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Skill Acquisition and Utilization During Evidence-Based Psychosocial Treatments for Childhood Disruptive Behavior Problems: A Review and Meta-analysis

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Abstract We review 85 empirical articles published since 2000 that measured the acquisition and/or utilization of parent management skills and/or child cognitive-behavioral skills in the context of an evidence-based treatment (EBT) for childhood behavior problems. Results showed that: (1) there are no standardized measures of skill acquisition or skill utilization that are used across treatments, (2) little is known about predictors, correlates, or outcomes associated with skill acquisition and utilization, and (3) few studies systematically examined techniques to enhance the acquisition and utilization of specific skills. Meta-analytic results from a subset of 68 articles (59 studies) showed an overall treatment–control ES = .31, $p < .01$ for skill acquisition and ES = .20, p = ns for skill utilization. We recommend that future research focus on the following three areas: (1) development of standardized measures of skill acquisition and utilization from a "common elements" perspective that can used across EBTs; (2) assessment of the predictors, correlates, and outcomes associated with skill acquisition and utilization; and (3) development of innovative interventions to enhance the acquisition and utilization of cognitive-behavioral and parent management skills.

Keywords Disruptive behavior · Evidence-based treatments · Skill acquisition · Skill utilization · Common elements

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Introduction

The focus of much psychotherapy research over the past few decades has been on defining, evaluating, and cataloguing evidence-based treatments (EBTs; e.g., Chambless and Hollon 1998; Ollendick et al. 2006). EBTs have been shown to be effective in treating a wide range of childhood and adolescent disorders, including disruptive behavior disorders (DBDs), relative to no treatment (Weisz et al. 1987, 1995), and even relative to usual care (Weisz et al. 2006). A recent review article identified no less than 16 different psychosocial EBTs for children and adolescents with disruptive behaviors (Eyberg et al. 2008). Examples include Parent Management Training (Patterson et al. 1975), Problem-Solving Skills Training (Kazdin 2003), and the Incredible Years program (Webster-Stratton and Reid 2003).

Skill Acquisition and Utilization

The acquisition and utilization of skills is central to many behavior therapy (BT) and cognitive-behavioral therapy (CBT) treatments, including treatments for disruptive behavior disorders. For example, in Parent–Child Interaction Therapy (PCIT; Funderburk and Eyberg 2011; McNeil and Hembree-Kigin 2011), parents must demonstrate mastery of a set of skills before moving on to the next phase of treatment and graduating from treatment. Therapists are trained to assess mastery of skills by coding parent–child interactions using a behavior observation coding system during each treatment session. Parents are also given homework sheets to report on their daily skill-use between treatment sessions. The purpose of this review and meta-analysis is to summarize the recent literature

(since 2000) on skill acquisition and utilization, constructs that are central to psychosocial treatments for disruptive behavior.

Definitions

There are no standard definitions of skill acquisition or skill utilization, and other terms have been used to describe similar constructs. For example, the term *treatment receipt* is similar to skill acquisition. Bellg and colleagues define treatment receipt as, "the degree to which the participant understands and demonstrates knowledge of and ability to use treatment skills" (Bellg et al. 2004, p. 444). Likewise, the term *treatment enactment* is similar to skill utilization. Treatment enactment is defined by Bellg and colleagues as, "the degree to which the participant applies the skills learned in treatment in his or her daily life" (p. 444). For the purposes of this review and meta-analysis, we use the terms *skill acquisition* and *skill utilization,* as these terms are more commonly used in the DBD literature (e.g., Lyon and Budd 2010; Nash et al. 2003; O'Callaghan et al. 2003; Shanley and Niec 2010; Thornberry and Brestan-Knight 2011; Timmer et al. 2011; Ware et al. 2008).

Skill Acquisition

We defined skill acquisition as the degree to which a parent/child can perform a skill learned during the course of treatment. This definition includes only the formal assessment of a skill by an "expert" rater (e.g., therapist, clinician, and assessor) using a rubric, checklist, behavior observation, or rating scale. It does not include a parent's self-report on a parenting measure (e.g., Parenting Practices Inventory or Alabama Parenting Questionnaire). An example of a measure that meets our definition of skill acquisition is the Dyadic Parent–Child Interaction Coding System (DPICS; Eyberg et al. 2005). The DPICS is an observational coding system used to record the frequency of encouraged behaviors and discouraged behaviors that are taught in PCIT. For example, Bagner et al. (2010) used the DPICS to measure skill acquisition in both treatment and control groups. In their study, trained coders observed 5-min parent–child interactions and recorded "do skills" (behaviors encouraged in PCIT: behavior descriptions, reflections, and praises) and "don't skills" (behaviors discouraged in PCIT: questions, commands, and negative talk).

Skill Utilization

We defined skill utilization as the degree to which a parent/child uses a skill in his/her daily life outside of treatment sessions. This might include the practice of a skill assigned as "homework" or "home practice" by the therapist, but this is only a very small piece of the definition. Rather, the term refers more generally to skill-use that is initiated by the parent/child on a day-to-day basis. An example of a study that meets our definition of skill utilization is Leathers and colleagues' KEEP study (Leathers et al. 2011). Parent skill utilization was measured using a telephone interview. Foster parents were asked to report on the number of times they had used intervention skills in the past 3 days. The KEEP intervention skills that were assessed included praise and specific discipline techniques (e.g., time-out, privilege loss, and work chores).

Rationale for a Review and Meta-analysis

Whereas there is a growing research literature on predictors and moderators of treatment outcome (e.g., symptom severity, comorbid conditions, and parent psychopathology), less is known about specific mechanisms through which these variables exert their influence on the course of treatment. From behavior therapy (BT) and cognitive-behavioral therapy (CBT) perspectives, these variables may influence the course of treatment via several mechanisms, including (a) participation/engagement, (b) skill acquisition, (c) skill utilization, and (d) maintenance of cognitive and behavioral changes. In order to improve treatment outcome, therefore, it is critical to measure these constructs in order to pinpoint barriers to treatment progress. Traditional randomized clinical trials have focused on assessing outcome in terms of symptoms, diagnoses, and functioning, with less attention to measuring these theoretically central intermediate processes (Nock and Ferriter 2005). A review and meta-analysis of skill acquisition and utilization is needed to guide future research and refine existing treatments for childhood behavior problems. Although numerous reviews and meta-analyses have focused on DBD treatments (e.g., Eyberg et al. 2008; Kaminski et al. 2008; Reyno and McGrath 2006), this is the first to focus exclusively on the constructs of skill acquisition and utilization. The most closely related prior reviews are perhaps studies by Kaminski et al. (2008) and Boyle and Lutzker (2011). The Kaminski et al. (2008) study is a component analysis, with a focus on *treatment content* and *delivery method*, but includes skill acquisition as one of several outcomes for a subset of the studies. Boyle and Lutzker (2011) examined the generalization (i.e., skill utilization) of parent training skills in 16 studies. However, their review did not estimate effect sizes or include studies on the generalization of child skills. In contrast to these prior reviews, the purpose of the current review and meta-analysis was to focus explicitly on skill

acquisition and skill utilization for both parent skills and child skills and to estimate effect sizes.

Current Study

The aim of the current study was to summarize the recent literature (since 2000) on skill acquisition and skill utilization for psychosocial DBD treatments. We chose 2000 as our cutoff to focus on the most recent decade (approximately) and thereby reflect the current state of the field. The aim of the review was to summarize (1) measurement approaches; (2) predictors, correlates, and outcomes examined in relation to these constructs; and (3) the frequency with which these constructs are specific targets of intervention. This information will be useful for identifying knowledge gaps and guiding future areas of research. The goal of the meta-analysis was to estimate effect sizes for skill acquisition and skill utilization. This information has the potential to inform treatment refinement (e.g., which skills are not being learned well by parents and children?) and generate hypotheses about specific mechanisms of change (e.g., which skills do parents and children actually use in their day-to-day lives?).

Method

Procedure

Articles were included in the review and meta-analysis based on the following criteria: (1) the target of treatment fell within the group of symptoms related to disruptive behavior disorders (e.g., externalizing behavior, behavior problems, conduct problems, and oppositional behavior); (2) the treatment was evidence-based (i.e., efficacy or effectiveness supported by at least one published study in a peer-reviewed journal); (3) the treatment was not primarily school-based; (4) there was a measure of skill acquisition and/or skill utilization; and (5) the measures were consistent with our definitions described above. As this article focuses on the recent literature, only articles published from January 2000 through January 2012 were included. A total of 85 articles were found and included in the review using these methods. Of these 85 articles, 68 were also included in the meta-analysis (see Fig. 1).

