



Thinking and Communicating Clearly About Evidence-based Practices in Special Education

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July 2011

In education, a significant gap exists between research documenting the effectiveness of practices and the actual instruction that occurs in typical classrooms (Carnine, 1997; Cook & Schirmer, 2006). Interventions shown by reliable research to positively impact student performance are not implemented commonly in classrooms. Yet practices shown to have little, no, or negative effects on students' outcomes are applied frequently. For example, special education practitioners reported regularly using some practices demonstrated to be ineffective (e.g., modality instruction), but indicated implementing other practices validated by research (e.g., mnemonic strategies) relatively infrequently (Burns & Ysseldyke, 2009; see also Jones, 2009).

Evidence-based practices (EBPs) are instructional techniques with meaningful research support that represent critical tools in bridging the research-to-practice gap and improving student outcomes (e.g., Cook, Smith, & Tankersley, in press; Slavin, 2002). The purpose of this paper is to (a) discuss the importance of clear terminology related to EBPs and what works in education; (b) define EBPs and discuss how they are identified; (c) consider the purview of EBPs; and (d) differentiate the term EBP from related terms such as research-based, best, and recommended practices.

The Need for Clear Terminology

The causes underlying the research-to-practice gap are multiple and complex. It seems that a necessary (although certainly not sufficient) condition for broadly implementing effective practices is establishing clearly which practices are most likely to work for whom. Accordingly, educators have used a number of approaches to identify what they believe are the most effective practices, referring to these

instructional approaches with terms such as best practices, recommended practices, research-based practices, practices supported by scientifically-based research, and EBPs. These labels all share the same underlying purpose -- to determine and denote effective practices. However, the terms have distinct meanings and imply different standards of rigor related to their empirical support.

EBPs represent educators' most recent efforts to reliably identify what works and, in comparison to other methods, have "upped the ante" in terms of the research support required. EBPs are unique among efforts to determine effective practices in that, as detailed below, a trustworthy body of research that meets specific standards of rigor must support these practices. Originating in medicine in the 1990s (e.g., Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996), the identification of EBPs soon spread to fields such as agriculture, nursing, psychology, and education (Slavin, 2002). Because EBPs represent practices found to be effective by the most reliable research, they have significant potential to effect meaningful, positive change in education (Slavin, 2002)—especially for students who are at-risk for school failure (e.g., students with disabilities) and require the most effective instruction to reach their potentials (Dammann & Vaughn, 2001).

However, EBPs are not self-implementing mechanisms that will be embraced and utilized automatically as they are identified. Indeed, influencing school practices and teacher behaviors has proven to be an extraordinarily difficult endeavor (e.g., Sarason, 1993). Moreover, many educational practitioners mistrust research—the basis for EBPs, generally preferring to rely on more personal sources for determining what and how to teach (e.g., Boardman, Arguelles, Vaughn, Hughes,

& Klingner, 2005; Nelson, Leffler, & Hansen, 2009). Thus, to abandon traditional ways of determining what works, teachers will have to be convinced to trust EBPs and accept the notion that the label “evidence-based” is a reliable indicator of what works for their students.

The phrase “evidence-based practice” has become an increasingly popular term in the educational lexicon (Cook et al., in press; Detrich, 2008; Slavin, 2002). On one hand, this may be a positive development, in that it appears to reflect educators’ recognition of the importance and promise of EBPs. However, EBP is being used perhaps too frequently, in that it commonly is misapplied. At conferences, in pre- and in-service trainings, and (perhaps most importantly) in informal discussions in teachers’ lounges and elsewhere, some educators (e.g., practitioners, teacher educators, scholars) use the term EBP ubiquitously and often inappropriately. For example, terms such as research-based practice, best practice, and recommended practice often are used synonymously with EBP—sometimes referring to empirically validated practices, and sometimes referring to practices that are being promoted in the absence of substantive research support. Moreover, considerable confusion exists regarding whether and how these terms differ, and what exactly EBP means.

