

# Evidence-Based Interventions in Pediatric Psychology: Progress Over the Decades

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This introduction to the special issue on Evidence-Based Interventions in Pediatric Psychology provides background on the process used to develop the special issue, a summary of the key findings from the series of reviews, and discussion of the implications for evidence-based practice. Authors followed a three-phase approach to develop their systematic reviews using rigorous systematic review methodology drawn heavily from the Cochrane Collaboration. The strength of the evidence for each pediatric psychology intervention was evaluated using Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology. The introduction discusses the progress that has been made in the evidence base for pediatric psychology interventions since the first special series published in 1999. Recommendations to stimulate further research and expand and strengthen the quality of the evidence base are described. The introduction concludes with implications from the special issue for pediatric psychology training in evidence-based practice.

**Key words** education; evidence-based practice; interventions; pediatric psychology; systematic review; training.

## Background and Purpose of Special Issue

This special issue is intended to provide an update and expansion to the series on empirically supported treatments (ESTs) published in 1999 in the *Journal of Pediatric Psychology* (volume 24, issues 2–4). The 1999 special series included eight review articles and a number of commentaries intended to describe the evidence base for interventions in pediatric psychology in the following areas: Procedure-related pain (Powers, 1999), abdominal pain (Janicke & Finney, 1999), disease-related pain (Walco, Sterling, Conte, & Engel, 1999), headache (Holden, Deichmann, & Levy, 1999), disease-related symptoms in asthma, diabetes, and cancer (McQuaid & Nassau, 1999), obesity (Jelalian & Saelens, 1999), severe feeding problems (Kerwin, 1999), and sleep problems (Mindell, 1999).

Chambless criteria (Chambless & Hollon, 1998; Chambless et al., 1996) were used to categorize the level of evidence for the reviewed treatments as promising interventions, approaching well-established interventions, or well-established interventions. At that time, several well-established interventions in different areas of pediatric psychology were identified. For example, relaxation and self-hypnosis were categorized as well-established interventions for pediatric headache, and multicomponent behavioral treatments were found to be efficacious for pediatric obesity. However, in other areas of pediatric psychology, there was limited available evidence, and no well-established interventions were identified (e.g., disease-related pain).

Almost 15 years have elapsed since the publication of that special series, during which time continued

development and evaluation of interventions has occurred in all areas of pediatric psychology. In addition, major advances have been made in systematic review methodology and trial reporting. Thus, to provide a contemporary examination of the evidence base, this required a rigorous approach and process to document the current state of the science of pediatric psychology interventions.

Thus, the goal of this special issue is to provide an update of the evidence base for pediatric psychology interventions through a series of systematic reviews and meta-analyses on cross-cutting intervention approaches. Systematic reviews (with meta-analysis when possible) were performed within 11 identified topic areas including injury prevention, adherence to treatment, parent- and family-based interventions, needle-related pain, insomnia, obesity, health promotion, chronic pain, feeding interventions, cognitive interventions, and encopresis. Thus, this issue expands upon the topics that were covered in the 1999 special series.

This special issue was conducted in tandem with a special issue in *Clinical Practice in Pediatric Psychology (CPPP)*. Guest editor Dr. Bryan Carter developed a parallel special issue on evidence-based interventions in pediatric psychology within the same 11 identified topic areas. The goal of the *CPPP* special issue is to describe applied clinical activities and models of practice that incorporate evidence-based interventions in real world settings with diverse clinical populations. Thus, although the *JPP* special issue provides a rigorous analysis of the current state of the scientific evidence for each intervention, the papers appearing in the tandem *CPPP* special issue are meant to illustrate the real-world application of these pediatric psychology interventions into day-to-day treatment activities.

For the *JPP* special issue, authors were invited to prepare systematic reviews. I recruited and worked with a small working committee formed with several of the invited authors (including Drs. Christine Chambers, Christopher Cushing, Christopher Eccleston, Grayson Holmbeck, and Dave Janicke) to develop a set of author instructions and review guidelines. Thus, all invited authors were provided with guidance on the review structure, methodology, and reporting. This allowed us to obtain some elements of uniformity in the presentation of reviews, to require the same rigorous high-quality review methodology, and to obtain the same evaluation of the strength of the body of evidence for each pediatric psychology intervention.

