overlapped with Tranfield et al. (2003), for example, the potential usefulness of EBMed as a model for management, the need to combine a variety of other factors (e.g., internal organizational evidence or "little e," practitioner expertise, and decision support systems) with external scientific research evidence ("Big E"), and the differences between medicine and management that make EBMgt more challenging than EBMed (e.g., lack of common professional training and absence of malpractice sanctions). But the second half of her talk focused on the role that academics, particularly instructors, have played in producing graduates who neither understand nor use research evidence when they leave college. Rousseau then suggested several things academics can do as teachers, both individually and collectively, to close the research–practice gap, such as managing students' expectations, providing examples of evidence-based practice (e.g., through guest lectures by evidence-based practicing managers), promoting active use of evidence, and forming collaborations of researchers, educators and practitioners. She cautioned that EBP can be misapplied, for example, by imposing identical regimens on units with differing needs or requirements, or superficially using the term evidence-based to promote the latest management fad or hidden agendas, but she closed with a positive vision for EBMgt: "A focus on evidence use may ultimately help to blur the boundaries between researchers, educators, and managers, creating a lively community with many feedback loops where information is systematically gathered, evaluated, disseminated, implemented, re-evaluated and shared" (Rousseau's 2006, pp. 267–68).

In contrast to Rousseau's (2006) address, Pfeffer & Sutton's (2006a) *Harvard Business Review* article was aimed at executives and managers, and starts with this zinger of a call-out: "Executives routinely dose their organizations with strategic snake oil: discredited nostrums, partial remedies, or untested management miracle cures. In many cases, the facts about what works are out there—so why don't managers use them?" (p. 63). Their answer is that instead of facts, managers rely on obsolete information they learned while they were in school, long-standing but unproven traditions, patterns based on their personal experience, the methods they are most personally skilled at applying, and "information from hordes of vendors with products and services to sell" (Pfeffer & Sutton 2006a, p. 63). As countermeasures to these trends, Pfeffer & Sutton offered tips for becoming an evidence-based organization and developing an evidence-based mindset: Demand evidence and metrics, probe weak or unclear logic, conduct experiments to see what works and what doesn't before developing policies and practices, and embrace an attitude of wisdom (act on the basis of the best available knowledge while continually questioning what you know).

In the final foundational paper reviewed here, Rousseau et al. (2008) advocate the use of systematic syntheses in OS. As do Tranfield et al. (2003), the authors emphasize that syntheses are not "conventional literature reviews . . . (which are) often position papers, cherry picking studies to advocate a point of view" (Rousseau et al. 2008, p. 476). Rather, "a research synthesis is the systematic accumulation, analysis, and reflective interpretation of the full body of relevant empirical evidence related to a question" (Rousseau et al. 2008, p. 475).

The authors argue that evaluating the evidentiary value of a body of primary studies in OS involves the use of six basic criteria: construct validity of all relevant variables, internal validity (proper demonstration of a causal relation), effect size, generalizability to other contexts (including unpublished research), intervention compliance (appropriate application of a practice or intervention), and contextualization (which goes beyond generalization by both identifying the limits of a phenomenon and explaining why it is limited).

Rousseau et al. (2008) remind readers that research syntheses are more challenging in OS than in many other fields, due largely to low levels of paradigmatic agreement and the complexity of

the domain. OS deals with multiple levels of analysis, examines both facts and opinions, deals with attitudes, behaviors, and outcomes of managers and workers, and produces a variety of tools based on scientific input (e.g., psychometric tests). Rousseau et al. view three sources of diversity in OS as particularly challenging: (a) alternative models of science (epistemology), (b) divergent views on the political and cultural implications of evidence, and (c) professional rivalry in competing for scarce resources.

Epistemologically, Rousseau et al. (2008, pp. 485–86) distinguish among three principal ways of knowing: positivism, which “seeks explanations founded on the notion of a unified reality governed by observable laws,” relativism, “where no universal reality is presumed . . . beyond what is socially constructed,” and critical realism, which “occupies the middle ground between positivism and relativism” and includes “any epistemological position that maintains the existence of an objectively knowable reality, while acknowledging that perception and cognition mediate human comprehensions of that reality.” The authors propose that syntheses in OS are best accomplished through a critical realist perspective, which they view as avoiding either/or trade-offs and encouraging triangulation across methods and data sources. Furthermore, in using the terms perception and cognition, Rousseau et al. include the ability to critically appraise facts, values, and assumptions.

Finally, the authors explain that there are at least four types of systematic research syntheses appropriate to OS: aggregation, integration, interpretation, and explanation. Of these, aggregation—a quantitative synthesis whose defining methodology is meta-analysis—has been by far the most commonly applied to date in both OS and medicine. Perhaps partly as a result, critics have been vociferous in their objections that EBMgt privileges logical positivism, quantitative research, and a particular hierarchy of evidence over other kinds of research, thus (according to critics) attempting to reduce pluralism and diversity in OS research (e.g., Learmonth 2008, Morrell & Learmonth 2015). However, Rousseau et al. (2008) make clear that the other three types of syntheses do not rely solely on quantitative evidence, with one (interpretation) consisting entirely of qualitative data (see Hoon 2013 for a proposed eight-step methodology for conducting interpretive meta-synthesis). In other words, they explicate and encourage multiple types of syntheses. These ideas are developed further in several chapters in *The Oxford Handbook of Evidence-Based Management* edited by Rousseau (2012b).