Consequently, many educators may be transferring the cynicism they have developed toward terms like best practice, which often have been used to refer to unsubstantiated techniques (Peters & Heron, 1993), to EBPs. Indeed, some educators likely have already decided to discount EBPs, which may appear to them to be the latest hollow catchphrase used to promote ineffectual instructional practices. As Cook et al. (in press) noted,

rather than helping to clarify which practices are effective, EBPs “may actually contribute to the confusion regarding what works, what doesn’t, and how to tell the difference” due to the term’s frequent misapplication. We recognize that terminology is far from the only issue involved in promoting the broad implementation of EBPs. However, we propose that educators having a full and accurate understanding of what EBP means, its purview, and how it differs from related terms will promote an appreciation of EBPs that facilitates their implementation.

Defining Evidence-based Practices

A myriad of organizations and approaches for identifying EBPs exists in education and related disciplines (Cook et al., in press; Mayer, in press; Slavin, 2008), each with their own take on what is necessary for a practice to be considered evidence-based. However, approaches tend to coalesce around four issues that we consider fundamental for determining EBPs: research design, quality of research, quantity of research, and magnitude of effect of supporting studies (see Cook et al., in press). Generally, then, we define EBPs as practices that are supported by a number of high quality studies that utilize research designs from which causality can be inferred and that demonstrate meaningful effects on student outcomes. Although a full discussion of the specific and varied approaches that different organizations employ to identify EBPs in their field is beyond the scope of this paper, we briefly illustrate the four defining elements of EBPs primarily by discussing standards for identifying EBPs in special education, as proposed by Gersten et al. (2005) and Horner et al. (2005). To provide readers with a broader understanding of EBPs, we also note some prominent caveats noted in the literature.

Research Design

Although a wide variety of research designs play important roles in informing and improving education (Odom et al., 2005), research consumers can only infer causality from studies that utilize specific kinds of research designs (Cook, Tankersley, Cook, & Landrum, 2008). For example, correlational research may show that a particular practice is associated with increased student outcomes (e.g., students attending classes in which a practice is used regularly exhibit higher achievement scores than students in other classes). However, such studies do not prove that the practice *caused* desirable student outcomes (e.g., teachers may have been using the practice because they had high achieving students in their class).

Accordingly, Gersten et al. (2005) and Horner et al. (2005) recommended that special educators consider only group experimental, group quasi-experimental, and single-subject research studies when determining EBPs. These types of research are unique in that they are designed to address whether the independent variable (e.g., an instructional practice) *causes* change in the dependent variable(s) (e.g., student outcomes) (see Cook et al., 2008). That is, when utilized appropriately, these research designs rule out primary alternative explanations for what may have caused changes in student outcomes other than the practice being examined.

Quality of Research Studies

Regardless of the research design, if a study is poorly conducted the results may not be valid. For example, even in random clinical trials, the so-called gold standard of efficacy research, if the intervention is implemented incorrectly, the dependent variables are not measured

reliably, severe attrition occurs, or any of a host of other methodological shortcomings occur, study findings may be errant and misleading. Therefore, a hallmark of EBPs is that supporting research studies must meet prescribed standards of methodological rigor (i.e., quality indicators).

In special education, Gersten et al. (2005) recommended that high and acceptable quality group experimental and group quasi-experimental studies must meet nine of 10 proposed essential quality indicators (e.g., adequate fidelity of implementation, at least one measure of generalized performance included). High quality group studies in special education must also address at least four of the eight specified desirable quality indicators (e.g., attrition not severe and comparable across groups, nature of instruction in control/comparison condition specified), whereas acceptable quality studies must only meet one desirable quality indicator. Horner et al. (2005) proposed that single-subject research studies must address all of 21 proposed quality indicators (e.g., adequate implementation fidelity, at least three demonstrations of experimental effect) to be considered in determining EBPs in special education.

Quantity of Research Studies

Scientific research is, by its nature, a gradual process. Confidence in research findings is never absolute, but is strengthened as findings from multiple studies converge. Therefore, EBPs are not identified on the basis of a single study, but instead require multiple high quality studies of appropriate design to show that a practice reliably improves student outcomes. Gersten et al. (2005) specified that at least two high quality or four acceptable quality group experimental and quasi-experimental studies must support a practice for it to be considered

an EBP in special education. To identify EBPs in special education using single-subject research, Horner et al. (2005) recommended that at least five high quality single-subject research studies that (a) were published in peer-reviewed journals, (b) were conducted in at least three different geographical locations, (c) were conducted by at least three different researchers, and (d) included a minimum of 20 participants across studies must support the practice.