Study Selection

Studies included in the review and meta-analysis were identified through a systematic online database search of PsycINFO and Medline. The search was comprised of terms related to disruptive behavior disorders (DBDs) and skill acquisition or skill utilization. We began with an initial list of terms and added to this list as more terms were identified through the literature. DBD-related terms included: *Disruptive Behavior Disorders, DBD; Conduct Disorder, CD; Oppositional Defiant Disorder, ODD; disruptive behavior, behavior problems, conduct problems, externalizing behavior, aggressive behavior, antisocial behavior, oppositional behavior*, and *noncompliance*. Skill acquisition terms included: *skill acquisition, skill mastery,* and *skill competence*. Skill utilization terms included: *skill utilization, skill use, skill practice, compliance, adherence, generalization,* and *skill implementation*. DBD terms were crossed once with each skill acquisition term and once with each skill utilization term for a total of 154 permutations. The search yielded 9,172 possible articles. Our literature search also yielded a brief quantitative review on the generalization of parent skills learned in behavioral parent training programs (Boyle and Lutzker 2011), which gave us an additional 16 possible articles. Of the articles identified through our literature search and the quantitative review, 15 met our inclusion criteria and were included in the review.

For a more thorough search of the literature, we also manually searched through articles published in relevant journals. A list of possible journals to search was compiled prior to the literature search. The publication titles of the articles found through the database search were added to this list. We added only the journals in which at least one relevant article was found, as these journals would be likely to have published relevant articles. The following journal titles were searched: *Behavior Therapy, Behavioral Disorders, Behavioral Interventions, Child and Family Behavior Therapy, Child Psychiatry and Human Development, Clinical Psychology Review, Clinical Psychology: Science and Practice, Education and Treatment of Children, International Journal of Child & Adolescent Health, Journal of Abnormal Child Psychology, Journal of Applied Behavior Analysis, Journal of Child Psychology and Psychiatry, Journal of Clinical Child and Adolescent Psychology, Journal of Consulting and Clinical Psychology, Journal of Emotional and Behavioral Disorders, Journal of Marital and Family Therapy, Journal of Pediatric Health Care,* and *Psychology in the Schools*. Eleven articles meeting our inclusion criteria were found using this method.

A second online database search using PsycINFO and Medline was conducted using the names of DBD treatments and models found in our first 26 articles. Keyword searches of *behavioral parent training*, *Fast Track*, *Incredible Years*. *Keeping Foster Parents Trained and Supported, KEEP, Multidimensional Treatment Foster Care, MTFC, Parent–Child Interaction Therapy*, *PCIT*, *Parent Management Training*, *PMT*, *Parent Management*

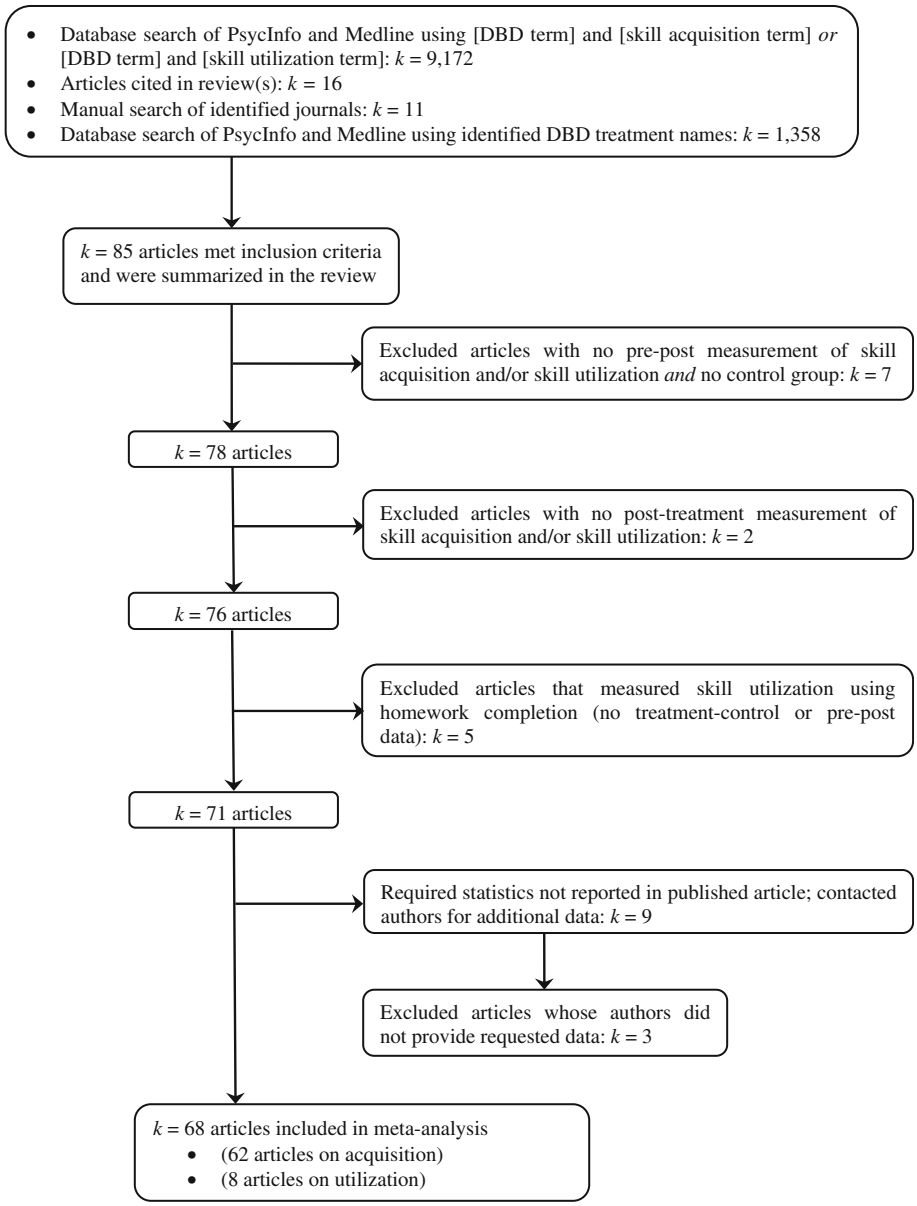

Fig. 1 Study selection flow chart

Training Oregon Model, *PMTO*, *Positive Parenting Program*, *Triple P*, *Problem Solving Skills Training*, and *PSST* yielded 1,358 articles. Fifty-nine of these articles met our inclusion criteria and were included in our review. Thus, our literature searches yielded a total of 85 articles on skill acquisition and/or skill utilization that met our inclusion criteria were included in the review.

Seventeen of the initial 85 articles were excluded from the meta-analysis because we were unable to calculate an effect size for skill acquisition and/or skill utilization based on the information provided in the article. For seven articles, skill acquisition and/or skill utilization was measured only once (e.g., at post-treatment) *and* the study did not have a control group, so no effect size could be calculated. For two articles, skill acquisition and/or skill utilization was measured during treatment sessions but not at post-treatment, so no effect size could be calculated. Five articles that measured skill utilization by tracking homework completion were also excluded. For these articles, homework completion (skill utilization) was measured for the treatment group throughout the intervention. No control group data and no pre- and post-data were collected, so no effect size could be calculated. For nine articles, statistics required for calculating an effect size (e.g., means and standard deviations) were not reported in the published article and the authors of these articles were contacted for additional data. The authors of six articles responded and were included in the analysis; the authors from three

articles did not respond and were excluded. A total of 68 articles were included in the final meta-analysis.

Study Coding

Study coding methods were based on Lipsey and Wilson's (2001) recommendations. The studies were coded using the coding procedures described in Appendices 1 and 2. The second author was trained by the first author in all coding procedures. Any questions or discrepancies were resolved through discussion between the first and second author. Individual skills within each study were coded by the first and second authors to assess reliability (88.4 % inter-rater agreement). Consistent with meta-analytic methods, multiple articles describing the same dataset were coded as a single study. We therefore had 68 articles but only 59 separate studies included in the meta-analysis. Study variables included in the meta-analysis were as follows (see Appendices 1 and 2 for a complete list of codes and operationalized definitions):

1. Research design descriptors: Total sample size, treatment group sample size, and control group sample size.
2. Nature of intervention descriptors: Intervention name, whether it was prevention or treatment, and type of control group (no treatment, waitlist, treatment as usual, alternative treatment, or no control group).
3. Skill descriptors: Whether the skill measured was acquisition or utilization, whether it was a parent skill or a child skill, and the specific category of skill (Positive Parenting, Negative Parenting, Praise, Verbal/Nonverbal Communication, Positive/Negative Consequences, Other Parent Skill, Emotion Labeling, Problem-solving, Anger management, Social Skills, or Other Child Skill).
4. Effect size descriptor: Whether the effect size was calculated for pre–post change or treatment–control difference (analyzed separately).

