

Children, Research, and Public Policy

Practice-Based Evidence for Children and Adolescents: Advancing the Research Agenda in Schools

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Work on this article was supported by grants (MSN103215 and MSN103211) to the first author and the Wisconsin Center for Education Research (WCER) from the U.S. Department of Education. Any opinions, findings, or conclusions expressed in this article are those of the author and do not necessarily reflect the views of the funding agencies, WCER, or cooperating institutions. Support to John R. Weisz came from the Catherine T. MacArthur Foundation, National Institute of Mental Health, and the Norlien Foundation. More detailed information on the themes in this article and the full report from the Task Force may be found at the American Psychological Association Web site (<http://www.apa.org/pi/cyf/evidence.html>).

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Abstract. The American Psychological Association Task Force on Evidence-Based Practice for Children and Adolescents (2008) recommended a systems approach to enhancing care in order to improve outcomes for children and adolescents with mental health needs and redress persistent systemic problems with the structure of services. Recommendations for enhancing an ecological approach to the adoption and implementation of evidence-based practices are offered through increased attention to practice-based research frameworks for adoption and dissemination. Five criteria are discussed for providing acceptable evidence, including (a) systematic evidence searching and adoption of evidence-based prevention and intervention practices, (b) implementation and adherence to intervention integrity, (c) invoking standards for drawing inferences from interventions, (d) using quality assessments to measure outcomes, and (e) adopting formal data analysis procedures to assess intervention outcomes. Each criterion is illustrated with an example. Future research and policy agendas are outlined.

School psychologists are increasingly aware of the contributions that have occurred in psychology and education around the evidence-based practice (EBP) movement. This movement has a rich historical context of linking science and clinical care dating back to the work of Lightner Witmer (Kratochwill, Morris, & Robinson, 2008). Building on the ground-breaking evidence-based intervention work of American Psychological Association (APA) Divisions 12 and 53 (e.g., Weisz & Hawley, 1998), the APA initiated a Presidential Task Force on Evidence-Based Practice in 2005. A report of that task force emphasized that various forms of research evidence can affect practice and can emphasize the importance of clinical expertise and judgment in providing psychological care (American Psychological Association Presidential Task Force on Evidence-Based Practice, 2006). The American Psychological Association Task Force on Evidence-Based Practice for Children and Adolescents (2008; hereafter called the "Task Force") was formed to build on the work of the Presidential Task Force to reduce the research-to-practice gap and promote evidence-based interventions in school psychological services, but with a special focus on the unique factors influencing children, adolescents, and their families.

The authors of this article were members of the Task Force. The Task Force was guided by four principles (see Table 1) to conceptualize the integration of research and

practice and a broader systemic orientation to improve overall mental health and educational care. We approached the issues from a broad metasystemic orientation with the goal of providing a framework that would encompass quality improvement and public health. The components of the framework are outlined in Figure 1.

We argued that a metasystems perspective is critical to both understanding children's mental health needs and delivering services with enhanced outcomes. In our Task Force report, we discussed the key components of a systems approach for children and adolescents with emotional and behavioral needs and subsequently outlined key components of this "metasystem" for children (Kazak et al., 2010), which we defined as

the various contexts and environments that surround and influence a child's adaptations and development. The core contexts that typically exert the most direct influence on children include their family; the cultural norms and values of their heritage; their peers; social institutions created to inculcate certain societal values (such as churches or schools); and for children with emotional or behavioral needs, the various systems that society creates to provide services to address these problems. (p. 86)

The service systems include pediatric health care, specialty mental health, juvenile justice, child protection, and substance abuse settings, and of course, schools.

Around the time that the EBP movement gained prominence in school psychology, the

Table 1
Guiding Principles for Evidence-Based Practice for Children and Adolescents

Guiding Principles for Evidence-Based Practice for Children and Adolescents

1. Children and adolescents should receive the best available care based on scientific knowledge and integrated with clinical expertise in the context of patient characteristics, culture, and preferences. Quality care should be provided as consistently as possible with children and their caregivers and families across clinicians and settings.
2. Care systems should demonstrate responsiveness to youth and their families through prevention, early intervention, treatment, and continuity of care.
3. Equal access to effective care should cut across age, gender, sexual orientation, and disability, inclusive of all racial, ethnic, and cultural groups.
4. Effectively implemented EBP requires a contextual base, collaborative foundation, and creative partnership among families, practitioners, and researchers.

response to intervention (RTI) initiative was developing in education and has now influ-

enced the provision of school-based psychological practice in major ways. RTI is a system

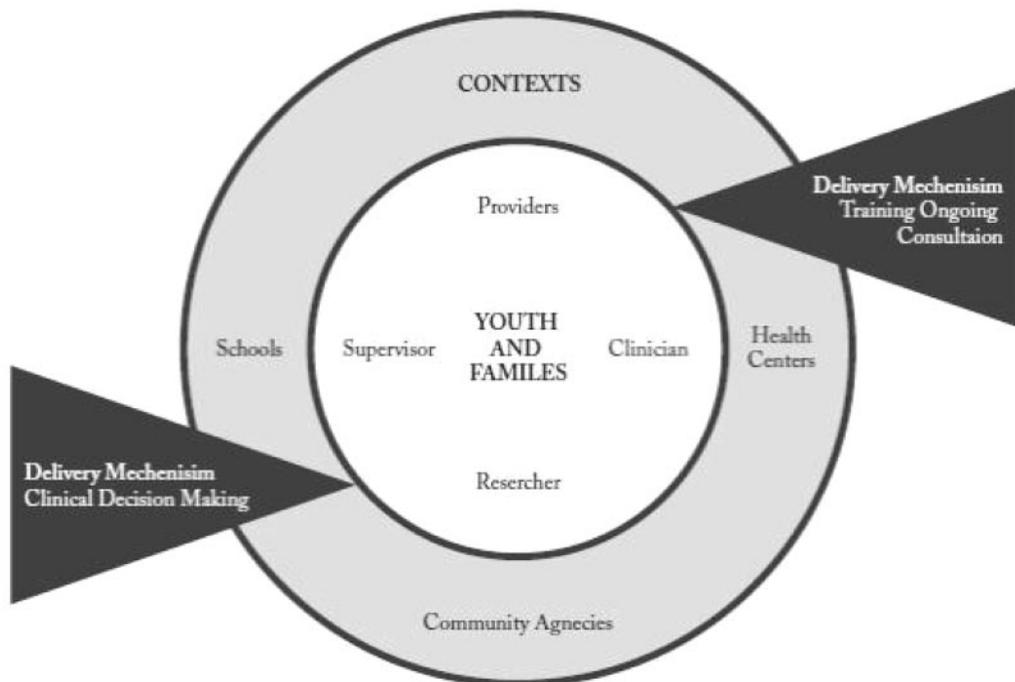


Figure 1. A metasytems social-ecological framework guides conceptualization of evidence-based practice in youth. *Source:* American Psychological Association Task Force on Evidence-Based Practice for Children and Adolescents. (2008). *Disseminating Evidence-Based Practice for Children and Adolescents: A Systems Approach to Enhancing Care.* Washington DC: American Psychological Association.