Other approaches also specify a maximum number of studies showing a negative or indeterminate effect of the practice for it to be considered an EBP. For example, the What Works Clearinghouse (WWC, 2008) requires that practices with positive effects (their highest rating category) (a) must be supported by at least two acceptable studies, at least one of which must be a randomized controlled trial, and (b) can have no acceptable studies demonstrating negative effects.

Magnitude of Effect

Conceptually, EBPs should have robustly positive, socially valid effects on student outcomes. Inconsequential effects that do not have functional or pedagogical significance are insufficient for a practice to be identified as an EBP. Consequently, Gersten et al. (2005) required that EBPs demonstrate a weighted effect size significantly greater than zero across high and adequate quality studies examining the practice. Rather than evaluate effect size across studies, the WWC (2008) examines effect sizes at the level of individual group experimental and quasi-experimental studies when identifying EBPs in general education. The WWC only considers group experimental studies showing statistically significant findings when determining whether a practice will be categorized as having

positive effects. However, practices categorized by the WWC as having potentially positive effects can be supported by studies with results that are either statistically significant or substantively important (i.e., not statistically significant, but with an effect size of $d > 0.25$). For single-subject research in special education, Horner et al. (2005) proposed that all high quality single-subject research studies demonstrate that the magnitude of change in student outcomes as a result of the intervention is socially important.

To foster a collective understanding of what EBPs are and appreciation of their potential for improving student outcomes, we recommend that educators exercise caution when referring to practices as EBPs. The term EBP should only denote practices supported by research studies that meet prescribed standards in a field regarding research design, quality, quantity, and magnitude of effect; it should not be applied to a practice merely because some research supports its effectiveness, it is recommended by an expert, or it accords with a desired theoretical or ethical perspective.

Caveats Regarding Evidence-based Practices

In addition to describing what EBPs are, it is important to clarify what EBPs are not. Although EBPs reliably indicate generally effective practices, they should not be thought of as a panacea for a number of reasons, including (a) they are not guaranteed to work for everyone, (b) they will be difficult to implement on a broad scale, and (c) they are not the only consideration in instructional decision-making.

In the social sciences, no intervention will work for everyone no matter its level of research support (Cook et al., 2008). In

education, as in other areas of social science, causality is used in a probabilistic rather than an absolute. Treatment resisters or non-responders exist for even the most effective interventions. For example, Torgeson (2000) noted that the most effective early reading interventions are ineffective for between 2% and 6% of young children. Thus, all things being equal, EBPs afford the highest likelihood of increasing a targeted outcome, but educators cannot have abject faith that an EBP will work for any given individual student. Educators should therefore systematically monitor the impact of their instruction on student outcomes, even when implementing an EBP.

Just as educators cannot assume that EBPs will work all students, neither can they suppose that merely generating a list of EBPs will translate into changed practice. As Fixsen, Blasé, Horner, and Sugai (2009) noted, “an evidence-based practice is one thing, implementation of that practice is another thing altogether” (p. 5). Indeed, many educators have expressed hostility and mistrust toward research in general and EBPs in particular (e.g., Boardman et al., 2005; Hammersley, 2005; Jones, 2009). Accordingly, in the field of medicine, Hiss (2004) suggested that although research on identifying EBPs (phase one research) has received a great deal of attention, research on how to implement EBPs (phase two research) will be of arguably greater importance. In education, researchers are beginning this second phase of EBP research by investigating how to facilitate the implementation of EBPs by developing such tools as practice-based evidence, implementation science, and enhanced professional development (Odom, 2009).

Furthermore, we want to be careful not to suggest that EBP status and research support for a practice are the only important

considerations in determining what and how to teach. Educators may be justified in implementing practices that have not been identified as EBPs for a number of reasons. For example, law or policy mandates, community and professional values, personal teaching styles, individual learner histories, and other factors represent important considerations that educators should use in conjunction with EBP status and research support of practices when making instructional decisions. Savvy educators will use EBPs as important tools in their instructional repertoire, but not be limited by these techniques.

Sources of Confusion Regarding the Purview of Evidence-based Practices

In addition to issues related to their defining characteristics, other sources of potential confusion regarding EBPs include (a) the scope of practices considered and (b) whether EBP refers to a decision-making process or an empirically validated practice.