The studies were analyzed at multiple levels of specificity according to the above variables. In the first set of analyses, we examined effect sizes for overall skill acquisition and overall skill utilization. In the second set of analyses, we divided the effect sizes further and examined parent skill acquisition, parent skill utilization, child skill acquisition, and child skill utilization separately. In the final set of analyses, we examined effect sizes for parent/child skill acquisition and skill utilization for each of our 11 skill categories (Positive Parenting, Negative Parenting, Praise, Communication, Consequences, Other Parent Skill, Emotion Labeling, Problem-solving, Anger management, Social Skills, or Other Child Skill; see Appendix 2 for category definitions).

Analyses

Meta-analyses were conducted with Lipsey and Wilson's (2001) SPSS macros. First, a meta-analytically derived mean effect size (d) was obtained for each outcome. Pre–post effects were analyzed separately from treatment–effect sizes. We relied on random effects models because this more conservative approach allows generalization beyond included samples (Rosenthal and DiMatteo 2001). A homogeneity statistic (Q) was derived based on these effect sizes to examine the amount of heterogeneity in the effect sizes. The Q statistic has a chi-square distribution based on $k - 1$ degrees of freedom, with k representing the number of effect sizes in the analysis. A statistically significant homogeneity Q statistic supports a heterogeneous distribution.

Results

Overview

The 85 articles that were included in the final review are summarized in Tables 1 and 2. Seventy-four (87 %) of the articles included in this review measured skill acquisition. A variety of skill acquisition measures were used, but the majority were observational ($n = 60$; 81.1 %). The rest included clinician report ($n = 3$; 4.1 %), self-report ($n = 1$; 1.4 %), or a test of knowledge/performance assessment to measure skill acquisition ($n = 12$; 16.2 %). A large number of these articles measured only the acquisition of parent skills ($n = 64$; 86.5 %) and did not examine child skills. Twenty-four (32 %) of the articles included in this review measured skill utilization. Types of measures used in these articles included observational ($n = 7$; 29.2 %), clinician report ($n = 1$; 4.2 %), self-report ($n = 5$; 20.8 %), parent report ($n = 1$; 4.2 %), test of knowledge/performance assessment ($n = 1$; 4.2 %), and homework ($n = 10$; 41.7 %). Articles measuring skill utilization also tended to assess parent skills ($n = 21$; 87.5 %) rather than child skills.

Many of these articles examined skill acquisition and skill utilization as a primary measure of treatment outcome. While these articles reported parent and child competency in performance of target skills and/or frequency of use of target skills in their daily lives, these constructs were not studied as specific mechanisms of change. In other words, a large number of the articles we reviewed did not examine any antecedents/predictors of, outcomes associated with, or ways to enhance skill acquisition and utilization. Thirty-five (47.3 %) skill acquisition articles and 11 (50 %) skill utilization articles measured skill acquisition and

Table 1 Characteristics of articles measuring skill acquisition

Study	Treatment	*N*	Skill(s)	Measure (setting)	Frequency/duration/sampling	Antecedents/ predictors	Outcomes	Enhancement
*1. Delaney and Kaiser (2001)	BCBS	4	Parent—praise, instructions, response to noncompliance	Observation (child-care centers)	Occurred at every pretreatment and treatment session; 12-min periods; coded first 10 min; all parent/child utterances and selected nonverbal behaviors coded		Child noncompliance	
*2. Chacko et al. (2009)	BPT	120	Parent—praise, positive affect, physical positive, no negative commands/critical statements/physical negative	Observation (clinic)	Occurred once at pretreatment, post-treatment, and 3-month follow-up; 15-min period consisting of 5-min tasks			Enhanced intervention
*3. Chronis-Tuscano et al. (2011)	BPT	70	Parent—praise, positive affect, physical positive, no negative commands/critical statements/physical negative	Observation (clinic)	Occurred once at pretreatment and post-treatment; consisted of 5- to 10-min tasks	Maternal ADHD	Child externalizing behaviors	
4. Feldman and Werner (2002)	BPT	36	Parent—behavior management	Clinician report (home)	Rated once on 7-point scale at follow-up			
*5. Marcus et al. (2001)	BPT	4	Parent—instructions	Observation (home or school)	Occurred 1–2 times per week throughout pretreatment, treatment, and post-treatment; 5- to 10-min periods; coded in 10-s intervals		Child noncompliance	
*6. Hawes and Dadds (2005)	BPT	56	Parent—praise, discipline, no harsh/aversive behavior	Observation (home)	Occurred once at pretreatment, week 3, week 5, and post-treatment; 30-min period	Child callous-unemotional traits		
*7. Hawes and Dadds (2006)	BPT	56	Parent—praise, discipline, no harsh/aversive behavior	Observation (home)	Occurred once at pretreatment, week 3, week 5, and post-treatment; 30-min period			
*8. Miles and Wilder (2009)	BST	3	Parent—guided compliance	Test of knowledge/ performance assessment (home or school)	One 5- to 10-min period at baseline (one parent demand); one 40- to 75-min period throughout each treatment session (five parent demands per period); multiple 7- to 13-min periods throughout post-treatment (five parent demands per period)			
9. Bierman et al. (2006)	Fast Track	410	Parent—warmth, no physical punishment	Observation (home)	Occurred once at year 2 and year 3 of treatment			

Table 1 continued

Study	Treatment	*N*	Skill(s)	Measure (setting)	Frequency/duration/sampling	Antecedents/ predictors	Outcomes	Enhancement
*10. Conduct Problems Prevention Research Group (2002)	Fast Track	891	Child—problem-solving	Test of knowledge/ performance assessment (school)	Occurred once at year 3 of treatment; eight drawing–vignette pairs of social problems; coded no more than three problem solutions per drawing–vignette pair			
*11. Conduct Problems Prevention Research Group (2004)	Fast Track	891	Child—problem-solving	Test of knowledge/ performance assessment (school)	Occurred once at year 4 and year 5 of treatment; 6 vignettes of social problems			
*12. Cummings and Wittenberg (2008)	IY	54	Parent—positive affect, behavioral responsiveness, emotional responsiveness, no depression/irritability/anger/ aggression	Observation (clinic)	Occurred once at pretreatment, post-treatment, and 1-year follow-up; 45-min period			IY vs. dyadic parenting
*13. Brotman et al. (2005)	IY	99	Parent—praise, valence, responsiveness, affection, no critical statements/harsh discipline	Observation (home)	Occurred once at pretreatment and post-treatment; 10-min period consisting of 5-min tasks			
*14. Drugli and Larsson (2006)	IY	127	Child—problem-solving	Test of knowledge/ performance assessment (school)	Occurred once at pretreatment, post-treatment, and 1-year follow-up; 12 vignettes of social problems			
*15. Drugli et al. (2007)	IY	127	Child—problem-solving	Test of knowledge/ performance assessment (school)	Occurred once at pretreatment, post-treatment, and 1-year follow-up; 12 vignettes of social problems			
*16. Eames et al. (2009)	IY	86	Parent—praise, positive affect, physical positive, problem-solving	Observation (home)	Occurred once at pretreatment and post-treatment	Clinician skills		
*17. Gardner et al. (2006)	IY	76	Parent—praise, discipline, joint play/talk, no hitting/ yelling/threats/negative commands	Observation (home)	Occurred once at pretreatment, post-treatment, and 18-month follow-up; 50-min period consisting of 5- to 20-min tasks		Child negative behaviors	