THE EXTANT EVIDENCE-BASED MANAGEMENT LITERATURE BASE

We now turn to a brief review of the currently existing literature on EBMgt. To locate the body of EBMgt literature, we first searched the Web of Science Social Science Index and ABI/Inform Global for the terms evidence-based management and evidence-informed management in the following fields: management, business, applied psychology, public administration, interdisciplinary social sciences, and industrial and labor relations. We then searched Scopus, PsycINFO, and Business Source Complete using the terms evidence-based management and evidence-based practice for additional articles. After screening for relevance, these searches yielded 134 articles in English language journals that had been published or were in press and available online by June of 2016 [see the supplemental Extended Literature Cited: Articles Addressing Evidence-Based Management (1999–July 2016), by following the **Supplemental Material** link in the online version of this article or at <http://www.annualreviews.org/>]. For purposes of this review, we eliminated magazine and newspaper articles, book reviews, articles that pertained to disciplines other than psychology and management (we did include health care management), and articles that used “evidence-based” in a way that did not pertain to EBP (e.g., “evidence-based” reviews of specific phenomena such as turnover).

 Supplemental Material

Once we had narrowed the set of articles, we jointly proposed (and then refined) a list of categories into which the articles seemed to cluster. We independently coded each article into its primary category and resolved discrepant cases through discussion. Resultant categories were empirical (21%), introductory/advocacy (16%), essays/perspectives (17%), teaching-related (14%), reviews (6%), critiques/responses (19%), how-to (5%), and other (2%).

Introductory/Advocacy Articles

The four foundational articles discussed in the previous section are examples of the introductory/advocacy category—articles that introduce the concept of EBP and build arguments as to why readers should adopt it. Articles other than the four already discussed contained similar themes, and some extended advocacy to somewhat different disciplines or types of management (e.g., Briner & Rousseau 2011 extended advocacy to I/O psychology, and Kovner 2014 extended it to nonprofit management).

Essays and Perspective Pieces

Articles categorized as essays⁴ and perspective pieces addressed a wide variety of topics. For example, several essays described recent developments in research or practice that the authors believed could be used fruitfully alongside or in service of EBMgt. One such development is the growing body of design science research (Van Aken 2005), which several essayists suggest might work harmoniously with EBMgt to improve the relevance of management research for practice (e.g., Hodgkinson & Starkey 2011, Rousseau 2012a, Van Aken & Romme 2009). Other essays argue for adoption of particular EBPs, such as Courtright et al.'s (2012) endorsement of crew resource management training for reducing accidents in high-risk team-based settings such as health care and air travel. Still others promote the creation of more dialogical venues across multiple groups of stakeholders (e.g., Romme et al. 2015). Chiaburu (2016) speculates that the use of big data analytics may reduce the dominance of what some perceive to be excessively rational, theory-based methods of analysis in management research (e.g., Alvesson & Sandberg 2014).

Teaching-Related Articles

Slightly more than 15% of the articles focused specifically on teaching. In her presidential address, Rousseau (2006) made it clear that academics' roles as teachers are very important to whether or not graduating students are motivated and equipped to become evidence-based practitioners. She soon followed up with an article advocating that academics teach from an evidence-based perspective (Rousseau & McCarthy 2007). She and McCarthy offer several guidelines for instructors: focus on principles where the science is clear, develop decision awareness in professional practice, diagnose underlying factors related to decisions, contextualize knowledge related to evidence use, develop evidence-based decision supports, and prepare to continually access new evidence. A subsequent empirical examination (Charlier et al. 2011) of more than 800 syllabi from required courses in management programs found that only 26% appeared to be teaching EBMgt principles, with higher proportions in courses taught by instructors with PhDs as well as in organizational behavior courses, where the proportion reached 48%.

The vast majority of articles in the teaching category consist of academics, in their roles as instructors, describing how (and why) they teach some aspect of EBMgt, largely so that others

⁴There is another category of (mostly) essays that are explicit critiques of EBMgt; these are discussed in the Critiques and Responses section.

might be able to borrow from their experiences (e.g., Dietz et al. 2014, Erez & Grant 2014). Several such articles were included in a special issue of the *Academy of Management Learning & Education*, a summary of which can be found in Rynes et al. (2014). Another set of teaching-related articles can be found in Rousseau's (2012b) edited *The Oxford Handbook of Evidence-Based Management*.

Empirical Articles

Empirical studies comprise the largest category of articles, accounting for 21% of all identified articles. Although it is encouraging that this is the largest category, from another perspective it means that nearly 80% of articles on EBMgt are not based on empirical evidence (see, also, Reay et al. 2009). Moreover, many of these studies would not rank highly on the six characteristics identified by Rousseau et al. (2008) as indicative of high-quality empirical research. For example, many studies interview relatively small numbers of practitioners who self-report how they use evidence or what factors they consider in making decisions. This methodology has long been known to be fraught with numerous biases and opportunities for error. Furthermore, there are almost no double-blind randomized controlled trials, the “gold standard” of evidence-based research aimed at answering “what works?” questions in aggregative reviews (Barends et al. 2014a, Tranfield et al. 2003), although not the gold standard for other sorts of important questions (Petticrew & Roberts 2003, Rousseau et al. 2008) and perhaps nearly impossible for certain types of (especially macro) OS studies (e.g., Beer 2014).

Here we describe a few of the more exemplary empirical studies. One is Pritchard et al.'s (2008) meta-analysis of 83 field implementations of the productivity measurement and enhancement system, an intervention that seeks to enhance the productivity of work units through performance measurement and feedback. Results revealed large mean productivity increases for the intervention ($d = 1.16$; weighted $d = 1.44$)⁵ and also showed that the increases often lasted over long periods of time and were obtained in many different types of organizations. One of the most impressive features of this meta-analysis is that it explicitly measured a variety of potential moderator variables. Examination of the artifact of sampling error variance showed that it accounted for only 15.6% of total variance, suggesting the presence of true contextual moderators. Moderator analyses showed that effect sizes were larger in units where the prescribed protocol was followed more closely, and when feedback was of higher quality and units were more centralized. Negative moderators were amount of feedback prior to implementation, group interdependence, and changes in the feedback system during the course of the study. Another excellent feature of this study is that it meets the serious need for replication studies in order to increase the chances of producing reliable and replicable results (e.g., Barends et al. 2014a, Starbuck 2016).