Micro- and Macro-Evidence-based Practices

One potential source of confusion regarding EBPs is which instructional approaches fall within their purview. EBP has been used to refer to both discrete practices and broad programs. The identification of EBPs in some fields (e.g., general education; see What Works Clearinghouse, n.d.) has tended to focus on broad programs, which we refer to here as “macro-EBPs.” Educational programs, which often encompass entire curricula, typically entail the use of specific instructional materials, instructional approaches and lessons, and even type and amount of training. As such, macro-EBPs characteristically provide consumers with a clear framework on the program’s implementation. However,

macro-EBPs may correspondingly minimize practitioners' ability to flexibly adapt the practice by necessitating that the entire program be implemented as prescribed.

In other fields, such as special education, efforts to identify EBPs have focused primarily on discrete interventions or "micro-EBPs" (e.g., repeated reading, self-regulated strategy development, time delay; see Cook, Tankersley, & Landrum, 2009). Because these micro-practices do not constitute an entire curriculum, they afford special educators considerable flexibility in how they might be implemented. That is, in contrast to macro-EBPs, micro-EBPs typically are not associated with prescribed frameworks for implementation that include specific instructional materials, student groupings, or training protocols. However, flexible application of micro-EBPs may introduce conditions that differ meaningfully from the contexts in which the practice was validated that might negatively impact its effectiveness (e.g., use of teacher made materials, provision of minimal training, application in varied student groupings).

In our view, it is not critical whether EBPs are used in a micro or macro sense; the different approaches represent relatively minor variations on a theme, with each approach entailing certain benefits and limitations. Indeed, most approaches for identifying EBPs can incorporate both micro- and macro-EBPs using a single set of standards. However, whether educators choose to focus on discrete practices, curricular programs, or both, potential EBPs must feature replicable instructional behaviors that are concretely defined. As such, broad policies (e.g., inclusion, transition), instructional frameworks (e.g., universal design for learning), and educational philosophies (e.g., constructivism,

behaviorism) that cannot be operationally defined by a set of instructional behaviors do not fall within the purview of EBPs. For example, although behaviorism is not an appropriate topic for an evidence-based review (because it is neither a practice nor a program), specific practices (e.g., self-monitoring, token economy) and programs (e.g., the UCLA Young Autism Program; e.g., Smith & Lovaas, 1998) based on behavioral principles can be examined as potential EBPs.

Decision-making Process or Empirically Validated Intervention?

Another potential source of confusion is that the term EBP can be used in two different, albeit related, ways. As indicated in Table 1, prominent definitions in many fields reflect the perspective that EBP is an approach to professional decision-making. In this sense, EBP can be thought of as an action (e.g., "that teacher doesn't follow fads, she engages in evidence-based practice"). Eddy (2005) referred to this use of the phrase as evidence-based individual decision-making, in which professionals use the results of the best available research in concert with other factors to make decisions. In contrast, as we have been using the term throughout this paper, EBP also is used commonly to refer to specific practices that have been validated as effective by meeting prescribed standards, or the product of evidence-based guidelines. Eddy (2005)—who is credited with first using "evidence-based" in publication (see Eddy, 1990)—suggested that these dual meanings of EBP are interdependent. That is, the process of evidence-based decision-making relies on the identification of specific EBPs; and specific EBPs have no practical effect without practitioners engaging in evidence-based decision-making.

**Table 1:
Definitions for Evidence-based Practice
and Evidence-based Education**

Sackett, Rosenberg, Muir Gray, Haynes, & Richardson (1996)	Evidence-based medicine: “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.” (p. 71)
Ingersoll (2000)	Evidence-based nursing practice: “The conscientious, explicit and judicious use of theory-derived, research based information in making decisions about care delivery to individuals or groups of patients and in consideration of individual needs and preferences.” (p. 152)
APA Presidential Task Force on Evidence-Based Practice (2006)	Evidence-based practice (in psychology): “The integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences.” (p. 273)
Whitehurst (2002)	Evidence-based education: “Integration of professional wisdom with the best available empirical evidence in making decisions about how to deliver instruction.”