Table 1 continued

Study	Treatment	*N*	Skill(s)	Measure (setting)	Frequency/duration/sampling	Antecedents/ predictors	Outcomes	Enhancement
*18. Gardner et al. (2010)	IY	153	Parent—positive affect, physical positive, praise, problem-solving, no negative commands/critical statements	Observation (home)	Occurred once at pretreatment and 6 months		Child problem behavior	
*19. Hutchings et al. (2006)	IY	157	Parent—praise, positive affect, physical positive, problem-solving	Observation (home)	Occurred once at pretreatment and 6 months; 30-min period	Community crime rate		
*20. Hutchings et al. (2007)	IY	153	Parent—positive skills	Observation (home)	Occurred once at pretreatment and 6 months; 30-min period			
*21. Jones et al. (2007)	IY	133	Parent—praise, positive affect, physical positive, valence, no negative commands/critical statements	Observation (home)	Occurred once at pretreatment and post-treatment; 30-min period; coded in 5-min intervals			
*22. McGilloway et al. (2012)	IY	149	Parent—praise, encouragement, physical positive, no negative commands/critical statements/physical negative	Observation (home)	Occurred once at pretreatment and 6-month follow-up; 30-min period consisting of 5-min tasks			
*23. Reid et al. (2004)	IY	882	Parent—no critical statements	Observation (home)	Occurred once at pretreatment and post-treatment; 30-min period		Child conduct problems	
*24. Reid et al. (2001)	IY	634	Parent—praise, positive affect, physical positive, no commands/critical statements	Observation (home)	Occurred once at pretreatment, post-treatment, and 1-year follow-up; 30-min period	Ethnicity		
*25. Reid et al. (2007)	IY	433	Parent—praise, descriptive commenting, encouragement, problem-solving, no, critical statements/commands/ negative physical	Observation (home)	Occurred once at pretreatment and twice at post-treatment; 30-min period			Classroom intervention alone vs. added parent training
*26. Scott et al. (2010a)	IY	174	Parent—affect, child-centered comments and requests, no commands/criticisms/ prohibitions	Observation (home)	Occurred once at pretreatment and 1-year follow-up; consisted of 3- to 10-min tasks			
*27. Scott et al. (2010b)	IY	112	Parent—attention, cooperation, warmth, no commands, criticism	Observation (school)	Occurred at pretreatment and post-treatment; 15-min period			

Table 1 continued

Study	Treatment	*N*	Skill(s)	Measure (setting)	Frequency/duration/sampling	Antecedents/ predictors	Outcomes	Enhancement
*28. Webster-Stratton et al. (2011a)	IY	99	Parent—praise, descriptive encouragement, reflective statements, problem-solving, no critical statements Child—problem-solving, emotion labeling	Observation (clinic) Test of knowledge/ performance assessment (clinic)	Occurred once at pretreatment and post-treatment; observation consisted of 10-min tasks; test included vignettes and pictures			
*29. Webster-Stratton et al. (2001a)	IY	272	Parent—positive affect praise, physical warmth, no critical statements	Observation (home)	Occurred once at pretreatment, post-treatment, and 1-year follow-up; 30-min period		Child conduct problems	
*30. Webster-Stratton (2001b)	IY	99	Child—problem-solving	Test of knowledge/ performance assessment (clinic)	Occurred once at pretreatment, post-treatment, and follow-up; 12 problem situations; coded as many solutions as child provided			
*31. Webster-Stratton et al. (2008)	IY	216	Child—problem-solving, emotion labeling	Test of knowledge/ performance assessment	Occurred once at pretreatment and post-treatment; series of vignettes and pictures			
*32. Webster-Stratton et al. (2011b)	IY	78	Parent—praise, no critical statements	Observation (clinic)	Occurred once at pretreatment and post-treatment; 30-min period		Child delinquency	
*33. Nash et al. (2003)	Making choices	70	Child—problem-solving skills	Test of knowledge/ performance assessment (school)	Occurred once at pretreatment and post-treatment; sets of 10–16 pictures and vignettes	Academic performance, study behavior, classroom behavior		
34. Benoit et al. (2001)	Parent training	3	Parent—instructions, praise	Observation (clinic)	Occurred at each session until mastery; two 10-min periods with short break between; at least 10 parent instructions given per period			
35. Research Units on Pediatric Psychopharmacology (RUPP) Autism Network (2007)	Parent training	17	Parent—parent training skills	Clinician report, self-report (clinic)	Occurred at each session throughout treatment; rated on 3-point rating scale			
*36. Bagner and Eyberg (2007)	PCIT	30	Parent—descriptions, reflections, praise, no critical statements/questions/ commands	Observation (clinic)	Occurred once at pretreatment and four months; consisted of 5-min tasks		Externalizing behaviors	

Table 1 continued

Study	Treatment	*N*	Skill(s)	Measure (setting)	Frequency/duration/sampling	Antecedents/ predictors	Outcomes	Enhancement
*37. Bagner et al. (2010)	PCIT	28	Parent—praise, reflections, imitating, descriptions, enthusiasm	Observation (clinic)	Occurred once at pretreatment and four months; consisted of 5-min tasks			
*38. Budd et al. (2011)	PCIT	4	Parent—descriptions, reflections, praise, no negative talk/questions/ commands	Observation (clinic)	Occurred once at pretreatment and post-treatment; 25-min period consisting of 5-min tasks			
39. Calzada et al. (2004)	PCIT	53	Parent—acknowledgment, answers, descriptions, praise, reflection, positive touch, no commands	Observation (clinic)	Occurred once at pretreatment; consisted of 5-min tasks	Mothers vs. fathers; ADHD comorbidity	Child noncompliance	
*40. Eyberg et al. (2001)	PCIT	20	Parent—praise, physical positive behavior, no critical statements/physical negative	Observation (clinic)	Occurred at pretreatment, post-treatment, 1-year follow-up, and 2-year follow-up; consisted of 5-min tasks			
41. Fernandez and Eyberg (2009)	PCIT	99	Parent—praise, no critical statements/smart talk	Observation (clinic)	Occurred once at pretreatment, post-treatment 1-year follow-up, and 2-year follow-up; consisted of 5-min tasks		Attrition rate	
42. Harwood and Eyberg (2004)	PCIT	22	Parent—no critical statements/ smart talk	Observation (clinic)	Occurred twice at pretreatment; consisted of 5-min tasks		Attrition rate	
*43. Leung et al. (2009)	PCIT	130	Parent—descriptions, reflections, praise, no questions/commands/critical statements	Observation (clinic)	Occurred once at pretreatment, post-treatment, and follow-up			
*44. Lyon and Budd (2010)	PCIT	14	Parent—praise, reflections, descriptions, questions	Observation (clinic)	Occurred at the beginning of most treatment sessions; consisted of 5-min tasks		Attrition rate	
*45. McCabe and Yeh (2009)	PCIT	58	Parent—praise, reflections, behavioral descriptions, no negative talk/commands	Observation (clinic)	Occurred once at pretreatment and post-treatment; consisted of 5-min tasks			Culturally modified PCIT
*46. Nixon et al. (2003)	PCIT	54	Parent—praise, no critical statements/commands	Observation (clinic)	Occurred once at pretreatment, post-treatment and 6-month follow-up; consisted of 5-min tasks			
*47. Nixon et al. (2004)	PCIT	54	Parent—praise, no critical statements/commands	Observation (clinic)	Occurred once at pretreatment and 1-year follow-up; consisted of 5-min tasks			
*48. Pearl et al. (2011)	PCIT	53	Parent—praises, reflections, behavioral descriptions	Observation (clinic)	Occurred once at pretreatment and post-treatment; consisted of 5-min tasks			

Table 1 continued

Study	Treatment	*N*	Skill(s)	Measure (setting)	Frequency/duration/sampling	Antecedents/ predictors	Outcomes	Enhancement
*49. Shanley and Niec (2010)	PCIT	60	Parent—praises, reflections, behavioral descriptions	Observation (clinic)	Occurred at both treatment sessions; 25-min period			In vivo feedback
*50. Thornberry and Brestan-Knight (2011)	PCIT	13	Parent—PCIT skills	Observation (clinic)	Occurred once at pretreatment and post-treatment; 25-min period consisting of 5-min tasks			
*51. Timmer et al. (2011)	PCIT	132	Parent—behavioral descriptions, reflective statements, praise, no questions/commands/critical statements	Observation (clinic)	Occurred at pretreatment and mid/post-treatment; 15-min period	Maternal depression		
*52. Timmer et al. (2010)	PCIT	80	Parent—behavioral descriptions, reflective statements, no commands/ questions/critical statements	Observation (home)	Occurred once at pretreatment and post-treatment; consisted of 5-min tasks			In-home coaching
53. Ware et al. (2008)	PCIT	5	Parent—behavioral descriptions, reflective statements, no commands/ questions/critical statements	Observation (home)	Occurred throughout pretreatment, treatment, and post-treatment; consisted of 5-min tasks			
54. Werba et al. (2006)	PCIT	99	Parent—acknowledgment, answer, behavioral description, praise, reflection, laugh, physical positive, no commands/ criticism/smart talk	Observation (clinic)	Occurred on two separate days; 15-min period			
55. Nock and Kazdin (2005)	PMT	76	Parent—PMT skills	Clinician report (clinic)	Occurred at sessions 5, 7, and 8; one rating on 5-point scale	Parent motivation		Participant enhancement intervention
*56. Bullard et al. (2010)	PMTO	110	Parent—skill encouragement, positive involvement, problem-solving, monitoring, no negative reinforcement/negative reciprocity/inept discipline	Observation (clinic)	Occurred once at pretreatment, 6-month follow-up, 12-month follow-up, and 24-month follow-up; 48-min period consisting of 5- to 10-min tasks	Marital relationship process		
*57. DeGarmo et al. (2004)	PMTO	238	Parent—positive parenting, poor discipline, monitoring	Observation (clinic)	Occurred once at pretreatment, post-treatment, 6-month follow-up, 12-month follow-up, and 24-month follow-up; consisted of 5- to 10-min tasks		Child externalizing behaviors and maternal depression	