In a second exemplary study, Glaub et al. (2014) developed a systematic method for taking well-supported research findings—in this case, involving the construct of personal initiative—and transforming them into a practical intervention that yielded important real-world results. The evidence-based tenets of the dynamics underlying personal initiative—i.e., formulating actionable goals, trying new behavior, and overcoming obstacles—were used to develop action guidelines for training and developing entrepreneurs in Uganda. Using a randomized control trial design, the authors recruited Ugandan business owners who were randomly assigned to several participant classes in order to compare trained participants' business success with that of randomly assigned but not-yet-trained counterparts. Results showed large differences between trained versus untrained groups in both personal initiative behaviors and objective measures of business success. In addition to providing specific training guidelines for using personal initiative among entrepreneurs, Glaub

⁵Weighted d was weighted by the number of data collection and feedback periods of each intervention.

et al. also provided a more general framework for constructing action guides based on evidence regarding how cognitions translate into behavior.

Several interesting articles come from the growing number of practice-oriented studies inspired by increased interest in EBMgt and the A-P gap. These studies focus on collaboration between academics and practitioners in evidence production, and/or on ways in which evidence is used in everyday practice (Rousseau & Gunia 2016). Although most of this research consists of case studies with limited ability to trace cause and effect, they nevertheless have a variety of countervailing advantages. These include determining the full range of variables or approaches that might be important to a particular research question, increasing the likelihood of research use by increasing practitioners' knowledge of and comfort with research practices and encouraging their participation, modifying EBMed practices to better fit the EBMgt environment, and incorporating both academic and practitioner inputs in resolving the lack of clarity that often arises in the process of conducting systematic reviews.

One such study is Marcos & Denyer's (2012) ethnographic case study of a collaborative knowledge production effort by a major UK professional services group and two researchers at a UK school of management. This study used a combination of interviews with 36 key actors, analysis of 414 written documents, and many hours of participant observation over a six-year collaboration. The original idea was that the two academics would conduct an SR of the research on high-reliability organizations (HROs), which would then be applied by the service group to assist their clients. However, the academics soon found that the evidence on HROs was anything but clear, which led to a much more active knowledge creation role among the practitioners than anticipated.

Readers are encouraged to read the fascinating details of this case for themselves. However, we share the authors' five concluding insights regarding A-P research collaborations: (a) Knowledge coproduction is contingent on the capabilities, actions, and experience of the involved individuals; (b) scientific and practitioner knowledge are complementary rather than contradictory; (c) "imagineering"—envisioning novel ideas (imagining) and then applying them to create specific solutions to client problems (engineering)—is a key A-P collaborative practice; (d) there are fine lines and potential tensions between exploration and exploitation in collaborative projects; and (e) involvement in collaborative projects can help practitioners develop research-related abilities such as interpreting data, assessing research quality, and understanding academic arguments.

Another illuminating case study was reported by Bansal et al. (2012), who describe the founding and emerging role of the Canadian nonprofit Network for Business Sustainability (NBS). The authors—all members of NBS—included three academics (including the NBS founder and executive director) and two practitioners (the managing director of NBS and an energy company sustainability manager). The main portion of the case includes first-person narratives from the five authors based on their experiences in coproducing an SR on "how to embed sustainability in organizational culture."

The lessons learned during the process were many. For example, the academic founder soon learned that member companies strongly preferred consultants' presentations to academics' presentations, and didn't see the advantages of using academics' stronger research methods. As a result, she had to work hard to explain the advantages of researchers' painstaking methods in producing SRs. Furthermore, the lead researcher soon learned that the Cochrane coding process, which was developed in medicine and depends on coding quantitative effect sizes, could not be applied to sustainability research, most of which consisted of case studies. All participants learned that key constructs were used in very different ways by different authors; thus, extensive joint academic-practitioner dialog was needed to develop a common vocabulary (see, also, Marcos & Denyer 2012). Researchers learned that it was important to include practitioner literature that

made unsupported claims to fully reflect practitioners' realities and give them a wide range of possible options. (They presented the findings in such a way that it was clear which "findings" were research supported and which were not). The group also learned that it was money well spent to hire a graphic designer to present their complex findings in a single visual. The result was a "culture wheel" integrating 59 possible practices (only 13 of which were research supported) into four quadrants. The authors conclude by discussing the paradoxes of A-P relationships and arguing that bridging the research–practice gap is beyond the capabilities of most individuals. As such, they call for the founding of more intermediary organizations like NBS.

In a study examining how evidence is used in decision making, Mele et al. (2013) conducted a multicase study to see how government policymakers in 16 different regions of Italy defined, sought, and used the "best available evidence" in decisions about creating policies with respect to investment in Da Vinci robots (used for laparoscopic surgery). Acquiring these robots is very expensive, and evidence of their superiority is lacking in most applications except urology. This makes robot acquisition an excellent phenomenon for studying whether, and how, research evidence is used in decision making. Overall, the authors examined 800 pages of interview transcripts (from 148 individuals) and 1,400 pages of documents related to robot purchase decisions.