of service delivery through which interventions are delivered that combine services for children in a multitiered prevention framework with ongoing progress monitoring of academic and/or behavioral targets at each of the levels of tiers (Glover, DiPerna, & Vaughn, 2007; Reschly & Bergstrom, 2009). In this regard, RTI represents a convergence of evidence-based interventions and several components represented in the tradition of prevention practice (e.g., screening, multitiered interventions; see Lembke et al., 2010, for an example context for reading research within an RTI model).

In part because of federal mandates and in part because of political influences, RTI was presented as a format for educational and psychological services to children in regular and special education. Because RTI requires evidence-based interventions as part of its multitiered models, even the most reluctant to adopt new frameworks for services have begun to attend to the EBP movement. The current context in which RTI is applied in schools provides a special opportunity for us to feature examples of how the empirical basis of RTI can be improved because RTI is an excellent example of the limitations of some research in the EBP movement that lacks a strong focus on an evidence base from practice.

The purpose of the current article is to extend the Task Force recommendations to researchers and practitioners in school psychology and to suggest how embracing practice-based evidence research agendas can improve both mental health and educational outcomes for children and families. Specifically, we note how practice-based research evidence work can enhance the scientific basis of psychological and educational preventions and interventions used in schools and has the potential to forge a partnership between researchers and practitioners. We are emphasizing interventions but consider a wide range of psychological activities to fall within the domain of EBPs (e.g., diagnosis, assessment). School psychologists are uniquely positioned to embrace some of the benefits of practice-based research that can advance EBPs to improve

children's mental health and academic outcomes.

Schools as Ecological Service Systems for Evidence-Based Practice: Variables Affecting Implementation Efforts

Among the most challenging issues in advancing EBPs in schools (as well as in other systems) are the variables influencing or inhibiting adoption and dissemination. Although evidence-based prevention and intervention practices share a common challenge related to barriers to implementation in educational settings, the clinical trial research base has often neglected implementation factors. In recent years, investigators have begun to focus on implementation variables. For example, Forman, Olin, Hoagwood, Crowe, and Sake (2009) examined factors related to adoption, implementation, and sustainability of evidence-based interventions in schools. They contacted intervention developers of 29 programs listed as EBP on four or more credible registries and conducted a structured phone interview with the developers to identify facilitators and barriers. Teacher and administrator support and training, integrating the interventions within other school curricula, having ongoing technical assistance or coaching to reinforce new skills, and having an economic model to facilitate implementation, were important facilitators across the phases of adoption, implementation, and sustainability. Barriers included time, school personnel beliefs about the intervention, competition with priorities already established in the school, and competition with federal guidelines such as No Child Left Behind (2001).

Forman and colleagues (2009) suggested several critical steps to improve successful implementation and sustainability, including (a) enlisting leadership support with principals and other administrators as well as teachers; (b) identifying financial resources to support continuation of the program; and (c) ongoing coaching, consultation, or mentoring along with training to ensure fidelity of the model and maintain integrity during implementation. For example, some research indi-

cates that the presence of teachers who report being overloaded and lacking available support persons in a preschool setting predicts higher reports of behavior problems among children (Raver et al., 2009). Thus, it is important to work with staff to explain the program and work commitments, and to deliver professional development, especially with online coursework coupled with mentoring and feedback linked to instructional practices (Landry, Anthony, Swank, & Monseque-Bailey, 2009). In addition, new programs should align with the school context (e.g., philosophy, goals, policies, cultural responsiveness), and the program outcomes should be important and visible to the school to optimize sustainability. Finally, staff turnover is a significant impediment to sustaining program integrity, and efforts to reduce teacher and administrator turnover are important. Specific organizational interventions that have been found to reduce turnover in other systems might be adapted for use in schools (Glisson & James, 2002; Glisson et al., 2008).

The findings from Forman et al. (2009) are consistent with research summaries that emphasize a systemic approach to address implementation (Fixsen, Naoom, Blasé, Friedman, & Wallace, 2005) and underscore how the ecology of practice settings and system issues can be either facilitators or barriers to implementation (see Lockman et al., 2009). In the next section, we discuss some models for addressing adoption, some relevant research strategies in adoption and dissemination, and emerging needs in this area to advance research in school contexts.

Practice-Based Research as a Framework to Address Implementation and Dissemination

Traditionally, psychologists have been encouraged to adopt evidence-based assessments and interventions that have been documented in experimental research conducted by researchers. In fact, the EBP movement was premised on the assumption that randomized controlled trials could document effective interventions and practitioners should apply

these in practice settings to improve academic and mental health outcomes of children. Research on implementation and dissemination has clearly challenged these perspectives as we noted in our Task Force report and the previous section (see also Flay et al., 2005; Weisz, Doss, & Hawley, 2006). Increasingly it is becoming recognized that new directions in how the evidence base is established or embellished must be considered. Numerous macro (systemic) and micro (individual) factors influence the implementation of EBPs. In the school context, educational policies are the backdrop within which characteristics of the school context (staffing, training, technical support) interact with the characteristics of recipients (students, parents, and teachers) to influence implementation outcomes (Raver et al., 2009). Advancing research agendas on implementation and dissemination in school contexts can address how innovative strategies support EBP implementation. Several approaches have been suggested.