Table 1 continued

Study	Treatment	*N*	Skill(s)	Measure (setting)	Frequency/duration/sampling	Antecedents/ predictors	Outcomes	Enhancement
*58. Forgatch et al. (2005)	PMTO	110	Parent—skill encouragement, positive involvement, problem-solving, monitoring, no negative reinforcement/negative reciprocity/inept discipline	Observation (clinic)	Occurred once at pretreatment, 12-month follow-up, and 24-month follow-up; consisted of 5- to 10-min tasks		Child noncompliance and externalizing/ internalizing behavior problems at home and school	
*59. Forgatch et al. (2005b)	PMTO	20	Parent—positive involvement, skill encouragement, problem-solving, monitoring	Observation (clinic)	Occurred once at pretreatment and 12 months; 48-min period	Treatment adherence		
*60. Ogden and Hagen (2008)	PMTO	112	Parent—discipline, problem-solving, monitoring, positive involvement, skill encouragement	Observation (clinic)	Occurred at pretreatment and post-treatment; 25- to 30-min period			
61. Marchant and Young (2001)	Positive parenting skills	4	Parent—instructions, teaching, praise, tokens/reinforcers, self-monitoring	Observation (home)	Occurred 1–3 times per week throughout pretreatment, treatment, and post-treatment; 30-min periods; at least eight parent instructions given per period		Child noncompliance	
*62. Marchant et al. (2004)	Positive parenting skills	4	Parent—praise, teaching	Observation (home)	Occurred 1–3 times per week throughout pretreatment, treatment, and post-treatment; 30-min periods		Child noncompliance	
63. Feinfield and Baker (2004)	Project TEAM	47	Parent—behavior management	Test of knowledge/ performance assessment (clinic)	Occurred once at pretreatment and post-treatment; 15-item multiple choice vignettes			
*64. Martinez and Forgatch (2001)	PTC	238	Parent—positive involvement, skill encouragement, problem-solving, monitoring, no negative reinforcement/negative reciprocity/inept discipline	Observation (clinic)	Occurred once at every 6-month interval from pretreatment to 30 months; 45-min periods		Child noncompliance	
*65. Farrell et al. (2001)	RIPP	626	Child—problem-solving	Test of knowledge/ performance assessment (school)	Occurred once at pretreatment, post-treatment, 6-month follow-up, and 12-month follow-up; 12-item multiple choice and six problem situations	Age, gender	Disciplinary violations, drug use, violent behavior/ attitudes	

Table 1 continued

Study	Treatment	*N*	Skill(s)	Measure (setting)	Frequency/duration/sampling	Antecedents/ predictors	Outcomes	Enhancement
*66. Bor et al. (2002)	Triple P	87	Parent—no negative physical contact/aversive question or instruction/aversive attention/interruption	Observation (home)	Occurred once at pretreatment and post-treatment; 30-min period consisting of 10-min tasks; coded in 10-s intervals			Enhanced intervention (additional partner support + coping skills)
*67. Boyle et al. (2010)	Triple P	10	Parent—praise, physical contact, questions, attention, affection, responsiveness, no angry/hostile affect	Observation (home)	3-5 periods throughout pretreatment, 1–3 throughout treatment, and 4–6 throughout post-treatment; coded in 10-s intervals			
*68. Hahlweg et al. (2010)	Triple P	280	Parent—praise, contact, question, instruction, attention, affection, no physical negative/aversive question or instruction/ aversive attention/ interruption	Observation (home)	Occurred once at pretreatment and 1-year follow-up; 20-min period consisting of 5-min tasks; coded in 10-s intervals	Two parent families vs. single parent families		
*69. Plant and Sanders (2007)	Triple P	74	Parent—no negative physical contact/aversive question or instruction/aversive attention/interruption	Observation (home)	Occurred at pretreatment and post-treatment; 30-min period consisting of 10-min tasks; coded in 10-s intervals			Enhanced intervention (6 additional sessions)
*70. Roberts et al. (2006)	Triple P	47	Parent—instructions, questions, praise, positive contact, positive social attention, no negative physical contact or social attention/negatively worded questions or instructions/ vague instructions	Observation (home)	Occurred once at pretreatment, post-treatment, and follow-up; 20-min period; coded in 15-s intervals			
*71. Sanders et al. (2007)	Triple P	305	Parent—no negative physical contact/aversive question or instruction/aversive attention/interruption	Observation (home)	Occurred at pretreatment, post-treatment, 1-year follow-up, and 3-year follow-up; 30-min period consisting of 10-min segments; coded in 10-s intervals		Externalizing behaviors	Self-guided vs. clinician-led vs. enhanced clinician-led intervention
*72. Sanders et al. (2000)	Triple P	305	Parent—no negative physical contact/aversive question or instruction/aversive attention/interruption	Observation (home)	Occurred at pretreatment, post-treatment, and 1-year follow-up; 30-min period consisting of 10-min segments; coded in 10-s intervals		Externalizing behaviors	Self-guided vs. clinician-led vs. enhanced clinician-led intervention

Table 1 continued

Study	Treatment	*N*	Skill(s)	Measure (setting)	Frequency/duration/sampling	Antecedents/ predictors	Outcomes	Enhancement
*73. Turner and Sanders (2006)	Triple P	30	Parent—Triple P skills	Observation (home)	Occurred at pretreatment and post-treatment; 15-min period consisting of 5-min tasks; coded in 10-s intervals			
*74. Presley and Hughes (2000)	Walker social skills curriculum	4	Child—anger management/ problem-solving	Test of knowledge/ performance assessment (school)	Occurred at each session throughout pretreatment, treatment, and post-treatment; multiple role plays			

* Articles included in the meta-analysis

PCIT = Parent–Child Interaction Therapy; IY = Incredible Years; PMTO = Oregon Model of Parent Management Training; BPT = behavioral parent training; BCBS = Blended Communication and Behavior Support; RIPP = Responding in Peaceful and Positive Ways; PTC = Parenting Through Change; BST = behavioral skills training; PMT = Parent Management Training

utilization but did not further examine antecedents, correlates, or outcomes.

Methods of Assessment

Articles varied greatly in methods and procedures of assessment of skill acquisition and utilization (see Tables 1, 2). There was no discernable pattern in the frequency, duration, and sampling of assessments. For example, although many articles used observations to assess skill acquisition and utilization, the specific methods for observation were different across most articles. Observation periods ranged from 5 to 75 min long and they included both structured tasks and play interactions. Frequency of observations ranged from once or twice during pretreatment and/or post-treatment to every treatment session. Coding methods also varied and included coding of every utterance/parent–child exchange, selected nonverbal behaviors, a set number of parent instructions/demands, and behaviors occurring at specific time intervals (e.g., 10 s). Other types of assessments such as clinician report and self-report used several different factors (e.g., homework completion, session attendance, and general impressions of skill competency) to come up with composite ratings of skill acquisition and utilization. Homework and tests of knowledge/performance assessments were generally tailored to the specific treatment or intervention used in the study, so their assessment procedures were very different from each other.

Antecedents/Predictors of Skill Acquisition and Utilization

Only 13 skill acquisition articles and five skill utilization articles looked at antecedents and predictors of skill acquisition and utilization (see Tables 1, 2). A study by Nock and Kazdin (2005) looked at parent motivation and its relation to skill acquisition and utilization in PMT. Before treatment, parents were given a self-report measure of motivation (Parent Motivation Inventory [PMI; Nock and Photos 2006]) to assess their Desire for Child Change, Readiness to Change, and Perceived Ability to Change. Skill acquisition and skill utilization were measured at three sessions throughout treatment via clinician and parent self-report. This study found that a few parent motivation variables (readiness to participate, perceived ability to participate) were related to clinician reports of parent skill utilization (Nock and Kazdin 2005). Another study by Forgatch et al. (2005) looked at clinician treatment adherence and competence and its effects on skill acquisition. Clinicians conducting PMT were rated on competent adherence to PMT according to the Fidelity of Implementation Rating System (FIMP; Knutson et al. 2003).