Results showed four different archetypes of research usage.⁶ Regions using the first archetype, "activation of a competency network," identified the best available evidence by producing their own local studies. The "authorization" archetype used a combination of research evidence from SRs as well as "an evaluation of the feasibility of the overall investment from a financial, economic, and organizational perspective" (i.e., local context; Mele et al. 2013, p. 855). In the two regions characterized by "incentive provision," policymakers decided to financially incentivize robotic procedures (via reimbursements) only for prostatectomies, the one surgery for which studies suggested a broad consensus regarding their superior effectiveness. The two regions using a "central planning" archetype explicitly rejected existing scientific evidence [Health Technology Assessments (HTAs)] because "HTA and the like are absolutely inadequate instruments because they refer to the past. We need an HTA of the future" (Mele et al. 2013, p. 858). Future research might be conducted in these regions to determine the reasons behind the regional variations (e.g., decision-maker beliefs, differences in local context), which regions obtained the best outcomes, and whether the new local studies were consistent with already-conducted ones.

Reviews

Six percent of articles (5.7%) were classified primarily as reviews; we mention four here. Barends et al. (2014a) conducted an SR of organizational change management (OCM) interventions. The authors concluded that the evidence base for OCM is weak, with a preponderance of one-shot studies, few replications, and generally low internal validity. Of 563 studies, only 2% used control groups and randomization, whereas 77% of studies had no controls and no pretests. Suggestions were made for improving the quality of the OCM research base, particularly through the production of replication studies, randomized controlled studies where possible, and increased use of cohort, case control, and time-series designs.

Goodman et al. (2014) reviewed the evidence on whether bibliographic search training improves trainees' ability to effectively search for the best available scientific evidence. Their review provides a wealth of information to instructors of EBMgt as well as to researchers or practitioners who seek to improve the efficiency of their searches for relevant research. They show how

⁶These archetypes are far more complex than can be conveyed here; we urge readers to consult the original article.

dramatically search results can differ, depending on the search engine chosen and the mode of search used; two different ways of searching the question, “What effect does job satisfaction have on creativity and innovation?” yielded 33 records via one search method versus 588,000 via the other! They also summarize the research on whether training improves bibliographic search outcomes (the answer appears to be “yes,” at least for medical students and residents as well as undergraduate business students) and what kinds of training seem to be most effective (e.g., guided exploration, giving feedback, and providing exemplary solutions).

Rousseau & Gunia (2016) reviewed research on EBP implementation across several disciplines, although the bulk of the research reviewed emanated from medicine, nursing, and related health care disciplines (e.g., psychiatry) rather than management. Drawing on Ajzen’s (1991) theory of planned behavior to organize their review, the authors found that EBP occurs more frequently where practitioners have the ability, motivation, and opportunity to practice in an evidence-based way. They also included a section on studies of EBP effectiveness showing that the use of decision aids such as guidelines and checklists has clearly been effective in health care applications. However, results may be more nuanced in other fields such as criminal justice (e.g., Cullen 2013). None of the examples of EBP effectiveness came from management, although there was one from youth psychotherapy (Weisz et al. 2013a,b).

Adams et al. (2016) reviewed 124 SRs to examine how they handled incorporation of “gray literature” or “the diverse and heterogeneous material that is made public outside, and not subject to, traditional academic peer review processes” (p. 1). Of the 124 reviews examined, 44 included gray literature (e.g., the sustainability culture review described earlier by Bansal et al. 2012), 31 did not include gray literature but acknowledged its existence, and 65 neither mentioned nor included gray literature. Analyses showed that the main reason for including gray literature was that the intended audience was primarily practitioners, who tend to view gray matter as more useful than do academics. Additional reasons included to fill in gaps in the peer-reviewed literature, better contextualize findings from academic research, find the most current evidence in fields where practice is outpacing research, or help formulate the research question when practitioner impact is an important goal. The authors describe several potential benefits from incorporating gray literature in systematic reviews and provide guidelines on whether and how to do so.

Critiques and Responses

Articles critiquing EBMgt (19%) came in the form of either stand-alone essays or responses to focal articles such as those by Briner & Rousseau (2011) and Barends et al. (2014a). These critiques and responses comprise a particularly complex category. Some of them introduce issues particularly pertinent to the evidence-based approach. Others, however, raise questions about the scholarly foundations of virtually all social science research, a topic that is much broader than EBMgt itself.

Epistemological and political critiques. The introduction of EBP to management has generated vociferous criticism from the very beginning. Indeed, Mark Learmonth, anticipating the publication of Rousseau’s presidential address in *Academy of Management Review*, wrote a dialogic response essay (Learmonth 2006) that focused mainly on epistemological and political differences of opinion. Indeed, a majority of journal space critiquing EBMgt has been generated by academics who, like Learmonth, identify as critical management studies (CMS) scholars (e.g., Mats Alvesson, Kevin Morrell, and André Spicer). However, there also have been (typically less vigorous) critiques among researchers in the positivist and critical realist traditions (see, for example,

some of the responses to the focal articles in *Industrial and Organizational Psychology* by Briner & Rousseau 2011 or in *Journal of Applied Behavioral Science* by Barends et al. 2014a).

Although Rousseau et al. (2008) focused on epistemological debates (e.g., positivism versus relativism) before political ones, for many CMS scholars the political issues associated with EBMgt are even more salient. For example, Learmonth (2008) says that his strongest concerns with EBMgt are its bias toward top managers and, “more crucially . . . the attempt to dichotomize evidence with ideology [and] facts with values . . . [this is] problematic because in organization studies, evidence is never just there, waiting for the researcher to find it. Rather, it is always necessary to construct the evidence in some way—a process that is inherently ideological and always contestable—not merely a technical, ‘scientific’ task” (Learmonth 2008, pp. 285–86).⁷

Claims of managerialist bias are neither new (Baritz 1960) nor confined to EBMgt. For example, Walsh et al. (2003) found that management research in general has become less focused on dependent variables associated with human welfare (e.g., satisfaction, health, justice, and social responsibility) and more concerned with economic objectives (productivity and performance). Moreover, some have argued that management research is no longer so much managerialist as shareholder focused, with the rise of research streams such as agency theory that privilege shareholders relative not only to workers, but also to managers and professionals (e.g., Ghoshal 2005, Leicht & Fennell 2001).