Specifically, the review methodology was guided in part by the methods of the Cochrane Collaboration and represent current best practice in systematic review methodology (see the Cochrane Handbook at <http://handbook.cochrane.org/> for further details). Each author team

developed a review protocol to describe their review strategy and methods using standard elements directed at reducing bias in the reviews. During the next phase of work, author teams conducted literature searches and extracted data for the meta-analytic reviews. Authors were asked to use the same methods to perform risk of bias assessment and were provided with suggestions for results reporting. Last, authors used a uniform method for evaluating the strength of the scientific evidence using the system, Grading of Recommendations Assessment, Development and Evaluation (GRADE). These phases of work are briefly described below to enhance understanding of how the reviews were conducted and also to provide sufficient information to allow for potential replication of these procedures in future systematic reviews of the evidence base in pediatric psychology.

## Phases of the Reviews

### *Phase 1. Develop Review Protocols*

The phrase “review protocol” may be unfamiliar to many readers. Protocols are developed for most types of research and serve to provide detailed instructions on methods and measurements that will be used in a research study. Similarly, the purpose of a protocol for a systematic review is to develop a strategy and methods for the review. The goal of a systematic review is to assess systematically and thoroughly the best possible scientific evidence about the topic under consideration, in this case, the effects of pediatric psychology interventions. Because a good review is based on a good protocol, this step is considered critical. Problems in protocols may be identified, such as a lack of clarity in describing interventions to be reviewed or an unclear plan for extraction of outcome measurements. Importantly, these can be corrected before undertaking the laborious work involved in performing literature searches, extracting data, and conducting meta-analyses. When authors prepare reviews for the Cochrane Collaboration, their review protocols undergo peer review where changes may be requested, and a formal approval is required before the review is officially commissioned. Our process also involved a formal review of the protocol by the working committee, and we provided written feedback to each author team.

The review protocol itself includes an introduction and methods section. The introduction explains the topic being reviewed, including a description of the condition/problem and a description of the intervention(s). Prior reviews, including other meta-analyses, are listed, and the focus and findings of the prior reviews described, highlighting the gaps in knowledge that the current review seeks to address

(e.g., focus on different population, focus on different outcomes, etc). The introduction ends with a list of aims for the review including the intervention(s) reviewed and the problem(s) addressed. This might include specific aims relating to understanding moderators of intervention effects (e.g., in different participant groups), different comparators of the intervention under study (placebo or active intervention), different duration of therapy or observation (short term vs. long term), or different outcome measures.

The second section of the review protocol includes the methods section, which addresses the criteria for considering studies for the review. This section has several elements that describe the studies to be included in the review (e.g., randomized controlled trials [RCTs], minimum sample size), and which will not be eligible (inclusion and exclusion criteria), as well as the type of participant groups, interventions (experimental and comparator), and outcomes that will be the focus of the review. Authors included a rationale for why each outcome is important to understanding or assessing the impact of the intervention. For example, many authors chose to consult the JPP series that was published in 2008 on empirically supported assessments (Cohen et al., 2008) for guidance on well-validated measures. Within the methods, a search strategy is described including databases that will be searched, dates of the search, and search terms. The methods to be used to extract or obtain data from published reports (e.g., using a data extraction form) and the method for assessing risk of bias are also stated in the protocol. The overall aim of the methods is to develop specific guidelines for deciding whether a study addresses the objective of the review and is of acceptable quality and validity. This section is intended to justify the reasons for including studies so that other authors could apply the criteria and reach the same decisions (i.e., ensuring replicability).

### ***Phase 2: Conduct Literature Searches and Begin Meta-Analysis***

After developing the review protocols, the next phase of work involved conducting literature searches and beginning the data extraction process for the meta-analytic reviews. Guidance was provided to authors on the conduct of meta-analysis, risk of bias assessment, and results reporting. In only one instance (for the review of feeding interventions), a meta-analytic review was not recommended. Some author teams consulted additional expertise from biostatisticians to perform the meta-analyses. After the initial literature search, each author team conducted an updated literature search through April 2013 (to keep the lapse from search to submission consistent across the

reviews). Some author teams worked with experts in library science to help develop and implement the search strategy.

Authors developed data collection forms to systematically extract data from each identified study. To optimize the efficiency of the data collection, a thorough form was constructed to incorporate study-related information and all outcome measurements as comprehensively as possible to avoid authors needing to go back to re-extract data from studies. We shared data collection forms between author teams to provide examples that might help streamline efforts.