One approach to enhancing implementation uses measurement feedback and components-based approaches to quality improvement as a way to improve delivery of EBPs (Bickman, 2009; Chorpita, Bernstein, Daleide, & The Research Network on Youth Mental Health, 2008; Chorpita & Weisz, 2009; Weisz & Chorpita, 2011). The studies focus on improving concurrent measurement of processes and outcomes and providing feedback to service providers and families about the change process, which is promising, because it can enhance the acceptability and use of efficacious interventions, and can be used to identify new promising practices that have not yet been the focus of experimental studies. Other research programs focus on fitting practices seamlessly into schools by attending to the unique ecological context of schools and their naturally occurring conditions (e.g., focus on learning, individualization, use of teaching and support staff; after school programs; Atkins et al., 2008; Frazier Cappella, & Atkins, 2007; Frazier, Adil, Atkins, Gathright, & Jackson, 2007; Frazier, Formoso, Birman, & Atkins, 2008), or through participatory action research in which data gathering and interpre-

Table 2
Dimensions of Science and Non-Science and Their Relationship to Research and Practice

Dimension	Science	Non-Science
Research	Scientific Researcher	Non-Scientific Researcher
Practice	Scientific Practitioner	Non-Scientific Practitioner

tation of the findings can guide decisions about a particular practice (Nastasi, Moore, & Varjas, 2004). As these new promising approaches gain research momentum, their applicability within a range of different school contexts are likely to assist psychologists and other professionals in enhancing the uptake of effective new practices.

Practice-based evidence research, the focus of this article, is another agenda that we recommended to improve the knowledge base for adoption and implementation of evidence-based interventions. As a context, practice-based evidence is not unique to psychology as it has been recommended in medicine as a methodology to facilitate practitioner engagement in the research process (e.g., Green, 2006) and is illustrated in nursing (e.g., Shieh, 2006). Essentially, the practice-based research process involves practitioners contributing to the knowledge base by collaborating with researchers and sharing information with the research community during the course of providing academic and mental health interventions in typical practice settings (Newman, Kellett, & Beail, 2003). As an example of why this might be an important issue, in a critique of RTI, Fuchs, Fuchs, and Stecker (2010) provide a rationale for the need for practice-based evidence in a common practice advocated in school problem-solving models (e.g., behavioral consultation). These authors argued, among other issues, that “there is little in the literature demonstrating that behavioral consultation improves school achievement or behavior when conducted by practitioners rather than researchers” (p. 314).

Practice-based evidence can be conceptualized within the context of a scientist-practitioner model in which two orthogonal fea-

tures of science and practice are identified (Lilienfeld, Ammirati, & David, 2012; McFall, 1991). Table 2 features the four dimensions of the relationship between research and practice.

Thus, we have a scientific-research focus in which experimental methods are used to develop the knowledge base for practice (e.g., randomized controlled trials, single-case design research). Likewise, nonscientific research (or pseudo-scientific) would include a variety of practices that yield a questionable data base for practice such as testimonials, news media announcements, among other nonscience claims (see Lilienfeld et al., 2012, and Norcross, Hogan, and Koocher, 2008, for examples of pseudo-scientific assertions). Within the practice quadrants, one can be a scientific practitioner or nonscientific practitioner. It is within the scientific practitioner quadrant that we suggest two subcategories, one of which involves a role for developing practice-based evidence.

In the first subcategory, we identify the more traditional scientist-practitioner who uses scientific research to guide and inform practice. This category characterizes individuals who embrace EBPs as featured by the Task Force and others (e.g., Hayes, Barlow, & Nelson, 1999) but is usually not involved in generating new knowledge. In the second subcategory, we emphasize a role for individuals who practice school psychology but who want to and could contribute to the scientific knowledge base. This individual would work in collaboration with researchers to implement EBPs in school practice with the primary intent to contribute to the scientific basis of our interventions while providing high-priority in-

formation on structural and contextual variables.

Practice-based evidence is premised on the assumption that there is a bidirectional relationship between research and practice, and transporting EBPs means that practitioners can gather information useful to guiding the knowledge base in a particular area (see Kazdin, 2008; Weisz, 2004; Weisz, Sandler, Durlak, & Anton, 2005). In embracing this role, evidence can be accumulated to report on effective practices and build a knowledge base that may otherwise be impossible to secure in traditional clinical trials, thereby helping to close the research-to-practice gap.

As knowledge accumulates, practice-based evidence can also be conceptualized as a methodology and process to address components of broad dissemination of EBPs and can be part of ongoing adaptations or modifications of evidence-based interventions to make them more applicable to local ecologies and more culturally responsive. Figure 2 displays three components of EBP showing that the approach is guided by a science framework, informed by clinical expertise, and delivered in multiple contexts.

Practice-based evidence research requires practice that involves assessment, intervention, and ongoing monitoring. In this prac-