Table 2 Characteristics of articles measuring skill utilization

	Treatment	N	Skill(s)	Measure (setting)	Frequency/Duration/Sampling	Antecedents/ Predictors	Outcomes	Enhancement
*1. Delaney and Kaiser (2001)	BCBS	4	Parent—praise, instructions, response to noncompliance	Observation (home)	Occurred three times at pretreatment and post-treatment; 12-min period; first 10 min coded; all parent/child utterances and selected nonverbal behaviors coded		Child noncompliance	
*2. Danforth et al. (2006)	BMFC	72	Parent—praise, no arguing/repeating/ negative tone	Observation (home)	Occurred once at pretreatment and post-treatment; 1-hour period	Mothers vs. fathers		
3. Chacko et al. (2008)	BPT	12	Parent—positive strategies	Homework (home)	Assigned throughout treatment			
4. Chacko et al. (2009)	BPT	120	Parent—positive strategies	Homework (home)	Assigned weekly throughout treatment			Enhanced intervention
5. Fabiano et al. (2009)	BPT	75	Parent—behavioral skills	Homework (home)	Assigned weekly throughout treatment			Enhanced intervention (father sports coaching)
6.Miles and Wilder (2009)	BST	3	Parent—guided compliance	Test of knowledge/ performance assessment (park or playground)	Occurred once at follow-up; one period of five uninterrupted parent demands			
*7. Hutchings et al. (2004)	IY	7	Child—problem-solving, emotion labeling, anger management	Parent report	Occurred once at pretreatment and post-treatment; use of 15 strategies			
8. Jensen and Grimes (2010)	IY	82	Parent—behavioral skills	Homework (home)	Assigned weekly from weeks 1–9 of treatment	Couple attendance		Concurrent child treatment
9. Reid et al. (2004)	IY	882	Parent—IY skills	Homework (home)	Assigned throughout treatment		Child conduct problems	
*10. Chamberlain et al. (2008)	KEEP	700	Parent—positive reinforcement, discipline	Self-report (home and clinic)	2-hour interview occurred once at pretreatment and post-treatment. Daily report occurred throughout treatment	High risk vs. low risk	Child behavior problems	
*11. DeGarmo et al. (2009)	KEEP	700	Parent—KEEP skills	Homework (home)	Assigned throughout treatment; completion recorded at each group session	Ethnicity, kinship	Negative placement disruption, foster parent mood, child behavior problems	

Table 2 continued

	Treatment	N	Skill(s)	Measure (setting)	Frequency/Duration/Sampling	Antecedents/ Predictors	Outcomes	Enhancement
*12. Leathers et al. (2011)	KEEP	25	Parent—praise, discipline, no inconsistent discipline/yelling/ hitting	Self-report (home)	Occurred once at pretreatment, 3 months, 6 months, and 12 months; 42-item questionnaire		Externalizing/ internalizing behavior problems	
13. Benoit et al. (2001)	Parent training	3	Parent—instructions, praise	Observation (home)	Occurred after mastery of each training phase; two periods with short break between; at least 10 parent instructions given per period			
14. Research Units on Pediatric Psychopharmacology (RUPP) Autism Network (2007)	Parent training	17	Parent—parent training skills	Homework (home)	Occurred at each session throughout treatment; rated on 3-point rating scale			
15. Berkovits et al. (2010)	PCIT	30	Parent—PCIT skills	Homework (home)	Assigned weekly throughout treatment; 5 min of practice per day			Clinician-led vs. self-guided abbreviated intervention
16. Lyon and Budd (2010)	PCIT	14	Parent—PCIT skills	Homework (home)	Assigned daily throughout treatment; 5–15 min of practice		Attrition rate	
17. Kling et al. (2010)	PMT	159	Parent—PMT skills	Homework (home)	Assigned over the course of 11 weeks; 29 homework assignments per parent		Child conduct problems	Practitioner-assisted group vs. self-administered training
18. Nock and Kazdin (2005)	PMT	76	Parent—PMT skills	Clinician report (clinic) Self-report (clinic)	Occurred at sessions 5, 7, and 8; two ratings on 5-point scale	Parent motivation		Participant enhancement intervention
19. Marchant and Young (2001)	Positive parenting skills	4	Parent—instructions, direct/coercive teaching, praise, tokens/reinforcers, self-monitoring	Self-report (home)	Occurred five times per week throughout treatment; 30-min periods; at least eight parent instructions given per period			
*20. O'Callaghan et al. (2003)	Social skills training	4	Child—sportsmanlike behavior, attentive behavior	Observation (university campus)	Occurred five days per week for six weeks; period lasted length of a full kickball game			

Table 2 continued

	Treatment	N	Skill(s)	Measure (setting)	Frequency/Duration/Sampling	Antecedents/ Predictors	Outcomes	Enhancement
21. Boyle et al. (2010)	Triple P	10	Parent—praise, physical contact, commands, questions, attention, affection, responsiveness, no angry/ hostile affect	Observation (home)	3–5 periods throughout pretreatment, 1–3 throughout treatment, and 4–6 throughout post-treatment; coded in 10-s intervals			
*22. Roberts et al. (2006)	Triple P	47	Parent—instructions, questions, praise, positive contact, positive social attention, no negative physical contact or social attention/ negatively worded questions or instructions/vague instructions	Observation (community)	Occurred once at pretreatment, post-treatment, and follow-up; 20-min period; coded in 15-s intervals			
23. Presley and Hughes (2000)	Walker social skills curriculum	4	Child—anger management	Observation (school)	Occurred three times per week throughout pretreatment, treatment, and post-treatment; 20- to 30-min period			

* Articles included in the meta-analysis

PCIT Parent–Child Interaction Therapy, *KEEP* Keeping Foster Parents Trained and Supported, *BMFC* Behavior Management Flow Chart; *BCBS* Blended Communication and Behavior Support; *BPT* behavioral parent training; *IY* Incredible Years, *PMT* Parent Management Training; *BST* behavioral skills training

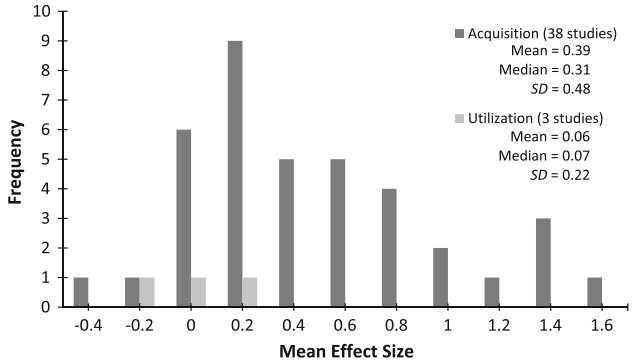

Fig. 2 Mean treatment–control effect sizes for individual studies

Parents were rated on use of PMT skills during parent–child interactions by observers. According to the results of this study, clinician treatment adherence and competence had a positive effect on parents' acquisition of PMT skills (Forgatch et al. 2005).

Outcomes Associated with Skill Acquisition and Utilization

Outcomes were most frequently investigated with 21 skill acquisition articles and seven skill utilization articles in this category (see Tables 1, 2). The majority of these articles looked at the relationship between skill acquisition and utilization and improvement rates in child behavior problems, finding a positive correlation between the variables (Delaney and Kaiser 2001; Kling et al. 2010; Marchant and Young 2001; Marchant et al. 2004; Marcus et al. 2001; Martinez and Forgatch 2001). For example, Martinez and Forgatch (2001) conducted a study relating child noncompliance levels to parents' acquisition of PMT skills. Skill acquisition was measured via laboratory observations of structured parent–child interactions. This study showed that both coercive discipline and positive parenting skills mediated treatment outcome. Rates of child noncompliance improved as use of coercive discipline decreased and positive PMT skills increased (Martinez and Forgatch 2001).