In addition, it is patently clear that not all research designed to influence managers is likely to oppress or disadvantage workers. For example, there are still many management researchers examining human welfare outcomes in an attempt to make workplaces more humane (Walsh et al. 2003). There are also researchers who emphasize that worker welfare, if treated seriously, is more likely to be supportive of than competitive with profits (e.g., Arthur 1994, Gittell et al. 2004).

Nevertheless, critics are concerned that the EBMgt movement will accelerate efforts to crowd out nonpositivist and progressive forms of social science research such as ethnographies, which often reveal the power and control dynamics that underlie seemingly objective and/or progressive practices (e.g., Barker 1993, Ho 2009). This fear is based on the fact that research funding in an increasing number of disciplines is beginning to demand evidence-based approaches—particularly positivistic ones—under the tagline of “what works” (Learmonth 2008). Under such priorities, quantitative research methods and aggregative forms of synthesis (such as meta-analysis) are likely to be favored over critical or interpretivist topics or methods. Thus, although EBP can theoretically incorporate a wide variety of methods and types of syntheses (Rousseau et al. 2008), in reality, environmental, political, and financial pressures may push research in an even more positivist direction (Morrell & Learmonth 2015).

Quality of the research base. Another major challenge for EBMgt (and for research more generally) is that just as EBMgt began to take flight, critiques about the quality of the scientific research base—not only in OS but also in many other fields—began to mushroom. One of the biggest and best-documented problems is the bias of journal editors and reviewers toward positive findings. In 2005, medical doctor and researcher John Ioannidis boldly proclaimed that for a variety of reasons, most current published research findings are false (Ioannidis 2005). The arguments he developed, as well as the follow-up studies his criticisms fostered, have widely confirmed that

⁷CMS objections to EBMgt—and, actually, to management research in general—are very complex and rarely discussed in the psychology literature. They are more frequently discussed in the management literature, particularly in Europe and Australia and less so in North America. The interested reader is strongly encouraged to read the original sources.

there are positive biases in published research in a wide variety of disciplines, with psychology and management being two of the worst offenders.

Fanelli (2011) empirically examined the alleged preference in scientific journals for statistically “significant” results. He analyzed more than 4,600 papers published in multiple disciplines between 1990 and 2007 and found that the frequency of papers supporting tested hypotheses had grown by 22% between those years. Out of 19 disciplines examined, psychology and psychiatry had the second highest percentage of positive results, and economics and business the fourth highest. The rate of increase in positive results was highest in economics and business and third highest in psychology and psychiatry.

As outlined earlier, the continued use of statistical significance testing decades after its numerous problems were first exposed (Rozeboom 1960) has also been a source of dismay to methodologists in OS (Schmidt 1996). Its problems are many, given, for example, that it relies on an assumption of randomized samples (which almost never are used in surveys and field studies in the social sciences), assumes only one calculation is made with a predetermined set of variables, and is heavily reliant on sample size. Perhaps the most serious problem, however, is the widespread assumption that a statistically significant result is “important,” whereas nonsignificant results are not.

The fact that journals are more likely to publish papers with seemingly “positive,” “important” results, combined with the fact that statistically significant results can often be attained with a variety of questionable research practices, makes research ripe for “gaming.” For example, many researchers appear to practice HARKing (hypothesizing after results are known) or p-Hacking (data dredging or subjecting data to multiple manipulations and respecifications in search of significant results) to increase the number of statistically significant findings in their submitted articles (Starbuck 2016). O’Boyle et al. (2014) found that as research projects metamorphosized from dissertations to published journal articles, the ratio of supported to unsupported hypotheses more than doubled (from 0.82 to 1.00 versus 1.94 to 1.00). These apparent increases in predictive accuracy came from dropping statistically nonsignificant hypotheses, adding statistically significant ones, reversing the predicted direction of hypotheses, and altering data (see, also, Simmons et al. 2011). Bosco et al. (2016) provide further evidence of HARKing and the resultant likelihood that meta-analyses are producing inflated effect sizes.

According to Starbuck (2016, p. 172), “because statistical significance is so easy to attain, significance tests fill journals with idiosyncratic findings, many of which no one can ever replicate.” Indeed, this is what has been found in numerous important studies since Ioannidis’ (2005) article. In the most ambitious of these, a large group of researchers from the Open Science Collaboration (2015, p. 943) “conducted replications of 100 experimental and correlational studies published in three psychology journals using high-powered designs and original materials when available.” The objective was to conduct direct replications, recreating the conditions believed sufficient for obtaining a previously observed finding.

Results showed that the mean effect size (r) of the replication studies was half the magnitude of the effect sizes in the original studies (0.197 versus 0.403). Ninety-seven of the original 100 studies had significant results ($p < 0.05$), whereas only 36% of the replications did. The authors concluded that “a large portion of replications produced weaker evidence for the original findings despite using materials provided by the original authors, reviewed in advance for methodological fidelity, and high statistical power to detect the original effect sizes” (Open Science Collaboration 2015, p. 943). In another study, Fanelli & Ioannidis (2013) extracted 1,174 primary results from 82 meta-analyses in either biological or behavioral research and found that extreme positive (and thus less likely to replicate) results were more common in behavioral than biological research, a finding that they attribute to lower methodological consensus and higher noise in the behavioral sciences.