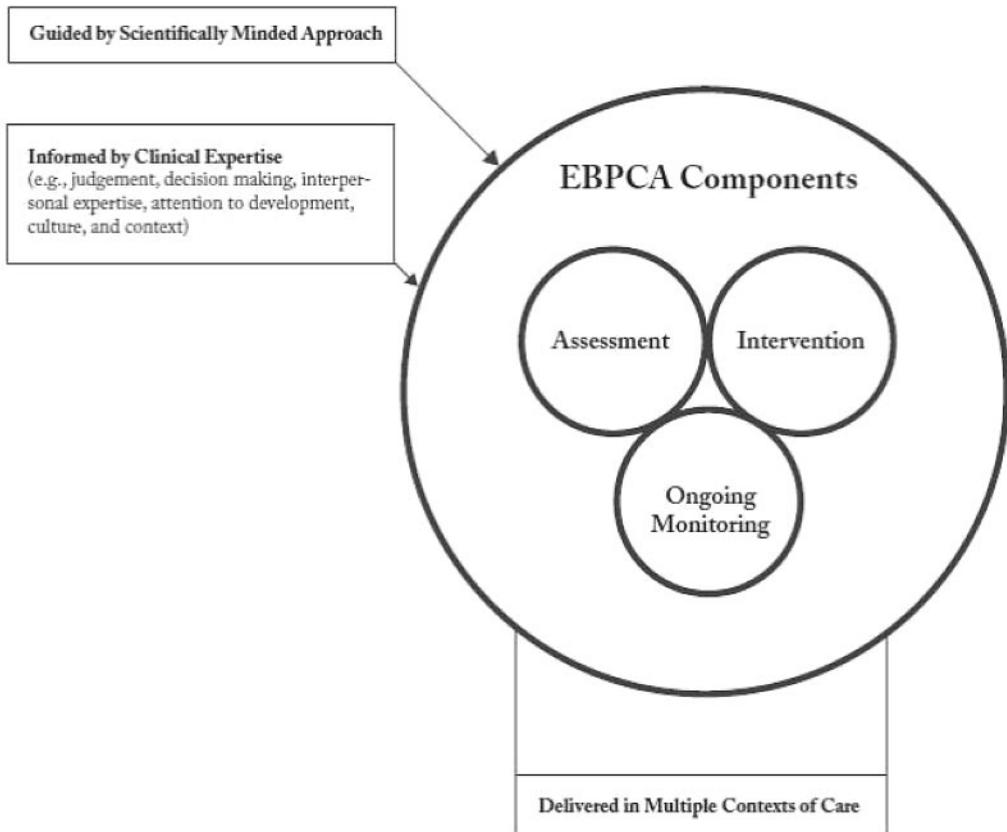


Figure 2. Three primary and reciprocal elements of an evidence-based clinical practice. *Source:* American Psychological Association Take Force on Evidence-Based Practice for Children and Adolescents. (2008). *Disseminating Evidence-Based Practice for Children and Adolescents: A Systems Approach to Enhancing Care.* Washington, DC: American Psychological Association.

tice context, valuable information can be shared with the research community that clinical trials may not always be able to deliver. We are not advocating that traditional clinical trials research be replaced or that conventional transportability research activities be deemphasized. For example, in the prevention literature, dissemination can incorporate scaling up, adoption, implementation, and sustainability of prevention and intervention programs (Flay et al., 2005). To scale up a program, such factors as training, manuals, organizational infrastructure, and resources must be described. Practice-based research seems especially complementary to help elucidate *processes that occur in practice* (Huang et al., 2005). Practice-based evidence research strategies can also help as a methodological strategy to further provide information on unique contextual features that require variations from clinical trials on these variables, which in turn will guide the evidence base for future adoption and implementation.

Standards for Credible Practice-Based Evidence

Despite some positive conceptual attributes of developing practice-based evidence, some standards must be invoked for generating evidence in order to contribute to the credibility of an intervention and its scientific underpinnings in the practice context. A threshold for acceptable evidence typically involves some level of certainty about conclusions being drawn from the data. Nevertheless, there is no agreed-upon standards criteria for practice-based evidence. There is some consensus that the evidence standards must be relaxed from those invoked for traditional experimental research. Indeed, the concept of doing any research in practice has been problematic with a number of practical and conceptual barriers being salient, especially when critical methodological features of research must be incorporated into the process (Kazdin, Kratochwill, & VandenBos, 1986). Thus, the challenge is to adopt methodologies that have sufficiently sound features to yield some credible information that can be shared with the

scientific community and at the same time allow application in practice that is acceptable, is cost effective, and can be implemented contextually in school systems to generate the kind of knowledge that is useful to guide future adoption and implementation.

Five criteria are advanced here to provide some conceptual guidelines for practice-based evidence (see Kratochwill, 2006 and 2007, and Kratochwill and Levin, 2010a, for earlier suggestions). Each of these criteria is illustrated in the application of practice-based research and can best be implemented in a partnership between researchers and practitioners. Special attention to elucidating structural and process variables that facilitate or inhibit adoption, implementation, and positive outcomes will be needed. Some of the same methodological tools used in research can be adopted in psychological and educational practice to advance the knowledge base of effective practices and eventually become the focus of controlled research and accomplish the goals noted earlier. In this regard, we emphasize the reciprocal relationship between practice-based evidence research and more conventional experimental research to support EBP development and implementation.

Evidence Searching and Adopting EBPs

An important step in developing practice-based evidence is to consider the available evidence base when considering a child's academic and/or mental health issue. This process can be completed by the practitioner and researcher working in concert to select an intervention or practice to meet psychological service needs. Nevertheless, there are actually few guides for psychologists in the knowledge, skills, and process of *evidence searching*, possibly because it has traditionally been a specialty in library science that is not routinely taught in psychology graduate programs. Realizing this gap in professional training, Falzon, Davidson, and Bruns (2010) provided a framework following five basic steps in the evidence-searching process:

- (1) Formulate a clear question about a patient or research issue;
- (2) search the literature to

Table 3
Questions to Ask for Client, Intervention, Comparison and Outcome (CICO)

Ask yourself. . .		Information to possibly include in your question
C Client	Who is your client? What is the client population of interest?	Your client's primary complaint, sex, age, race, history (any factors that will influence your search)
I Intervention	What are you planning to do for your client?	Specifics of your planned assessment or treatment (any therapies you are considering)
C Comparison	Is there an alternative to the treatment? (Sometimes there is no comparison.)	The alternative treatments, if any
O Outcome	What do you think will occur after applying the treatment?	Your desired or hypothesized outcomes

Source: Adapted from Norcross, J. C., Hogan, T. P., & Koocher, G. P. (2008). *Clinician's guide to evidence-based practices*. New York: Oxford Press. Reproduced with permission.

find the best available evidence; (3) critically appraise the evidence for its validity, accuracy, and usefulness; (4) apply useful findings, integrating them with clinical expertise and patient's characteristics, culture, and preferences; and (5) evaluate the outcomes and, if needed, initiate a refined search. (p. 551)

Falzon et al. (2010) elaborate on the first two steps in the process and invoke the patient-intervention-comparison-outcome (PICO) framework for the first step (Norcross et al., 2008). Table 3 provides a guide for each of the questions that a practitioner can ask for each step of the framework. Note that we have replaced the "Patient" with "Client" to reflect the educational context of this process for a psychologist working in schools (i.e., CICO). Also note that Norcross et al. (2008) add an optional "T" to the PICO components that reflects the *type* of question that the psychologist is hoping to answer, such as issues pertaining to diagnosis, therapy relationships, among many others.

The second step involves searching the literature for the best available evidence and will likely reveal numerous articles, chapters, books, and Web sites that feature relevant information. As an example, the What Works

Clearinghouse (WWC) provides reviews of many educational interventions and is involved in producing intervention reports of developments in a particular area as well as practice guides (see <http://ies.ed.gov/ncee/wwc/reports/>).