Enhancing Skill Acquisition and Utilization

Enhancement was studied in a small number of these articles. Eleven skill acquisition articles and six skill utilization articles investigated specific methods for improving enhancement of skill acquisition and utilization (see Tables 1, 2). Shanley and Niec (2010) studied the effects of in vivo feedback on skill acquisition among parents receiving PCIT. For parent–child pairs in the coaching group, parents received feedback and coaching during play interactions with their children. Parents were coached using

modeling and praise via a bug-in-the-ear device. Parents who were coached during play interactions had significantly higher rates of PCIT skill acquisition than parents who were not coached (Shanley and Niec 2010). In Nock and Kazdin's (2005) study with families in PMT, they developed a participant enhancement intervention (PEI) designed to improve both skill acquisition and utilization among parents. Parents in the PEI group received an added 5- to 15-min discussion during sessions one, five, and seven. These discussions focused on parent plans for change and potential barriers to treatment participation. Parents also completed a worksheet on plans to overcome these barriers as they occurred during treatment. Parents who received this added discussion scored significantly higher on clinician and self-report measures of PMT skill acquisition and utilization (Nock and Kazdin 2005). Kling et al. (2010) compared practitioner-assisted group training and self-administered training in terms of their effects on skill utilization among parents receiving PMT. Parents in the self-administered training group received a single training session and then implemented PMT on their own. Those in the group training met weekly with other parents for instruction, discussion, and practice of PMT skills. Homework completion (a component of skill utilization) was significantly higher for parents receiving group training versus those receiving self-administered training (Kling et al. 2010).

Meta-Analytic Results

Of the 85 articles included in the review, 68 were included in the final meta-analysis (see Fig. 1). These 68 articles represented 59 separate studies. Of these 68 articles, 62 measured skill acquisition and eight articles measured skill utilization. (Two articles measured both skill acquisition and utilization). Effect sizes are summarized in Table 3 (skill acquisition) and Table 4 (skill utilization). Separate sub-category (e.g., positive parenting) effect sizes were only calculated when three or more studies met inclusion criteria. Because there were so few studies on skill utilization, separate effect sizes could not be estimated for the utilization of child CBT skills or for the utilization of separate skill categories. Figure 2 depicts a histogram of the mean treatment–control effect sizes for individual studies.

Pre–post Versus Treatment–Control Effect Sizes

In every instance, pre–post effects sizes were substantially larger than treatment–control effect sizes, by a magnitude of 300–1400 %. Across all analyses, average pre–post effect sizes ranged from 1.15 to 2.02 compared to treatment–control effect sizes which ranged from .04 to .66. We focus the remainder of this section on treatment–control effects sizes as the more conservative estimate of effect sizes.

Table 3 Effect size estimates for skill acquisition (random effects models)

Construct	*k*	*N*	*d*	95 % CI	*Q*
Overall skills					
Pre–post	16	591	1.59**	.92–2.26	188.98**
Treatment–control	38	5,108	.31**	.20–.42	102.73**
Overall parent skills					
Pre–post	14	517	1.71**	.95–2.47	175.83**
Treatment–control	33	3,747	.30**	.18–.42	83.26**
Positive parenting					
Pre–post	7	306	1.63**	.63–2.63	94.21**
Treatment–control	24	2,957	.41**	.24–.59	94.59**
Negative parenting					
Pre–post	11	507	1.39**	.64–2.14	157.90**
Treatment–control	29	3,353	.26**	.12–.40	84.05**
Praise					
Pre–post	4	196	2.02	−.33 to 4.38	80.74**
Treatment–control	6	378	.66*	.15–1.18	26.71**
Communication					
Pre–post	6	166	1.85**	.86–2.84	16.35**
Treatment–control	7	629	.13	−.20 to .47	20.51**
Consequences					
Pre–post	2	7	–	–	–
Treatment–control	3	460	.04	−.19 to .27	2.81
Other					
Pre–post	1	4	–	–	–
Treatment–control	3	460	.22	−.07 to .51	4.26
Overall child skills					
Pre–post	1	70	–	–	–
Treatment–control	7	1,552	.40**	.12–.68	30.21**
Emotion labeling					
Pre–post	0	0	–	–	–
Treatment–control	2	315	–	–	–
Problem-solving					
Pre–post	0	0	–	–	–
Treatment–control	5	569	.17	−.17 to .51	14.93**
Anger management					
Pre–post	1	4	–	–	–
Treatment–control	0	0	–	–	–
Social skills					
Pre–post	1	70	–	–	–
Treatment–control	2	983	–	–	–

* $p < .05$; ** $p < .01$

Table 4 Effect size estimates for skill utilization (random effects models)

Construct	*k*	*N*	*d*	95 % CI	*Q*
Combined skills					
Pre–post	4	91	1.15*	.04–2.26	11.21*
Treatment–control	3	772	.20	−.03 to .44	2.40
Parent skills					
Pre–post	2	76	–	–	–
Treatment–control	3	772	.20	−.03 to .44	2.40
Child skills					
Pre–post	2	15	–	–	–
Treatment–control	0	0	–	–	–

* $p < .05$; ** $p < .01$

Skill Acquisition

The overall treatment–control effect size for skill acquisition was .31 ($p < .01$; see Table 3). Orwin's (1983) *fail-safe N* calculation indicated that an additional 21 studies with null findings would be necessary to reduce the mean effect size below $d = .20$ (Cohen's minimum *d* for a small effect size). All *fail-safe N* estimates listed below are for the same effect size standard of $d = .20$. The effect size was .40 ($p < .01$; *fail-safe* $N = 7$) for child skills and .30 ($p < .01$; *fail-safe* $N = 17$) for parent skills. Separate effect size estimates were calculated for positive parenting strategies (ES = .41, $p < .01$; *fail-safe* $N = 25$), negative parenting strategies (ES = .26, $p < .01$; *fail-safe* $N = 9$), praise (ES = .66, $p < .05$; *fail-safe* $N = 14$), communication skills (ES = .13, $p =$ ns), and consequences (ES = .04, $p =$ ns). For child skills, a separate effect size was calculated for problem-solving (ES = .17, $p =$ ns).

Skill Utilization

The overall treatment–control effect size for skill utilization was .20 ($p =$ ns; see Table 4). All three effect sizes included in this effect size estimate were for parent skills. A separate effect size could not be calculated for child skills or for separate skill categories.

Discussion

Based on the results of our review and meta-analysis, we recommend that future research focus on three areas in order to fill gaps in the empirical literature. First, we recommend that researchers seek to develop standardized measures and methods for assessing the acquisition and utilization of cognitive-behavioral skills that can be used across the various EBTs for childhood behavior problems. Second, we recommend additional research on the determinants, correlates, and sequelae of skill acquisition/utilization. Third, we recommend that research focus on innovative ways to enhance the acquisition and utilization of BT and CBT skills.

Need for Standardized Measures of Skill Acquisition and Utilization

The absence of standardized measures and methods for assessing skill acquisition and skill utilization makes it difficult to compare the extent to which patients and families are using the skills they are learning in treatment in their day-to-day lives across treatments. This makes it difficult to compare treatment results with one another across the various psychosocial EBTs for childhood disruptive behavior problems. Measures of skill acquisition were generally specific to a particular treatment protocol and tended to assess either broad categories, such as positive or negative parenting, or a very narrow set of skills such as praise and problem-solving. To this end, we recommend the development of a measure from a "common elements" perspective (e.g., Chorpita and Weisz 2009) that can be used to assess the acquisition of a wide range of BT and CBT skills that are common across several psychosocial EBTs for childhood disruptive behavior problems. Researchers (McLeod and Weisz 2005) have developed an observational measure of therapist behavior from a "common elements" approach (Therapy Procedures Observational Coding System) to understand the content and extensiveness of skills reviewed by therapists in treatment sessions. A similar approach may be helpful to measure parent and/or child skill acquisition and utilization.

Measures of skill utilization were largely retrospective self-reports or infrequent (often just one time) home observations. Both modalities appear to have their place as self-reports are more convenient and less costly, whereas behavioral observations in the home are typically more accurate indicators of day-to-day functioning. Therefore, efforts should be taken to evaluate the utility of self-report versus observational methods of skill utilization as it unclear whether the more costly and labor-intensive behavioral observation approach is necessary. In terms of specific assessment methods, we recommend the development of an ecologically valid time-sampling or event-sampling approach to gather data on skill utilization between treatment sessions. There are several approaches to collecting valid data outside of the laboratory (or clinic) including daily diary methods (e.g., Bolger et al. 2003), ecological momentary assessment (EMA; Stone and Shiffman 1994), experience sampling methods (ESM; Reis and Gable 2000), and ambulatory assessment (AA;

Ebner-Priemer and Trull 2009). Such methods have numerous advantages over traditional retrospective self-reports including ecological validity, real-time assessment, and the opportunity for multiple assessments (e.g., Bolger et al. 2003; Ebner-Priemer and Trull 2009).