Last year, JPP adopted the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards for reporting of systematic review findings (Palermo, 2013). Thus, authors were asked to also use the PRISMA standards and to refer to the PRISMA explanation document. Authors created a PRISMA flowchart to summarize the flow of studies from search to inclusion. Authors also followed recommendations and guidelines in the PRISMA statement regarding best practices in results reporting (e.g., stating the statistical methods used for the type of outcome data) (Moher, Liberati, Tetzlaff, & Altman, 2009).

Because RCTs provide the highest level of quality, when possible within a topic area, the authors included only RCTs in their reviews. The systematic review of multiple RCTs is much more likely to inform us about whether a treatment produces positive benefits. RCTs have become the “gold standard” for judging whether a treatment does more good than harm. There are, however, examples in several of the systematic reviews where authors incorporated nonrandomized (pre–post) intervention studies due to a lack of RCTs. The conclusions the authors have drawn from these studies is made with caution given the higher risk of bias in nonrandomized designs.

### **Risk of Bias**

Poor study quality and incomplete reporting are major limitations that reduce the ability to provide meaningful conclusions from intervention research. It is essential to understand bias present in individual studies, as this must be part of the interpretation of the evidence base. Readers may be more familiar with the term “quality” than risk of bias. The terms quality and risk of bias are distinguished in current systematic review methods, with the latter being the preferred term and a suggested reporting element in the PRISMA standards. Risk of bias focuses specifically on carefully considering what methodological and clinical risks of bias may have a bearing on the results of the systematic review. Risk of bias essentially gets at the validity of the studies. Because certain methodological characteristics may be associated with effect sizes (e.g.,

inadequate allocation methods are associated with higher effect sizes), risk of bias assessment is recommended to be used in the data synthesis and interpretation of the body of evidence.

Risk of bias assessment is critical to a high-quality systematic review, and thus we chose to standardize this element of the review across all of the protocols. Authors used the Cochrane Collaboration Risk of Bias Tool (Higgins et al., 2011) that is also recommended by PRISMA. The six domains include the following: Selection bias (random sequence generation, allocation concealment), performance bias (blinding of participants and personnel), detection bias (blinding of outcome assessment), attrition bias (incomplete outcome data), reporting bias (selective reporting), and other sources of bias. Authors were asked to review Chapter 8: Assessing Risk of Bias in Included Studies, in the *Cochrane Handbook* for further information and examples of tables used to describe supporting information and criteria for making judgments about risk of bias, included in behavioral interventions specifically. Authors rated risk of bias for each study. Some of the author teams have included ratings of risk of bias for each individual included study in Online Supplementary Material that accompanies their systematic reviews. Readers should be sure to check the links for each individual systematic review paper to access Supplementary Material. All author teams prepared a figure summarizing risk of bias across included studies so the reader can understand the specific sources of bias, which are categorized as low risk, unclear risk, or high risk, across the studies.

### **Phase 3. Analysis, Writing, and Rating the Quality of Evidence**

During the last phase, authors completed meta-analyses and rated the quality of the evidence. Quality of evidence was assessed using the GRADE criteria (see <http://www.gradeworkinggroup.org/>) (Guyatt et al., 2011). This is a departure from the 1999 JPP special issue in which the Chambless criteria were used. Chambless criteria had been used previously to classify empirically supported psychological treatments for particular disorders (Chambless & Hollon, 1998; Chambless et al., 1996). Over the past decade, there has been both enthusiasm as well as controversy about classifying the strength of the evidence and quality of the evidence for various treatments. Systematic review methodology has evolved, and in response, a number of groups have developed alternative frameworks for integrating and weighing the available research evidence. For the present special issue, we decided not to use the Chambless criteria or to compare the present results with the Chambless criteria. Instead, we used the

GRADE system. The decision to use the GRADE framework is based in part on its increased clinical applicability. The GRADE system is used worldwide for classifying the evidence for clinical practice guidelines in medicine. In addition, this is the only system that allows for separately considering quality of evidence and strength of evidence. This presents an important opportunity to bring this framework to pediatric psychology through this special issue, which we believe is an advance and may facilitate clinical practice guideline development in the future in our field.