There are two additional contributions that practice-base evidence can make to the knowledge base. First, although there are a large number of options to review and select EBPs, including major Web sites that feature programs with varying levels of research support (e.g., the Collaborative for Academic Social and Emotional Learning [www.CASEL.org], National Register of Evidence-Based Programs and Practices [www.nrepp.samhsa.gov], toolkits for implementing EBPs in school and other community settings), many academic and mental health prevention and intervention practices needed for the diversity of school-aged children have not been evaluated in research (e.g., Kazdin, 2008; Kratochwill, 2007; Reynolds & Shaywitz, 2009). Evaluation practices can yield important information that becomes the focus of future research, completing the cycle of the interrelationship between practice and research. Second, ac-

tual study of the clinical decision-making process in selecting an intervention is underresearched and would make a valuable contribution in the future.

Consider a psychologist who is consulting with a classroom teacher over concerns with managing a classroom of students, many of who are demonstrating serious problematic behavior. The psychologist will immediately be confronted with the question about how to recommend an effective classroom management procedure for this situation. Table 3 provides the CICO framework that reflects addressing the first step in the practice-based evidence process. The psychologist would proceed by searching the literature and appraising it for its quality. He or she would then apply the findings by considering the cultural and school context, and evaluate the literature given options in this area. At this stage it would be helpful to understand the decisions that the psychologist makes in selecting an intervention and why.

In this search process, the psychologist would find a number of evidence-based options for preventing and solving classroom management problems (e.g., Freiberg & Laponte, 2006; Robinson & Ricord Griesemer, 2006) and may decide to use the *Good Behavior Game* as an option, especially given its preventative benefits (e.g., Kellam, Rebok, Ialongo, & Mayer, 1994). The psychologist may also eventually consider a broad-based universal application of positive behavior support for the school as implemented in an RTI framework (Lewis, Newcomer, Trussell, & Richter, 2006). Thus, the outcome of the evidence searching process has resulted in locating some evidence-based interventions that can be used in addressing this concern. More important in our context, the option of studying this process of intervention selection has been provided.

Implementation and Intervention Integrity

Many issues surround implementation. One issue is intervention integrity. This issue has become a centerpiece of research in the

EBP movement. Traditionally, in practice, once an intervention has been adopted, it must be implemented with integrity (Gresham, 1989; Hagermoser Sanetti, & Kratochwill, 2008). For example, RTI interventions depend on the integrity of implementation across multiple tiers (i.e., implementation of the program/intervention as intended by the program developer). When research is assessed, major limitations of implementation integrity have been identified (e.g., Klimes-Dougan et al., 2009). Future work needs to provide better documentation that these interventions in research are actually implemented with integrity (Power et al., 2005). Researchers also need to identify the barriers to and factors influencing implementation with integrity and this is where practice-based evidence work can be helpful.

The existing base of research evidence suggests that implementation integrity must be actively promoted in clinical trial research across numerous disciplines, including medicine, education, and prevention (Hagermoser Sanetti, & Kratochwill, 2009). Practice-based evidence researchers could study factors that (a) promote and monitor implementation (Hagermoser Sanetti, & Kratochwill, 2008; McLeod, Southam-Gerow, & Weisz, 2009), (b) examine obstacles to intervention integrity in practice settings, and (c) address them so as to ensure positive outcomes. The role of the practitioner–researcher in integrity assessment is first to determine whether the intervention matches the originally intended protocol and population, and if not, what variations were made and with what intervention outcomes. New models of integrity assessment and promotion that are theoretically driven and appropriate for work with teachers are being developed (Hagermoser Sanetti, & Kratochwill, 2010) and these could be tested in practice as well. Although we hope these tools will facilitate the implementation of interventions, the evidence base still needs to be extended by developing an understanding of the reasons why an intervention was not implemented as intended, including the factors featured by Forman et al. (2009), among others.

Consider the application of classwide peer tutoring (CWPT; Greenwood, Maheady, & Carta, 1991), a peer-assisted learning strategy (PALS; Greenwood et al., 1991) in a school hoping to reduce the base rate of reading problems in its students. With considerable research support (see Greenwood, Kamps, Terry, and Linebarger, 2007 for an overview), the use of CWPT as part of the PALS strategy would require an assessment of whether students are actually engaged in peer-assisted collaborative learning strategies in which they support each other's instruction in classroom settings. In CWPT, students are arranged in dyads for reading instruction. Various rules guide the actual tutoring behavior and students engage in such peer teaching activities as task presentation, correction, and point and praise awarding for correct responses. Outcome assessment occurs in such areas as phonemic awareness, decoding, and comprehension (see Greenwood, Reynolds, Abbott, & Tapia, 2004).

In this situation, the psychologist will be involved in a variety of integrity monitoring activities, some of which may be adopted from the original research projects focused on CWPT and PALS (Greenwood et al., 2007). Psychologists can make important practice-based research contributions when they assess the integrity of the program in the context of previous scaling up research on CWPT in schools, where it was found that several factors influence the process: (a) consideration of administrator support, (b) communication patterns among teachers and administrators in program implementation, and (c) early implementation during the school year (Greenwood et al., 2007; Forman et al., 2009). Thus, practice-based research could focus on these issues in implementation and any others that are unique to the context (cultural diversity, high levels of poverty, among others).

Standards for Drawing Inferences From Intervention Effects

Among the various candidates for integrating research in practice are qualitative

methods (including mixed methods), quasi-experimental group designs, regression discontinuity designs, and single-case research methodology. Single-case research designs have been especially strong candidates for this merger and have been featured repeatedly in the psychological literature as compatible with practice (see Barlow, Nock, & Hersen, 2009; Borckardt et al., 2008; Hayes et al., 1999; Morgan & Morgan, 2001) because of their quantitative focus, design structure, and focus on the individual. Nevertheless, single-case designs have some major limitations applied in practice (e.g., Kratochwill & Piersel, 1983), especially when used in their traditional applications where the criterion of replication is featured as a design standard (as in common designs and their variations: ABAB, multiple-baseline, alternating treatment designs).