The Wing Institute (n.d.)	Evidence-based education: “A paradigm by which educational stakeholders use empirical evidence to make informed decisions about education interventions (policies, practices, and programs).”
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Nonetheless, to avoid misunderstanding, educators should be clear with their terms. One option is to refer to specific EBPs using a distinct term, such as evidence-based intervention (e.g., Detrich, 2008; U.S. Department of Education, 2003) or empirically supported treatment (e.g., Woody, Weisz, & McLean, 2005). We recommend, however, that educators use EBP to refer to the specific practices supported by research that meet prescribed guidelines regarding research design, quality, quantity, and effect – as we have throughout this paper. To avoid confusion, we suggest that educators use “evidence-based education” to describe the broader process of evidence-based decision-making, rather than EBP. This is consistent with how terms such as evidence-based medicine and evidence-based nursing are used in other fields.

Distinguishing Evidence-based Practices from Related Terms

In addition to clarifying the meaning and purview of EBPs, it is also important that educators distinguish EBPs from other related terms (e.g., research-based practice, best practice, recommended practice).

Research-based Practices

Educators often use the term research-based (and related terms such as data-based, research

-supported, or empirically-validated) practice(s) interchangeably with EBP(s) to connote endorsement of an instructional practice by virtue of its research support. Two primary issues cause confusion regarding the meaning of research-based practices, especially in relation to EBPs: (a) research-based practice is used loosely, sometimes referring to ineffective practices; and (b) although educators often use the terms synonymously, research-based practices differ meaningfully from EBPs.

Research-based practice is a particularly bewildering term because it can be used to describe practices that range from being supported by a robust, rigorous research base to those supported by a meager and flawed research base. Indeed, because seemingly “any program can find some research that supports the principles it incorporates” (Slavin, 2002, p. 18), virtually any practice can be referred to as research-based. Typically, though, the term is intended to connote the objective and reliable determination of a practice’s effectiveness on the basis of its research base. That is, in our experience, educators tend to refer to a practice as research-based when they believe that research clearly demonstrates that it is an effective practice, not when some initial research tentatively suggests that it might be effective. As such, identifying practices as research-based in order to prioritize them for classroom use seems self-evidently beneficial and has been promoted widely as a critical element in bridging the gap between research and practice.

Nonetheless, the research base supporting many research-based practices often is not as robust as the term seems to imply. For example, repeated reading is frequently promulgated as an effective, research-based practice for students with and-at risk for

learning disabilities in reading (e.g., Council for Learning Disabilities, n.d.; LD Online, n.d.). However, Chard, Ketterlin-Geller, Baker, Doabler, and Apichatabutra (2009) reported that although repeated reading was supported by multiple studies, its research base did not include a sufficient number of high quality studies that used appropriate research designs for the practice to be considered an EBP for children with and at-risk for learning disabilities. EBPs and research-based practices, then, are not synonymous. Although all EBPs are research-based, many—most, we suspect—practices considered research-based do not meet the rigorous standards of EBPs.

We have two recommendations for researchers regarding the use of the term research-based practices. First, because it can refer to practices with such varied empirical support, we suggest that providing a brief description of the level and type of research support for the practice will be more meaningful and informative than simply referring to a practice as research-based. Indicating that, “Practice X is research-based” is not particularly informative. In contrast, describing a practice as being supported by two high quality, quasi-experimental research studies with an average effect size of $d = 0.50$ provides a more meaningful indication of the practice’s research base. Alternatively, organizations can specify criteria for the amount and type of research that they require to consider a practice research-based. Secondly, to avoid confusion, “research-based practice” should not be used interchangeably with EBP. Because EBP connotes a higher standard of empirical support, if a practice meets the rigorous standards for EBPs, it should be referred to as such—even though it is technically both evidence- and research-based.

Best and Recommended Practices

Description and advocacy of best practices and recommended practices can be found in virtually every area of education. Like EBPs and research-based practices, best and recommended practices originated as an “effort by our field to integrate the large body of research that has emerged” and bring it to bear on improving practice (Peters & Heron, 1993, p. 376). However, like research-based practices, best and recommended practices have no commonly agreed upon criteria. Thus, any discussion of best or recommended practices begs at least two questions: best or recommended by whom, and on what basis?