Authors were provided instructions in using GRADE. Specifically, for the seven most important outcomes, studies included in the analysis are assessed on five categories—risk of allocation bias, indirectness, inconsistency, imprecision, and publication bias. This provides an overall rating of the outcome, which ranges from ‘high’ to ‘very low’. Summary of Findings tables are constructed for the outcomes to summarize the GRADE ratings, as can be seen in each of the systematic reviews in this issue. GRADE uses four categories that correspond as follows to the interpretation of the evidence base. High quality means that further research is very unlikely to change confidence in the estimate of the effect. Moderate quality means that further research is likely to have an important impact on our confidence in the estimate of the effect and may change the estimate. Low quality means that further research is very likely to have an important impact on our confidence in the estimate of the effect and is likely to change the estimate. Very low quality means that we are very uncertain about the estimate of the effect.

### **Summary of the Evidence Base for Pediatric Psychology Interventions**

Using the rigorous methods described above, 11 systematic reviews were produced to document the evidence base for pediatric psychology interventions. Below is a summary of the findings from these reviews.

Two of the systematic reviews were focused on pain interventions, one on chronic pain interventions and one on needle-related procedural pain interventions. Fisher et al. (2014) reviewed the evidence for psychological interventions for pediatric chronic pain. This subsumed RCTs of psychological interventions for children and adolescents with a range of pain conditions such as headache, abdominal pain, and musculoskeletal pain. Their findings demonstrated moderate-quality evidence for psychological interventions to reduce pain and improve function, with the strongest evidence in children with headache. No effects were found for positive benefits on either anxiety or

depression. The authors concluded that psychological therapies can significantly reduce pain and disability in children and adolescents with chronic pain, although there is currently a lack of evidence for some clinical pain conditions and outcomes. For example, there were no trials including children with neuropathic pain or that included sleep outcomes. However, in contrast to the special series published in 1999, which included separate reviews for headache, abdominal pain, and disease-related pain interventions, evidence for psychological therapies has expanded tremendously. In the 1999 series, only a handful of RCTs of psychological interventions had been conducted in any pain condition, and there is now a fairly robust literature base.

Birnie et al. (2014) reviewed RCTs of distraction and hypnosis interventions for needle pain and distress in children. Findings showed strong support for distraction and hypnosis for reducing pain and distress from needle procedures, although the quality of available evidence was low. Characteristics of distraction interventions had some influence on treatment efficacy; however, across a wide range of distraction interventions positive effects on reductions in pain and distress were shown. To move this area of research forward, the authors recommend increased attention to the quality of research to address more nuanced questions about how to match treatment to characteristics of individual children. In the prior special series, Powers (1999) reviewed a broad range of procedure-related pain interventions and found that cognitive behavioral interventions (including relaxation, distraction, and imagery) were effective in reducing pain and distress related to medical procedures. Since that time, as Birnie et al. demonstrate, many additional RCTs have been conducted to reduce children's needle pain and distress, clearly showing the benefit of distraction and hypnosis.

The efficacy of comprehensive behavioral family lifestyle interventions (CBFLIs) for pediatric obesity was reviewed by Janicke et al. (2014). These investigators found moderate-quality evidence that CBFLIs produced small effects for improvements in child weight outcomes. There were a number of significant moderators of effects including the duration and time of treatment, child age, format of therapy (individual vs. group), form of contact, and use of intent to treat analysis. CBFLIs were not found to have significant effects on change in caloric intake, although the quality of this evidence was low. The authors conclude that future research is needed to better document changes in caloric intake, physical activity, and metabolic parameters associated with participation in CBFLIs. Jelalian and Saelens (1999) also found in the prior special series support for short-term efficacy of comprehensive behavioral

obesity intervention programs for improving weight outcomes. Since that time, there are now additional outcome data in adolescents and on long-term outcomes that has expanded this evidence base.

The topic of injury prevention is new to this special issue. Schwebel et al. (2014) evaluated behavioral interventions to teach children pedestrian safety. They found moderate-quality evidence for behavioral interventions to lead to improvements in children's pedestrian safety, both immediately after training and at follow-up several months later. In particular, interventions focused on dash-out behavior, crossing at parked cars, and selecting safe routes across intersections were effective. In addition, there was evidence for the efficacy of both individualized and small-group training for children. The authors discuss the importance of using theories of child development to design interventions, to consider how to focus intervention efforts internationally, as pedestrian safety represents an important global health issue, and the need for innovation in measurement of children's pedestrian behaviors.