As an option, single-case design's application in a "case study" format has strong potential for merger with practice-based research (Kazdin, 1982, 2011; Kratochwill, 1985) because these methods allow major validity threats to be considered and may allow some level of causal inference in the absence of design replication standards as required in formal single-case research. These standards are under development and may be a viable option for generation of empirical knowledge in research and practice (Levin, O'Donnell, & Kratochwill, 2003; Kratochwill & Levin, 2010a). For example, when considering how to draw valid inferences from case studies, researchers can use such factors as the number and type of assessment occasions, projections of performance of behavior, and number of treatments, among other dimensions, to improve the validity of the study. The contribution of this standard to practice-based evidence is to help with causal inference when examining the intervention outcomes in a practice context. Reuther, Davis, Moree, and Matson (2011) reported a case study involving the use of a modular cognitive behavioral treatment of selective mutism that demonstrates how some basic case study design features can be used to improve the evidence base in practice. These authors adopted an evi-

dence-based intervention focused on Modular Cognitive-Behavioral Therapy for Childhood Anxiety Disorders (Chorpita, 2007) based on the relationship of selective mutism to anxiety. Various treatment procedures were used including psycho-education, exposure, cognitive restructuring, social skills training, and relapse prevention procedures. The authors adopted various outcome measures including fear hierarchy ratings, self- and parent-report ratings, and interviews. They reported that the treatment outcome was generally positive at the end of 21 sessions and at post-treatment and at 1- and 6-month follow-up.

Among the various procedures that can improve the credibility of case study research, the authors embraced several of these variables that made their report valuable for practice-based evidence. They introduced the treatment in the face of a chronic problem, adopted a standardized treatment manual, used well-developed assessment measures, and repeated these measures across time to gauge outcomes, scheduled follow-up assessment, among other factors. However, in their case report the authors used a B (intervention only) design with repeated monitoring across the outcome measures. One major improvement that could be scheduled into this type of case study is developing a baseline assessment in the design, thereby constructing an AB design (Kazdin, 2011). Such a procedure builds a no-treatment to treatment comparison into the evaluation procedures and when complemented with a randomized start time for the treatment, can increase validity considerably (Kratochwill & Levin, 2010b).

Assessments to Measure Intervention Outcomes

A practice-based evidence approach relies on systematic measures to evaluate intervention outcomes. Systematic measures in practice involve three important assumptions (Kazdin, 2008). First, clinical evaluation is necessary to determine whether client outcomes are positive and consistent with the findings of the original EBP research. Second, ongoing assessment of client progress allows

modifications and options for determining changes in the intervention as well as the potential for monitoring any negative side effects of the intervention (itself an important contribution of practice-based evidence). Finally, evaluation can complement “clinical judgment” and extends beyond traditional protocols for measurement used in research, thereby allowing study of how the practitioner used clinical expertise and judgment in treatment.

Improvements to practice-based evidence depend on having cost-effective and time-efficient measures that can be used in schools (Jenson-Doss & Hawley, 2010). One example option for evaluation of practice with an emphasis on schools has been presented through Outcomes; Planning, Monitoring, Evaluating (Outcomes: PME; Stoiber & Kratochwill, 2002). Outcomes: PME can be linked to intervention at the level of the individual, group, or system and can be implemented by a psychologist providing services as a consultant or through a problem-solving team. Measurement options involve a variety of strategies including goal attainment scaling, which may be particularly cost- and time-efficient for practitioners. Outcomes: PME can be implemented in a case study format and is therefore compatible with the methodological standards for generating empirical knowledge from practice, including action research and participatory action research (Nastasi et al., 2004). Whatever measures are used, meeting high standards of reliability and validity is critical.

Most psychologists practicing in schools have been exposed to the importance of evaluating interventions in multiple ways and, in fact, many have been educated within a scientist-practitioner model where this dimension of practice is featured (e.g., Hayes et al., 1999). Many psychologists have also been exposed to the work in applied behavior analysis that has traditionally emphasized the importance of data-based decision making as interventions are implemented in practice. RTI systems depend very heavily on effective progress monitoring measures (or outcome assessment) to both identify students (screen-

ing) and to make decisions about the effectiveness of an intervention and movement within and across tiers (progress monitoring). Although considerable work needs to be done to advance reliability, validity, and assessment utility of progress monitoring approaches in both academic and social/emotional domains (Reynolds & Shaywitz, 2009), there is growing evidence that the results of various standardized tests used in curriculum-based measurement in oral reading, for example, are strongly correlated with one another (Reschly, Busch, Betts, Deno, & Long, 2009). Furthermore, recent research has advanced work on estimating standard error metrics in curriculum-based measurement (Christ, 2006).

Because RTI systems typically include a progress monitoring assessment component that is an integral part of the school system of services, outcome measures may be readily available and can be used at relatively low time and cost to help make decisions about effective prevention and intervention (Riley-Tillman & Burns, 2009). For example, measures of progress monitoring in academic domains are now widely available and Web based (see information from the National Center on Response to Intervention, <http://www.rti4success.org/progressMonitoringTools>). In addition, systematic assessment within various behavioral and mental health outcomes can be readily applied, such as in positive behavior support (Horner, Sugai, Todd, & Lewis-Palmer, 2005). Other options in clinical intervention are emerging, as will be illustrated later. These options make the role of the practitioner in generating evidence all the more likely and credible for influencing future research and practice.

As an example relevant to clinical intervention, the Child System and Treatment Enhancement Projects model for treatment of youth mental health problems uses a multi-component approach called Modular Approach to Treatment of Children with Anxiety, Depression, Trauma, or Conduct Problems (MATCH-ADTC; Chorpita & Weisz, 2009), combined with a clinical information system to inform practitioners about their young clients' response to intervention, week by week

(Weisz & Chorpita, 2011). MATCH-ADTC consists of 33 modules encompassing components of evidence-based interventions for the four clusters of disorders and problems embodied within the name of the protocol; for example, one module focuses on learning to calm oneself at times of stress, and another focuses on identifying and modifying anxious or depressive thoughts. Decisions about which modules to use, when, and for how long before switching to another are guided by a regular flow of response to intervention information in the form of a Web-based client dashboard like the one shown in Figure 3 (see Chorpita, Bernstein, Deleiden, & The Research Network on Youth Mental Health, 2008). The upper panel of the dashboard shows how the child is responding to treatment, based on weekly reports of caregiver and youth on the Brief Problem Checklist (Chorpita et al., 2010), a standardized measure of internalizing and externalizing symptoms. With one click of a mouse, the upper panel will also display caregiver and youth weekly reports on Top Problems (Weisz et al., 2011), which is a measure on which caregiver and youth (separately) rate the severity of the three problems each identified as most important at the outset of treatment.

Improvement in student behavior is indicated by declines in parent and child ratings on each measure over time. The middle panel shows which modules were used in treatment, and when. Circles indicate which modules were planned (e.g., in supervision) for each week; filled circles indicate that plans were carried out, empty circles that the planned modules were not carried out. The lower panels show who attended the sessions and whether certain procedures of special interest (e.g., role-plays, homework) were used. This particular dashboard shows high problem levels up to about Day 85, then a drop thereafter, with occasional rises, but the overall pattern shows a child whose response to intervention was quite favorable from the beginning of treatment to the end. The precise timing of the changes can be matched to days in treatment and to the particular modules used in particular weeks.