Critiques of systematic reviews. In addition to these general problems with the entire social science research base, questions have also been raised about the presumed superiority of SRs, which are more specifically associated with EBP. There are at least two common critiques of SRs in an OS context: (a) their predominant emphasis on “normal science” hierarchies of evidence quality and (b) the evidence preappraisal process, which can lead to seemingly arbitrary or excessively narrow study inclusion criteria.

Turning to the first issue, in some writings (Tranfield et al. 2003, Rousseau et al. 2008, Rousseau & Gunia 2016), it is abundantly clear that there are many issues in OS for which the normal science hierarchy of evidence quality (which privileges aggregative quantitative reviews and randomized control trials) may not be the most appropriate one. However, this point is not very clearly made (if at all) in other EBMgt advocacy articles. For example, Beer (2014) questions the appropriateness and feasibility of the use of the medicine-derived hierarchy in Barends et al.’s (2014a) systematic review of OCM: “It is very hard if not impossible to conduct controlled studies in complex organizations where strategies, problems, and leaders are constantly changing” (p. 29).

More generally, several of the respondents to Briner & Rousseau’s (2011) and Barends et al.’s (2014a) focal articles argued that a much broader view of evidence must be taken for many of the problems confronted in EBMgt if advocates hope for a positive reception by practitioners and nonpositivist researchers (e.g., Boatman & Sinar 2011, Cronin & Klimoski 2011, Hodgkinson 2011). We believe that the previously reviewed experiences of Bansal et al. (2012) and Marcos & Denyer (2012) reinforce this critique. Thus, like Rousseau & Gunia (2016), we recommend Petticrew & Roberts’ (2003) typology (versus hierarchy) of evidence for preliminary guidance as to the most appropriate evidence for the question at hand and encourage the development of additional typologies for fitting appropriate methodologies to different types of questions.

Burke (2011) offers a striking example of the second area of contention regarding SRs, the evidence preappraisal process. Burke et al. (2006) had conducted a meta-analysis of 95 health and safety training field experiments conducted between 1971 and 2003. Their results suggested that more engaging (versus passive) training methods had stronger effects on trainee knowledge acquisition, safety performance, and accident and injury reduction. However, a subsequent SR was commissioned by Canada’s Institute for Work and Health and the United States’ National Institute for Occupational Safety and Health on the same topic (Robson et al. 2010). This review examined only 14 safety training programs out of 6,469 initially identified studies—a mere fraction of all the experimental studies Burke et al. examined—and concluded that there was “insufficient evidence of high engagement training (single session) having a greater impact on OHS-related behaviors compared to low/medium engagement (single session).” In other words, despite a much smaller database, Robson et al. (2010) asserted that their findings contradicted Burke et al.’s (2006) positive findings.

Robson et al.’s (2010) SR became the official federal government research statement and advice on safety training effectiveness for workers in the United States and Canada (Burke 2011), even though it is less likely to provide effective safety and health training than the methods suggested by Burke et al.’s far more thorough meta-analytic review. Indeed, Burke et al. (2011) conducted a subsequent meta-analysis incorporating 113 studies with 147 independent samples that reconfirmed his earlier strong results with respect to the positive effects of highly engaging safety training on both knowledge acquisition and actual safety performance. Burke et al. (2011, p. 38) argue, “The requisite evaluation of study quality in an SR and misuse of study quality as an inclusion or exclusion criterion within SRs can work against the quality of an SR.” Thus, the question of whether SRs really represent the “best available evidence,” particularly when sanctioned by government or funding agencies and not subject to rigorous peer review by highly trained researchers, would seem very important.

Table 2 Future research and other actions

Research suggestions	Other actions
More (and more diverse) systematic reviews	Create more institutionalized points of contact between academics and practitioners.
Studies of evidence co-creation by academics and practitioners	Create different types of publications and new features in existing publications.
Studies of evidence use	Change management education.
Studies of whether/how well evidence-based management works	Create an electronic library of systematic reviews.
Ride the big data wave (mindfully).	Experiment with new journal editorial policies to overcome current problems with scientific publishing.
	Create more open-access databases.

MOVING FORWARD

In this section, we make recommendations for future research and other actions to enhance the reach and credibility of EBMgt (see **Table 2**). We begin with research.

Recommended Research

As this review has shown, the vast majority of what has been written about EBMgt has been nonempirical. Thus, our first and foremost recommendation is to create a moratorium on further “opinion” pieces about EBMgt, instead focusing on producing more systematic reviews and high-quality empirical work. Additional research suggestions are available in an online supplement, “Future Research Suggestions from the Evidence-Based Management Google Group” (follow the **Supplemental Material** link in the online version of this article or at <http://www.annualreviews.org/>).

More (and more diverse) systematic reviews. Like Beer (2014), Hodgkinson (2011), and Trankfield et al. (2003), we believe that many aspects of management are simply too complex, interconnected, and uncontrollable for wholesale reliance on tools developed for EBMed (e.g., the “hierarchies of evidence” cited by Barends et al. 2014a and Kepes et al. 2014). As such, we believe that more high-quality SRs are needed that evaluate research quality on the basis of fit with the question (Petticrew & Roberts 2003) and that incorporate more than quantitative primary studies. As such, we particularly encourage integrative and explanatory reviews (which incorporate multiple types of evidence) and interpretative reviews (which synthesize qualitative research into higher-order theoretical constructs; Rousseau et al. 2008, p. 492). In addition, we encourage more aggregative reviews that start with a practical question (rather than with a “body of literature”), as well as further examination of the implications of including gray literature (or not) in SRs (Adams et al. 2016).