Another new topic to this special issue is cognitive interventions. Robinson, Kaizar, Catroppa, Godfrey, and Yeates (2014) reviewed the efficacy of cognitive interventions for children with neurological disorders, acquired brain injuries, and neurodevelopmental disorders. They found significant positive large treatment effects in most outcome domains (e.g., attention, working memory, and memory tasks), and small effects for academic achievement and behavior rating scales. However, the quality of evidence was rated very low in all domains because of limited studies, substantial heterogeneity, and poor study quality, and thus caution was suggested in interpreting the findings. The authors provide a number of suggestions for advancing the literature in this area and highlight the critical need for further advancement in the study of cognitive interventions.

Law, Fisher, Fales, Noel, and Eccleston (2014) reviewed interventions delivered to parents and families of youth with a broad range of chronic health conditions (e.g., cancer, chronic pain, diabetes). They examined the impact of intervention on parent behavior and mental health outcomes and on child symptoms and behavior. Across the various parent interventions, positive effects were found on parent behavior at posttreatment and follow-up, and the evidence was rated as moderate quality. In examining types of interventions, problem-solving therapy was found to be particularly effective in modifying parent behavior and mental health symptoms. The authors conclude that further data are needed on parent and family interventions in additional populations of youth with chronic medical conditions and that higher quality trials that include more

complete parent and child outcome data would move this field forward. In the prior special series, McQuaid and Nassau (1999) reviewed a range of interventions for disease-related symptoms in children with asthma, diabetes, or cancer. They included family therapy interventions for children with asthma, concluding that it was a promising intervention but with little available data at that time. Although parent and family interventions have now been applied to additional populations, there continues to be a need for further research to expand this evidence base.

Freeman, Riley, Duke, and Fu (2014) reviewed the evidence for behavioral treatment of fecal incontinence with constipation in children. This topic of investigation has been dominated by single-subject designs; however, several RCTs were found for inclusion in this review. Across different types of behavioral interventions, results indicated that behavioral intervention was more effective than control conditions for overall improvements in reducing soiling. The authors conclude that available evidence is limited and that additional, higher quality trials are needed to better understand the relative effects of different behavioral treatment strategies and to identify therapeutic mechanisms that can promote toileting habits and reduce soiling.

The efficacy of behavioral interventions for pediatric feeding problems was reviewed by Lukens and Silverman (2014). Because this area of study has primarily used nonrandomized and single-subject methodologies, a narrative synthesis of the evidence base was performed. Their findings demonstrated positive effects of psychological intervention for the treatment of feeding problems. However, limited data and the lack of studies using RCT methodologies limit conclusions that can be drawn regarding the efficacy of these interventions. In the prior special series, Kerwin (1999) found that contingency management (including positive reinforcement and ignoring) were effective strategies for children with severe feeding problems from a review of nonrandomized studies. Since the 1999 special series, there has been limited progression of the literature (only two RCTs have been performed in over a decade). The topic of pediatric feeding interventions represents an important focus for future research efforts that may be guided by the recommendations offered by Lukens and Silverman.

Another topic that is new to this special issue is adherence interventions. Efficacy of adherence-promoting interventions for children, adolescents, and young adults with chronic health conditions were reviewed by Pai and McGrady (2014). They focused their review on recent RCTs to reflect changes in assessment and intervention (e.g., use of technology) so as to provide a contemporary

examination of the state of the science in this area. Overall, there was low to moderate quality evidence for adherence and disease outcomes to change with adherence treatment at postintervention and at follow-up. The authors provide recommendations for future intervention development in this area including considering important issues in the delivery of adherence-promoting interventions to subgroups with adherence difficulties and increasing the time to follow-up so that long-term maintenance of improvements is better captured.

Behavioral interventions for pediatric insomnia were reviewed by Meltzer and Mindell (2014). They included studies focused on healthy and special needs populations (e.g., children with neurodevelopmental disorders, chronic health conditions) in RCTs and nonrandomized pre-post trials. Overall findings indicated moderate-quality evidence for positive effects of behavioral intervention for a number of sleep outcomes (e.g., night wakings, sleep efficiency) in young typically developing children treated for bedtime problems and night wakings. There was low-quality evidence for behavioral interventions for insomnia in children with special health needs due to the lack of available studies. In the previous special series, Mindell (1999) reviewed the evidence for bedtime problems and night wakings in young children finding support for the use of extinction, parent education, graduated extinction, and scheduled awakenings. Since that time, there have been additional RCTs conducted for treatment of bedtime problems in young children. However, as the authors identify, there remains an important gap in knowledge of the efficacy of behavioral interventions for older children and adolescents with insomnia, highlighting the critical need for future treatment development for these populations.