Because this particular form of progress monitoring is Web based, it provides easy access by clinicians and clinical supervisors to information about client progress, and it allows easy information sharing, even by phone, as clinicians in a supervision group all log on and view the dashboards for the children in their caseloads. The dashboards also inform clinical supervision by distinguishing between youngsters who are and are not improving. The system allows clinicians to navigate through treatment episodes efficiently, using evidence on treatment response to guide decisions about how long to continue particular modules, when to change direction, and when to begin planning for termination. In addition to such case-level applications, it is also possible to aggregate dashboard reports across cases to produce summary information for, say, a psychologist's full caseload, all the cases of a particular clinical supervisor, or even all the cases in a particular clinic.

Data Analysis Procedures to Assess the Credibility of Intervention Effects

An important component of practice-based research is determining the intervention effect. It is important to adopt appropriate and credible visual and statistical evidence standards compatible with the case study methodological format (Kratochwill & Levin, 2010a). Generally, the practice-based researcher can use visual analysis and/or statistical procedures available for single-case designs. For example, the What Works Clearinghouse standards feature some major components of conducting a visual analysis (Horner et al., 2005; Kratochwill et al., 2010) that can be applied to the data.

Various statistical analysis procedures have also been recommended for single-case design, and some can be translated to case study design when assessing intervention outcomes. For example, one class of randomiza-

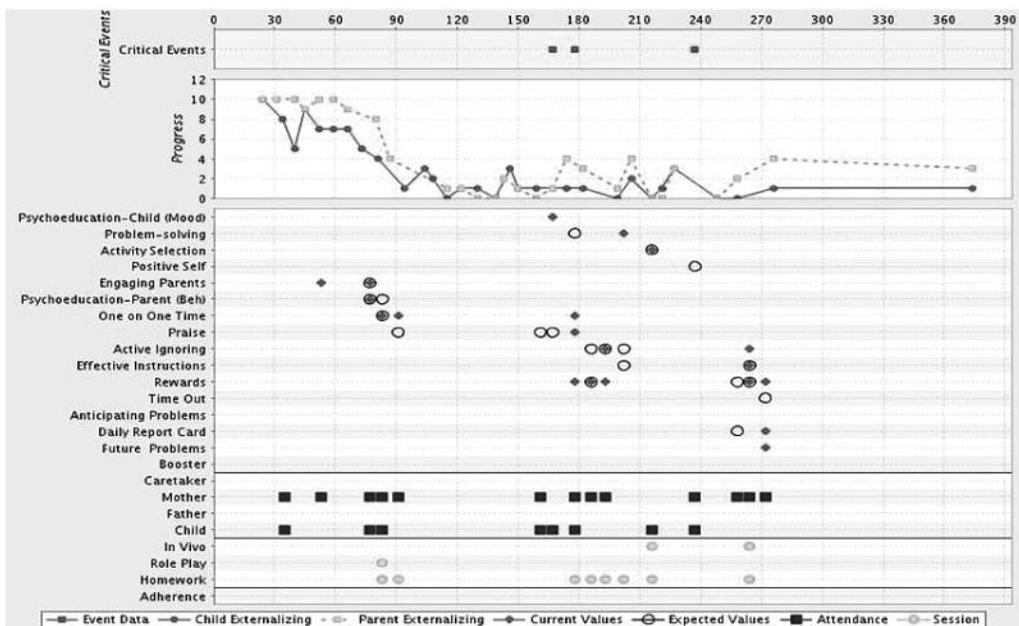


Figure 3. One approach to progress monitoring within response to intervention: The clinical dashboard used to monitor treatment response in the Child System and Treatment Enhancement Projects program. Research Network on Youth Mental Health. Reprinted with permission.

tion procedures can actually increase both internal and statistical conclusion validity of the research (Kratochwill & Levin, 2010a, 2010b). As an illustration, in an AB design the practice-based researcher can determine the point of intervention on a random (as opposed to a clinician-generated) start point in the data series. Such a procedure would be possible with many of the progress monitoring procedures now used in schools.

Single-case intervention outcome data can also be complimented with various clinical outcome indices that traditionally have been used in medical research but more recently converted for application in single-case designs (Parker & Hagan-Burke, 2007). Such metrics as risk difference, relative risk, relative risk improvement, and odds ratio can be integrated into single-case design wherever there is a baseline (A) and intervention (B) phase. Although these metrics were introduced to complement formal and well-controlled single-case intervention research designs, they can serve the same function in practice-based evidence work (as with an AB design). For example, when these metrics are applied in research and practice contexts, a comparison between these measures can serve in the role of mapping differences (if any) between research outcomes on an evidence-based practice and practice-based intervention outcomes.

Let us return to the Reuther et al. (2011) case study involving the use of a modular cognitive behavioral treatment of selective mutism. We noted that one major improvement that could be scheduled into this research study is adopting an AB design. In addition to improving the basic validity of the report, an AB design structure allows for some possible and more formal data analysis procedures, thereby strengthening the statistical conclusion validity of the results. In particular, an AB design increases the possibility of adopting simulation modeling time-series analysis (Borckhardt et al., 2008), randomization tests (with a randomized start point in the series; Kratochwill & Levin, 2010b), and some of the clinical outcome indices noted earlier. Thus, adding a baseline comparison

phase has a number of distinct methodological and statistical advantages for the use of single-case design in generating practice-based evidence.

Dissemination of Findings From Practice: Implications for Prevention-Intervention Practice, Policy, and Directions for Research

Applying knowledge that is gained systematically to improve public health and education is a well-documented priority for traditional clinical trial research. National organizations, the federal government, states, and provider organizations have created resources, initiatives, and other approaches to assure that research-informed practices are widely used. This focus includes state-based initiatives to disseminate EBPs, registries of effective programs (e.g., What Works Clearinghouse), development of measurement feedback systems for integration in clinical practice (i.e., Kelley de Andrade, Sheffer, & Bickman, 2010; Garland, Bickman, & Chorpita, 2010; Lambert et al., 2003), and the establishment of organizations to disseminate effective practices through high-quality training and coaching application. To advance research on dissemination and implementation of EBPs, several critical issues must also be addressed at the policy level and in research; these issues are mentioned here with the hope that they can be addressed by the school psychology leadership.