Studies of evidence co-creation. One of the most encouraging developments in EBMgt and A-P gap research is the increase in field studies examining the co-creation of evidence by academics and practitioners. Studies such as those conducted by Bansal et al. (2012) and Marcos & Denyer (2012) provide contextualized evidence of the mutual learning that occurs during the process of knowledge coproduction. They also exemplify more egalitarian and mutually respectful roles between academics and practitioners than has sometimes been the case (e.g., Trank 2014).

Recent suggestions regarding how to make such coproduction most effective focus less on “bridging gaps” and more on encouraging differentiation of roles and appreciating paradox as ways

of stimulating more unique outcomes (e.g., Bartunek & Rynes 2014, Dipboye 2014). For example, Cronin & Klimoski (2011, p. 57) conceptualize the production of evidence-based knowledge as a supply chain, calling for maximum differentiation among four relevant actors (basic researchers, applied researchers, practitioners, and stakeholders) to produce the “best synthesis of heterogeneous knowledge.” This is very different from the type of scientist-practitioner model in which one person embodies both dimensions—a model that is increasingly difficult to sustain in today’s world of greater role specialization and research complexity.

Studies of evidence use. As our online supplement shows, members of the EBM Collaborative place high importance on the need for more research regarding evidence usage. Useful studies might be conducted in both the lab (e.g., to identify individual differences in evidence use; Caprar et al. 2016) and in the field (e.g., to learn what happens in different organizational units under less controlled conditions; e.g., Ferlie et al. 2005, Shollo et al. 2015, Pritchard et al. 2008). Rousseau (see the July 21, 2016, entry in the online supplement, Future Research Suggestions from the Evidence-Based Management Google Group, by following the **Supplemental Material** link in the online version of this article or at <http://www.annualreviews.org/>) suggests that such research can be organized by phases of the complete EBP process: inputs, throughputs or processes, outputs, and outcomes. The theory-building study by Mele et al. (2013, p. 844) provides an excellent example of a study that describes differences in each of the first three stages across four technological innovation archetypes:

The framework developed here suggests that governing through evidence entails selecting or combining a variety of evidentiary bases, structuring a new relational arrangement among the actors involved, and standardizing decisional criteria and procedures. Combining these elements with the specific governing output sought by policymakers explains the different steering capabilities of institutional arrangements in practice.

Mele et al. (2013) also support Eisenhardt & Graebner’s (2007) contention that multi-case research can be particularly generative in terms of theory-building regarding evidence use. An alternative model for planning and organizing future research on EBP is Ajzen’s (1991) theory of planned behavior (Rousseau & Gunia 2016). Application of this theory suggests that peoples’ use of various types of evidence is a function of their ability, motivation, and opportunity to do so. Previous research has clearly shown that most OS practitioners (and many researchers as well) do not turn to cumulated research findings (“Big E”) when making decisions (Heath & Heath 2013, Rynes et al. 2002). Hence, determining how to foster the incorporation of such findings would be very useful.

Focusing on each of Ajzen’s three components provides a way to both summarize previous research and design future research. Research focusing on abilities is exemplified by Goodman et al.’s (2014) exploration of bibliographic search training and Sholomskas et al.’s (2005) examination of different methods for training clinical therapists in cognitive behavioral therapy. Examples focusing on motivation include Caprar et al.’s (2016) focus on threats to self-concept from certain types of evidence and Bozionelos’ (2005) demonstration that interviewers’ self-interest can get in the way of using evidence-supported hiring processes. Opportunity-related studies investigate such factors as the role of time pressure (Dalheim et al. 2012) or psychological safety and opportunity to practice on EBP adoption (Tucker et al. 2007).

Determine whether/how well evidence-based management works. One criticism of EBMgt has been that although there are numerous articles encouraging its adoption, most are based



on opinion and anecdotes. After their review of the EBMgt literature, Reay et al. (2009, p. 17) concluded, “There is not really sufficient evidence on which to base managerial changes, any more than we would encourage physicians to change their practice based on opinions and anecdotes The lack of strong evidence for EBMgt leaves us with the clear conclusion that stronger, more rigorous empirical research related to the impact of EBMgt on organizational performance is severely lacking, and greatly needed.”

Clearly, there are many cases where it has been shown that organizations (or entrepreneurs) that implement a particular evidence-based practice (e.g., training people in safety procedures, hiring more intelligent people, showing more personal initiative) attain better outcomes than before (Glaub et al. 2014, Schmidt 2009) or than organizations or work units that do not (e.g., Burke et al. 2011). However, we know of no research showing that organizations that implement EBMgt as their daily practice show reliably better results than before, or in comparison with control or matched organizations that do not. We have found no randomized control trials addressing the question, or even quasi-experimental designs. Therefore, it would be helpful going forward to conduct longitudinal follow ups of managers who have received EBP training in-house, in executive education, or via CEBMa programs, looking at how many of them actually implement EBP, to what extent, and with what measurable outcomes.

Ride the “big data” wave (while watching for sharks). There has been a phenomenal increase in the extent to which organizations are collecting data about employees, workplace characteristics, and outcomes via their HRIS systems (Davenport et al. 2010). Moreover, relative to earlier periods, contemporary databases offer the possibility of producing very high-quality research: “The potential of longitudinal data to generate causal insights is very great due to the clarity and orderliness in the cumulative record of events, experiences, and conditions over time and the inherent capacity to control for many confounding influences” (Guzzo 2011, p. 67; for an exemplary between-organizations example, see Kim & Ployhart 2014).