Using an ecological framework, Cushing, Brannon, Suorsa, and Wilson (2014) reviewed the evidence for health promotion interventions focused on smoking, physical activity, diet, and sedentary behavior. Studies were coded as intervening on the individual child, family, school, community, or through media. Across all interventions, meta-analytic findings demonstrated small positive effects for health promotion interventions on modifying children's health behavior. The quality of evidence was rated as moderate. In their exploratory analyses of different levels of intervention, the authors found support for focusing intervention efforts on the individual child or adolescent as well as within the school and community system for specific health behaviors (smoking, dietary behavior). Given the large number of RCTs on this topic area, future studies can build on the general efficacy data by focusing specifically on the important gaps in understanding of

change on objective outcomes and within certain ecological systems that are identified by Cushing, Brannon, Suorsa, & Wilson.

### **Progress (but Lots of Room to Grow) in the Evidence Base for Pediatric Psychology Interventions**

Further intervention development and testing has been conducted across all areas of pediatric psychology over the past 15 years. In most topic areas, there are now RCTs of pediatric psychology interventions. The evidence base has particularly grown (with many RCTs) in adherence, pain, and health promotion interventions. In contrast to the 1999 series, most author teams were able to conduct meta-analysis from RCTs in their topic areas. As a field, we are building an evidence base for the interventions performed in our clinical practice. This is a critical juncture for pediatric psychology. Systematic reviews provide the starting point for the development of consensus statements and clinical practice guidelines. As the field of clinical psychology makes efforts to follow the Institute of Medicine (IOM) standards for generating clinical practice guidelines (Hollon et al., 2014), comprehensive systematic reviews of the evidence are needed. Only treatments with documented efficacy from RCTs are considered in such statements and guidelines. Thus, we are beginning to accumulate the research evidence that can ultimately be used to include pediatric psychology interventions as first-line treatments.

However, this series of systematic reviews also demonstrates that as a field we must make focused efforts to not only continue to grow the evidence base but we must improve on it in substantial ways. The systematic reviews in this special issue uniformly reached the conclusion that the quality of trials of pediatric psychology interventions is suboptimal; the majority of the reviews found unclear or high risk of bias in included studies. There are a number of issues related to poor trial design and incomplete reporting that reduce the quality of the evidence base. Inadequate reporting presented a major challenge among all the topic areas. In particular, there were notable deficiencies in reporting of sample descriptives (e.g., age range of the sample) and of outcomes (e.g., mean, SD), which compromised the ability to conduct many of the planned meta-analyses. Other common issues included reporting bias (e.g., not reporting all outcomes measured in the study), attrition, and small sample sizes. Often, the problem of small samples was magnified by an inconsistency of results among included studies. When only a few studies

are included in analyses, there is a potentially large impact if the average effect of one study differs in size or direction.

Many solutions to these problems have been offered such as encouraging publication of clinical trial protocols, to require use of the CONSORT statement (Schulz, Altman, & Moher, 2010) for reporting clinical trials outcomes, and holding authors, reviewers, and editors accountable for lack of compliance. Our field also has a poor record of replicating interventions, and the preponderance of evidence in different areas comes from single investigators/laboratories, and thus there is an important need to encourage replication efforts in our field.

### **Implications for Future Research on Pediatric Psychology Interventions**

As the evidence base accumulates in different areas of pediatric psychology interventions, our future research will be able to move beyond basic questions of treatment efficacy to understanding of the efficacy of individual treatment components and of mediators and moderators of treatment outcome. There has been tremendous interest in mechanisms of psychological treatment. Future research is needed to foster a better understanding of how evidence-based pediatric psychology interventions work, with whom and why they work, and how they might be improved upon.

There has been recent discussion and suggestion to consider the use of innovative research designs to test behavioral interventions. This is sparked in part by debate on whether the RCT is the best method to evaluate psychological therapies because of the limitations in translating efficacy findings to real-world clinical practice. Suggestions have been made to measure clinical efficacy and effectiveness through large-scale observational and translational studies (Morley, Williams, & Eccleston, 2013; Rowbotham et al., 2013). Pragmatic or effectiveness trials may be ideal for studying long-term therapeutic effectiveness of psychological interventions delivered in different health settings (e.g., primary care). Such trials often include all patients (including those with comorbidities) and may randomize at the level of the clinic or provider rather than the individual patient. Use of these types of designs to study pediatric psychology interventions may help close the translation gap in relating our interventions to real-world populations in real-world health-care systems.