Some overlap does exist between (a) best and recommended practices, (b) research-based practices, and (c) EBPs. Most practices supported by research have been promoted as best or recommended, and practices may be deemed best or recommended on the basis of their research support. However, educators may also refer to practices as best and recommended due to tradition, expert opinion, theory, and moral values—regardless of whether they are validated empirically. Indeed, an instructional technique can be called a best or recommended practice for virtually any reason, so long as someone is willing to advocate for it. Thus, conceptually, practices promoted as best or recommended may not be research-based, and are even less likely to be EBPs. Co-teaching, for example, often is considered a best or recommended practice for included students with disabilities. However, the research support for co-teaching is inconclusive and clearly does not meet EBP criteria (Cook, McDuffie-Landrum, Oshita, & Cook, 2011).

The terms best and recommended practices have been overused and misapplied for so

many years (see Peters & Heron, 1993) that we encourage educational scholars not to describe practices in these ways. The phrases invite ambiguity and have taken on a negative connotation for many educators who have seen decades of questionable best and recommended practices come and go. Expert opinion, theory, and values are not unimportant considerations in deciding what and how to teach. But advocating for a practice for these reasons should not, in our opinion, be done under the guise of best or recommended practice; as these terms seem to suggest that the practice is supported by research as well. If a practice is research-based or an EBP, we recommend that those terms be used to indicate that empirical support exists for the practice. Practitioners should approach best and recommended practices cautiously (i.e., caveat emptor) and not trust that they are empirically validated without being provided with additional evidence.

Conclusion

Recent educational reforms and legislation (e.g., Individuals with Disabilities Education Act of 2004, No Child Left Behind Act of 2001) stress the important role that scientific research can and should play in determining what works and making instructional decisions. As might be expected, educators have developed new terms as thinking regarding the use of research in instruction has evolved. The terms we considered in this paper (i.e., EBP, research-based practice, and best or recommended practice) form a hierarchy of empirical rigor that corresponds with the terms’ chronological emergence.

Educators have used terms such as best and recommended practices to denote preferred practices that might be prioritized for implementation since at least the early 1980s

(Peters & Heron, 1993). However, best and recommended practices can be promoted on various grounds (e.g., expert opinion, moral values) and may or may not be empirically validated. As concerns regarding the research-to-practice gap became prominent, the term research-based practices emerged as a way to recognize only those practices supported by research. However, practices have been denoted as research-based despite having only modest research support. To guard against the likelihood that some research-based practices are actually ineffective, the term EBP subsequently came to be used to identify practices shown to be effective not just by any research, but by a number of high quality studies using (quasi-)experimental research designs that demonstrate meaningful effects on student outcomes.

As each new term entered the educational lexicon, previously popular phrases were not abandoned automatically. And the meanings of the terms and differences between them were never made clear to many educators. Thus, considerable confusion and misapplication of EBP, research-based practice, best and recommended practice, and related terms have occurred and continue to occur. This confusion has consequences, as many educators have become perplexed and disillusioned not only with the terms, but also with the educational reforms and instructional practices they represent. To facilitate the understanding and appropriate use of these terms, we discussed definitions and potentially confusing aspects of EBPs, highlighting how this term differs from other, related terms. We also recommended that educators:

- not describe empirically validated instructional approaches as best or recommended practices;
- specify their rationale for recommending practices on the basis of

theoretical, ethical, legal, or anecdotal support rather than generically referring to such practices as best or recommended practice;

- specify the level and type of research that supports a practice (to the degree practical), rather than generically referring to practices that have some empirical support, but do not meet evidence-based criteria, as research-based;
- refer to practices as EBPs only when practices are supported by studies that meet prescribed evidence-based criteria related to research design, quantity, quality, and magnitude of effect.

Fulfilling EBPs' potential to broadly improve school outcomes for students will require much more than clear understanding and careful use of terminology. Indeed, substantial and difficult work must be accomplished in such areas as reviewing practices to identify EBPs, effectively disseminating EBPs, and providing relevant supports for the broad adoption and maintenance of EBPs. Yet, as the Taoist proverb suggests, "The journey of a thousand miles begins beneath one's feet." And so moving toward achieving the grander goals of evidence-based reforms may depend upon a foundation of clear terminology.

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Acknowledgements

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