Determinants, Correlates, and Sequelae of Skill Acquisition/Utilization

Although BT and CBT skills are conceptualized as specific mechanisms of change, they are rarely examined as such in the empirical literature. To this end, it will be important in future research to explore the determinants, correlates, and sequelae of skill acquisition and utilization. For example, it will be important to assess the association between skill utilization and the reduction in child behavior problems. A good exemplar of such a study was conducted by Chamberlain and colleagues (Chamberlain, et al. 2008). In the study, specific parenting skills (e.g., positive reinforcement) were found to mediate the reduction of behavior problems in a group of foster children. More studies like this one will have important implications for understanding and addressing nonresponse and partial response to treatment. If poor or infrequent skill utilization is strongly associated with treatment response and outcome, then targeting skill utilization may enhance treatment response and outcome.

Enhancing the Utilization of Skills

Finally, we recommend developing interventions designed specifically to increase skill utilization outside of treatment sessions beyond traditional "homework" or "home practice" assignments. These interventions would not be stand-alone treatments, but rather designed to supplement or augment existing skill-based treatments. Although there are numerous possibilities for such interventions, procedures would likely involve increased between-session contact between families and clinician through additional phone contact with the primary clinician, a third-party skills coach, or virtual contact and feedback through the use of digital technologies (e.g., PDA, iTouch, or smart phone). We recommend that any protocol receive ongoing input from families and clinicians to ensure acceptability, feasibility, and clinical utility. This input could be in the form of formal consultation or focus groups. Once a protocol has been developed, its efficacy could be examined through a randomized clinical trial comparing those who receive an augmented skills-enhancement protocol versus those who receive a standard skills-based treatment alone. It will be especially important to examine group differences in terms of: (1) skill utilization, (2) symptom reduction, and (3) treatment outcome.

Effect Sizes

Overall, the treatment–control effect size for skill acquisition was significantly different from zero, but in the "small to moderate" range by traditional standards. However, there was some variability noted within specific skill categories with praise having the largest effect size, falling in the "moderate to large" range by traditional standards. This suggests that some skills might be easier to acquire than others. There were far fewer studies on skill utilization compared to skill acquisition. This is not surprising, given that skill utilization is more of a distal outcome and requires assessing children and parents outside of the clinic setting. Overall, the treatment–control effect size for skill utilization was in the "small" range by traditional standards and not significantly different from zero. Pre–post effect sizes appeared to be substantially inflated in comparison with effect sizes from studies using more rigorous treatment–control designs. In light of this, we recommend that studies using pre–post designs be interpreted very cautiously.

Summary

This review and meta-analysis of the empirical literature on psychosocial EBTs for DBDs showed an overall treatment–control ES = .31 for skill acquisition and ES = .20 for skill utilization. Our review of the literature also highlights the need for additional research on the acquisition and utilization of BT and CBT skills. Filling in this gap is especially important as BT and CBT skills are conceptualized as being specific factors of change. We recommend the development of standardized assessment measures and methods for assessing skill acquisition and utilization from a "common elements" perspective, followed by the investigations of determinants, correlates, and sequelae of skill acquisition and utilization. This research will likely have implications for enhancing treatment delivery through interventions targeting skill utilization which can be used to supplement or augment existing skills-based treatments. Such an approach has the potential to reduce rates of nonresponse and partial response to treatment.

Appendix 1

Study-Level Codes

Bibliographic Reference (APA)

1. Study ID #. Assign a unique identification # to each study. Formatted as TX# (PCI 01, PCI 02, IYR 01, IYR 02, etc.)

BPT Behavioral parent training
FTR Fast Track
IYR Incredible years
KEE KEEP
PCI PCIT
PMT PMT/PMTO
PPP Triple P
OTH Other (includes BCBS, BMFC, BST, Making choices, Positive parenting, RIPP, Social skills training, TEAM, and Walker social skills)

2. Paper #. Assign each manuscript a unique #. Number in order from 1 to 85.
3. Publication year (last two digits).

Sample Descriptors

4. Mean age of sample at the beginning of the intervention (missing = 999).
5. Description of sample (eligibility criteria, severity of symptoms, etc.):

Research Design Descriptors

6. Method of assignment to conditions (random, non-random).

1 random
2 non-random
9 cannot tell
0 no control group

7. Total sample size (start of study)
8. Treatment group sample size (start of study)
9. Control group sample size (start of study; no control = 0)

Nature of the Treatment Descriptors

10. Intervention name

1 Behavioral parent training
2 Fast Track
3 Incredible years
4 KEEP
5 PCIT
6 PMT/PMTO
7 Triple P
8 Other (Definition: includes BCBS, BMFC, BST, Making choices, Positive parenting, RIPP, Social skills training, TEAM, and Walker social skills)

11. Intervention type

1 treatment
2 prevention

12. Intervention target

1 parent
2 child

13. Avg # of sessions for treatment group (missing = 999)
14. Nature of control group

1 receives nothing (Definition: no evidence of any treatment)
2 wait list (Definition: delayed treatment control, etc.)
3 treatment as usual (Definition: control receives the usual treatment for DBD without special enhancement that constitutes the treatment of interest)
4 alternative treatment (Definition: control is not really a control but another treatment [other than usual treatment] being compared with the focal treatment)
9 cannot tell
0 no control group

Appendix 2

Effect Size Level Codes

1. Study ID #
2. Paper #
3. Effect size #. Assign each effect size within a study a unique #. Number multiple effect sizes within a study sequentially (e.g., 1, 2, 3, 4…)

Dependent Measure Descriptors

4. Type of skill-use

1 acquisition
2 utilization

5. Parent or child skill

1 parent skill
2 child skill

6. Description of skill:
7. Category of skill:

1 Positive parenting (Definition: study measure is a composite of multiple positive parenting behaviors, such as praise, positive affect, encouragement,

positive reflections/descriptions of child behavior, and problem-solving)
2 Negative parenting (Definition: study measure is a composite of multiple negative parenting behaviors, such as criticism, negative physical contact, vague instructions, vague commands, and interruptions)
3 Parent praise (Definition: measures verbal and nonverbal affirmation of child)
4 Parent verbal/nonverbal communication (Definition: measures increase in positive or decrease in negative verbalizations, social attention, or physical touch)
5 Parent positive/negative consequences (Definition: measures effective use of consequences)
6 Parent other (Definition: includes measures of monitoring, balance of turns, problem-solving, and broad treatment skills that are not clearly described)
7 Child emotion labeling (Definition: measures identification of positive or negative feelings)
8 Child problem-solving (Definition: measures positive strategies to address social problems)
9 Child anger management (Definition: measures strategies for controlling anger such as relaxation techniques)
10 Child social skills (Definition: measures understanding of social cues or appropriate engagement with peers)
11 Child other (Definition: includes measures of broad treatment skills that are not clearly described)

8. Statistical nature of skill

1 continuous
2 dichotomous
3 artificial dichotomous
4 ordinal

9. Skill compared to treatment outcome (e.g., child externalizing behavior)?

1 yes
0 no

10. Effect size type

1 pre–post
2 treatment–control (at post)

Effect Size Data

11. Type of data effect size based on

1 means and *SD*s
2 *t* value or *F* value
3 Chi-square ($df = 1$)
4 frequencies or proportions

12. Page number where data found
13. Pre–post score correlation Only needed if effect size type is "pre–post" (i.e., #9 is coded as 1). If not needed (i.e., #9 is coded as 2), enter 999

When means and standards deviations are reported or can be estimated (**NOTE: for pre–post effect size comparisons, report post-data where it says "treatment group" and pre-data where it says "control group"):

14a. Treatment group sample size (or post-sample size; NA = 999)
14b. Control group sample size (or pre-sample size; NA = 999)
15a. Treatment group mean (or post-mean; NA = 999)
15b. Control group mean (or pre-mean; NA = 999)
16a. Treatment group *SD* (or post-*SD*; NA = 999)
16b. Control group *SD* (or pre-*SD*; NA = 999)

When proportions or frequencies are reported or can be estimated (**NOTE: for pre–post effect size comparisons, report post-data where it says "treatment group" and pre-data where it says "control group"):

17a *n* of treatment group with a successful outcome (or *n* at post; NA = 999)
17b. *n* of control group with a successful outcome (or *n* at pre; NA = 999)
18a. Proportion of treatment group with a successful outcome (or proportion at post; NA = 999)
18b. Proportion of control group with a successful outcome (or proportion at pre; NA = 999)

When significance test information is reported:

19a. *t* value (NA = 999)
19b. *F* value (NA = 999)
19c. Chi-square value (NA = 999)

Calculated Effect Size

20 Effect size (NA = 999)

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* denotes articles included in the meta-analysis.
† denotes articles include in the review.

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