Another suggestion for alternative research designs are use of adaptive interventions. The use of adaptive intervention designs may better address questions about the specific mechanisms of treatment, differences in patient

subgroups, and optimal sequencing of different treatments, particularly in areas where interdisciplinary treatments are the norm. As an example, the use of the sequential, multiple assignment, randomized trial (Almirall, Compton, Gunlicks-Stoessel, Duan, & Murphy, 2012) has gained popularity for testing the effects of behavioral interventions. In adaptive interventions, the type or the dosage of intervention offered to participants is individualized and repeatedly adjusted in stages over time based on individual progress (Nahum-Shani et al., 2012). At each stage, all participants are randomly assigned to a treatment option so that participants are randomized multiple times in order to assess the effectiveness of each stage. Because there are a number of decision rules that can be made based on patient individual characteristics and periodic assessments that gauge patient progress, this type of design seems to better emulate clinician's real decision making processes. Examples of adaptive intervention designs are emerging in child and adolescent treatment research (Gunlicks-Stoessel & Mufson, 2011), and there is ongoing work using these designs in pediatric psychology treatment research.

### **Implications for Training in Evidence-Based Practice**

Over the past few decades, there has been a continued evolution of evidence-based medicine and continued development within psychology of the concept of evidence-based practice. Sackett, Rosenberg, Gray, Haynes, and Richardson (1996) defined evidence-based medicine as "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." At that time, evidence-based medicine was just evolving as a discipline, and programs were beginning to teach learners at different levels about evidence-based medicine. Over the next two decades, familiarity with evidence-based medicine and evidence-based practice concepts has certainly evolved, but there remain difficulties in applying these concepts to training in psychology.

A 10-year follow-up survey of clinical psychology training programs about their training and supervision in ESTs provides some interesting data about uptake of these concepts in clinical psychology (Woody, 2005). The survey asked about how much training was offered in 26 treatments listed as empirically supported for some time (since the 1990s). Although there was some improvement in

didactic dissemination to trainees, actual supervised training in ESTs appeared to decline over time. There were a number of barriers identified by training directors including uncertainty about how to conceptualize training in ESTs, lack of time, shortage of trained supervisors, lack of control over practicum experiences, perceived inappropriateness of established ESTs for a given population, and philosophical opposition.

Recently, core competencies for training in pediatric psychology have been published (Palermo et al., 2014). Within the area of evidence-based practice, several specific competencies for pediatric psychology training were emphasized including (1) clinical training to acquire expertise in how to perform evidence-based treatments for pediatric psychology populations, (2) training in how to consider and assess patient preferences to enhance clinical decision-making, and (3) scientific training in clinical trial methodology and reporting, systematic reviews, and search strategies to enable conduct of research to inform practice.

As the special issue highlights, there are significant gaps in the evidence base in pediatric psychology, and we will need future generations of pediatric psychologists to be trained to tackle these challenges. Educators may need to consider curriculum enhancements to ensure that pediatric psychology students receive appropriate training in how to conduct systematic reviews and to evaluate the evidence from systematic reviews. For example, students should understand best practices and reporting guidelines for clinical trials (CONSORT; Schulz, Altman, & Moher, 2010) and for systematic reviews including familiarity with the PRISMA checklist (Liberati et al., 2009). Moreover, students should understand risk of bias, the difference between efficacy and clinical effectiveness, and how to judge the quality of the research evidence. Many doctoral programs provide no formal training in systematic review methods, and students learn only by actual involvement in systematic reviews. Although participation in a Cochrane review or other systematic review provides a valuable learning opportunity for students, it is likely to be undertaken by only a minority of students. Examples of models for teaching evidence-based practice in pediatric psychology are needed. Moreover, increased efforts to disseminate nontechnical descriptions of treatment efficacy data for pediatric psychology interventions will enhance teaching activities directed toward students and consumers of our research (e.g., other health professionals, public).

In conclusion, significant progress has been made in developing the evidence base for interventions designed to improve the health and behavior of children, youth, and families presenting with common pediatric psychology



issues. The next generation of intervention studies can capitalize on the recommendations put forth in this special issue to continue to strengthen the conclusions that can be drawn of the impact of pediatric psychology interventions.

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