First, we need a broad framework for knowledge development in practice-based evidence. Implementation of practice-based evidence is itself an important research agenda that should be given priority in our journals, but we also need a roadmap of what practice-based evidence research to conduct on what topics. Evidence-based intervention knowledge about children's mental health and the promotion of academic competencies and achievement has grown exponentially over the past 15 years. The challenge is to take this evidence base and fit it into the prevailing and predominant contexts surrounding children with academic and mental health needs. The

multiple levels of the school context require sophisticated methods, research designs, assessment strategies, and decision-making tools to inform the uptake of these newer practices. A broad systems approach recommended by the Task Force can facilitate this agenda, and a metasystems model can further help guide research in this area especially when embracing practice-based evidence initiatives outlined in this article (Kazak et al., 2010).

Second, it will be critical to identify sources of funding where the researcher–practitioner partnership is a centerpiece of the research process elaborated in this article. The EBP research enterprise largely exists to fund researchers, but researcher–practitioner partnerships must be fostered and supported with funding to advance the science of EBP. Advocating for this partnership in funded research to the Institute of Education Sciences and the National Institute of Mental Health would be a desirable agenda in the future, although other sources might be considered such as private foundations with a stake in EBPs. Some conceptual and empirical models have been advanced that provide leads for how this process might be supported. For example, Fantuzzo, McWayne, and Bulotsky (2003) provided a framework for advancing mental health science and practice with a partnership-based component to advance implementation. Among other issues, the partnership component can help address important barriers to implementation of EBPs including, for example, why participant communities and especially schools say “no” to research collaboration.

Third, it will be important for school psychology journal editors to promote publication of research findings generated from practice-based approaches. An example of this option was already established in the *Journal of Clinical Child Psychology* with a section devoted to intervention research conducted with relaxed methodological standards and in a practice context. As an illustration, Cunningham, Ellis, and Naar-King (2010) present the results of Multisystemic Therapy, an intervention adapted to treat obesity, as applied to an obese 15-year-old African American boy. The

study pointed the way to some important contextual variables to consider in future adaptations of Multisystemic Therapy to this population of students. Other recent examples published in this series can also be useful to practitioners such as the treatment of attention deficit hyperactivity disorder in a preschool child (Verduin, Abikoff, & Kurtz, 2008) and modular cognitive behavioral treatment of selective mutism as featured in our case illustration earlier (Reuther et al., 2011). We would encourage school psychology journal editors to adopt a similar option in their editorial policies to promote practice-based evidence investigations. In this process, some attention to the criteria advanced in this article could be considered, especially when the work represents a partnership with academic and practicing psychologists.

Fourth, journal editors in the school psychology field should consider adopting policies that allow publication of negative results, both from highly controlled research trials and in our context, practice-based research. It is possible that some intervention practices in common use in schools actually have negative results. This research casts doubt on the effectiveness of these various practices and procedures. With the scientific bias against publishing negative results studies, this information cannot be featured to affect practice (Kratowill, Stoiber, & Gutkin, 2001). The importance of negative results and negative side effects noted as paramount in the psychotherapy field (e.g., Barlow, 2010) is especially relevant in school psychology practice as RTI is implemented with diverse venues across school districts in this country. Practice-based evidence research may further shed light on why a particular intervention is not effective under certain practice conditions and the potential negative side effects of interventions.

Fifth, although the clinical outcome metrics discussed earlier can improve intervention outcome reporting in practice-based evidence research (Parker & Hagan-Burke, 2007), some standards or common effect size measures (e.g., standardized mean difference, percentage of variance accounted for) compatible with group clinical trial research must be

developed for single-case designs (and in our context, case study designs), given the limitations of current options (Shadish & Rindskopf, 2007; Shadish, Rindskopf, & Hedges, 2008). We hope that this research agenda will result in some degree of consensus on appropriate single-case effect size measures that can be aggregated with group designs. Such an agenda is critical for eventual dissemination of results based on designating prevention- interventions that are adapted or better suited for particular ecologies.

Conclusion

In this article we have recommended that traditional experimental research be complemented with information developed from practice-based evidence. In particular, we recommended consideration of several issues when practice-based evidence is used to embellish the evidence base of scientific knowledge: (a) systematic evidence searching and adopting evidence-based prevention and intervention practices, (b) implementing and adhering to intervention integrity, (c) invoking standards for drawing inferences from interventions, (d) using quality assessments to measure outcomes, and (e) adopting formal data analysis procedures to assess intervention outcomes. Developing practice-based evidence can move the EBP science forward while also enhancing adoption, implementation, and dissemination. What sets practice-based evidence research apart from traditional methodologies is that this research activity is primarily implemented by practitioners working in partnership with researchers to extend the knowledge base on implementation in the natural context of practice. The various criteria advanced here can help address our understanding of structural and process variables that affect adoption, implementation, and outcomes as compared to traditional research evidence attesting to an EBP. It is of particular importance as both APA task forces called for EBP that features clinical expertise and consideration of the client's characteristics, culture, and preferences as part of the process. Implementation and dissemination of better

practices to improve children's mental health and achievement depends on models, theories, and practices to support innovation. The tools exist, but they must be put to good use.

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Date Received: December 23, 2009

Date Accepted: June 13, 2011

Action Editor: Thomas Power ■

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Accepted Manuscripts for Forthcoming Issues

Langberg, J. M., Epstein, J. N., Becker, S. P., Girio-Herrera, E., & Vaughn, A. J. *Evaluation of the Homework, Organization, and Planning Skills (HOPS) Intervention for Middle School Students With ADHD as Implemented by School Mental Health Providers.*

Humphrey, N. & Wigelsworth, M. *Modeling the Factors Associated With Children's Mental Health Difficulties in Primary School: A Multi-Level Study.*

Rikoon, S. H., McDermott, P. A., & Fantuzzo, J. W. *Approaches to Learning Among Head Start Alumni: Structure and Validity of the Learning Behaviors Scale.*

Shapiro, E. S. & Gebhardt, S. N. *Comparing Computer Adaptive and Curriculum-Based Measurement Methods of Assessment for Universal Screening in Math.*

Baxter, S. A. & Ardoin, S. P. *The Impact of Context and Word Type on Students' Maze Task Accuracy.*

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