Of course, these are “best-case” scenarios; there is a real possibility that such data will be inappropriately analyzed, interpreted, or applied. Calvard (2016, p. 65), for example, argues that “big data’s overwhelming quantity can only be translated into accessible quality via the reflexive, critical, and flexible use of appropriate theories, cues, interpretive frames, routines, and learning mechanisms to bridge the gap between raw data and knowledge creation.” Guzzo (2011) worries about the decoupling of theory from results in big data applications.

Chiaburu (2016, p. 111) argues, however, that sidestepping certain theoretical and methods-related norms of normal science may “catalyze what some see as a stagnant, constricted, way of doing science.” Similarly, Mayer-Schönberger & Cukier (2013, p. 7) argue that to fully take advantage of the benefits of big data, “society will need to shed some of its obsession for causality in exchange for simple correlations: not knowing why, but only what.” They describe three underlying shifts in the way that we analyze information that are transforming society: Data are “more, messy, and good enough” (Mayer-Schönberger & Cukier 2013, p. 7). Because academics—even more than society in general—tend to have an obsession for causality, these trends suggest that clinging too firmly to this anchor puts academics at risk of missing the train.

As a final comment, there are also opportunities to create big data sets from prior academic research that are useful to both researchers and practitioners. A good example of this can be found in Bosco et al. (2016), who extracted 147,328 correlations from primary studies published in *Journal of Applied Psychology* and *Personnel Psychology* between 1980 and 2010. They attempted to empirically derive “small, moderate, and large” effect sizes for comparison with Cohen’s (1988) widely cited (but nonempirically derived) estimates of $r = 0.1$ (small), $r = 0.3$ (moderate) and $r = 0.5$

(large). Determining actual effect sizes is important because Cohen's nonempirical benchmarks have become standard inputs to power analyses during research design.

Bosco and colleagues found that the actual correlations found in applied psychology are much smaller than Cohen's estimates suggested. For example, the median effect size for the 147,328 correlations was $r = 0.16$ (as compared with Cohen's 1988 estimate of 0.3), with a range when the overall distribution was split into thirds (small, medium, and large) of 0.09–0.26. (Note that this interval does not include Cohen's estimate of $r = 3$.) They go on to provide similar estimates for progressively more specialized or context-specific subsets, such as attitude-attitude correlations (further subdivided into organization attitudes–job attitudes, organization attitudes–people attitudes, and job attitudes–people attitudes), attitude-intention correlations, attitude-behavior correlations, and attitude-performance correlations. In so doing, their results provide highly useful information for research planning purposes—such as producing better informed non-nil hypotheses and estimating necessary sample sizes for adequate power (which are now larger than previously assumed)—as well as for practitioners who wish to evaluate the relative effectiveness of various types of interventions.

A second study by Bosco et al. (2016) provides strong (albeit indirect) evidence that HARKing exists and that it is inflating our estimates of effect sizes, not only in direct but also indirect ways (e.g., HARKed relationships are more likely to be mentioned in article titles and abstracts, which increases the likelihood that these inflated estimates will be cited by others). Solutions are offered based on their findings.

Other Actions

In addition to conducting more empirical research, we also recommend the following evidence-supportive actions (Table 2):

- Create more institutionalized points of contact, or “trading zones,” between academics and practitioners (Bansal et al. 2012, Romme et al. 2015).
- Create different types of publications and new features in existing publications focused on evidence that is better suited to application and practice (e.g., shorter articles, more dialogs, PowerPoint presentations).
- Change management education to (a) create more understanding of and desire for research evidence and (b) help students find and create evidence for themselves (see *AMLE* special-issue publication Rynes et al. 2014).
- Create an electronic library of systematic reviews, hosted by either CEBMa (HakemZadeh & Vishwanath 2016) and/or the Academy of Management.
- Experiment with new journal editorial policies designed to overcome current problems with scientific publishing. One example is the *Strategic Management Journal's* recent decision to reject null-hypothesis significance testing in favor of requiring interpretation of effect sizes, plus their encouragement of replications and studies with non-results (Bettis et al. 2016). Another is the decision by several OS journals (e.g., *Journal of Business and Psychology*, *Organizational Research Methods*) to provide a new submission option, the Hybrid Registered Report, designed to evaluate papers “on the merits, rigor, and quality of the project rather than what was actually found” (<https://jbp.uncc.edu/>).
- Create more open-access databases. Lack of free (or very low-cost) access to research findings creates a clear barrier to practitioners (and academics) who do not have the benefit of organization-funded subscriptions to research databases such as ABI/INFORM, Business Source Premier, or PsycINFO.

CONCLUSION

EBMgt is in a relatively early stage of development. To this point it has evoked considerable amounts of discussion—mostly positive, but sometimes highly critical and other times skeptical. Empirical investigations have been less plentiful than opinion pieces and are particularly lacking regarding the outcomes of implementing EBMgt interventions. Nevertheless, some of the empirical work has been both creative and informative, particularly in the areas of academic–practitioner knowledge coproduction and practitioner uses of evidence. Challenges remain, including ensuring the quality of systematic reviews, broadening the types of systematic reviews conducted, and continuing to improve the quality of the research base. We hope this review fosters EBMgt’s ability to respond to those challenges.

DISCLOSURE STATEMENT

The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

ACKNOWLEDGMENTS

We thank Herman Aguinis, Eric Barends, Rob Briner, Denise Jepsen, Frederick Morgeson, Denise Rousseau, and Baba Vishwanath for helpful comments on earlier drafts of this review and contributions to the online supplement on future research needs.

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Errata

An online log of corrections to *Annual Review of Organizational Psychology and Organizational Behavior* articles may be found at <http://www.annualreviews.org/errata/orgpsych>