Parent-Child Interaction Therapy: A Meta-analysis

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CONTEXT: Parent-child interaction therapy (PCIT) is effective at reducing children's externalizing behavior. However, modifications are often made to PCIT, and it is not known whether these impact effectiveness.

OBJECTIVE: To systematically review and meta-analyze the effects of PCIT on child externalizing behaviors, considering modifications, study design, and bias.

DATA SOURCES: We searched PubMed, PsycINFO, Education Resources Information Center, Sociological Abstracts, and A+ Education.

STUDY SELECTION: We selected randomized controlled or quasi-experimental trials.

DATA EXTRACTION: We analyzed child externalizing and internalizing behaviors, parent stress, parent-child interactions, PCIT format, and study design and/or characteristics.

RESULTS: We included 23 studies (1144 participants). PCIT was superior to control for reducing child externalizing (standardized mean difference [SMD]: −0.87, 95% confidence interval [CI]:−1.17 to −0.58). PCIT studies that required skill mastery had significantly greater reductions in externalizing behavior than those that did not (Mastery: SMD: −1.09, 95% CI: −1.44 to −0.73; Nonmastery: SMD: −0.51,95% CI: −0.85 to −0.17, $P = .02$). Compared with controls, PCIT significantly reduced parent-related stress (mean difference [MD]: −6.98, 95% CI: −11.69 to −2.27) and child-related stress (MD: −9.87, 95% CI: −13.64 to −6.09). Children in PCIT were observed to be more compliant to parent requests (SMD: 0.89, 95% CI: 0.50 to 1.28) compared with controls. PCIT effectiveness did not differ depending on session length, location (academic versus community settings), or child problems (disruptive behaviors only compared with disruptive behavior and other problems).

LIMITATIONS: Results for parent-child observations were inconsistently reported, reducing the ability to pool important data.

CONCLUSIONS: PCIT has robust positive outcomes across multiple parent-reported and observed parent-child interaction measures, and modifications may not be required even when implemented in diverse populations.

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Dr Thomas contributed to conceptualizing and designing the study, wrote the first draft of the protocol, extracted and analyzed data, wrote the initial draft of the manuscript, and significantly contributed to revisions; Dr Abell extracted and contributed substantially to data analysis and contributed to the drafting of the final manuscript; Drs Webb and Avdagic screened studies, extracted data, and significantly contributed to drafting the protocol and manuscript; Prof Zimmer-Gembeck contributed substantially to designing and conceptualizing the study and drafting the protocol, and she critically reviewed the manuscript and significantly improved manuscript quality; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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REVIEW ARTICLE

Many parents seek professional help for their young children, most commonly for excessive or chronic externalizing behaviors (eg, large tantrums, aggressive behavior) and parents' own difficulties managing these.[1] However, parenting interventions offered within local contexts vary widely in their effectiveness,[2] making it important to constantly assess the base of knowledge to understand what programs are most effective and to ascertain whether local conditions or study design differences might explain variability in effectiveness.

Parent-child interaction therapy (PCIT) is a widely available program for parents with children aged ~2 to 7 years. PCIT is a behavioral parent training intervention derived from social learning[3] and attachment[4] theories. PCIT is designed to reduce child externalizing behaviors via improving parenting skills and parent-child positive interactions (ie, by enhancing the parent-child relationship[5]). In the usual PCIT format, a therapist observes a parent-child dyad through a 1-way mirror and uses a bug-in-the-ear device to coach the parent to attend positively, consistently, and predictably to the child's play and other behaviors. PCIT has 2 sequential phases: child-directed interaction (CDI) and parent-directed interaction (PDI). Each phase begins with a didactic session to teach the parent skills relevant to that phase, which is then followed by direct coaching sessions throughout the rest of each phase. Coaching sessions are opportunities for parents to practice positive communication skills with the goal of fostering positive parent-child relationships. Parents also learn to reinforce their children's positive behaviors, while ignoring most negative behaviors. Direct coaching sessions also provide the parent with immediate feedback and remediation of skill implementation (for more information, see www.PCIT.org).[5]

Although PCIT is evidence-based, widely used, and receives substantial government money for implementation,[6] it has often been modified from its "traditional" origins[5] in both content (eg, adjunct sessions,[7,8] planned restrictions to intervention length,[9,10] and whether participants met mastery criteria[11,12]) and context (eg, intervention settings[13,14] and specialized populations[11,14,15]). Some adaptations occurred because of equity of access to intervention,[16] cultural concerns,[17] or expectations that specialized populations required modifications to PCIT.[7,12] It is not known whether these changes are necessary to guarantee the effectiveness of PCIT.

Although modifying PCIT to consider cultural sensitivities, adding further support via adjunct treatment sessions, or providing flexibility by providing services in the family home is done to guarantee PCIT effectiveness, this modification has not been directly examined within any previous review. No authors of previous meta-analyses have summarized the effect of PCIT on child externalizing behavior outcomes when program modifications (content or contextual) have been made while also examining study quality. In addition, all previous meta-analyses were published before the publication of many of the most rigorous studies or did not include all available studies. The authors of 1 early meta-analysis summarized the findings from 13 studies (including 9 randomized controlled trials [RCTs]) of PCIT published before 2004.[18] The authors of a second review[19] built on the previous review, but they only analyzed 7 studies published between 2004 and 2011 rather than conducting a larger pooled analysis. This review also restricted studies to those in which PCIT was delivered in the standardized format, excluded studies with adjunct interventions such as in-home coaching or motivation components, and excluded studies conducted outside of the United States (n = 17). Finally, Kennedy et al[20] only considered PCIT studies in which the study sample comprised physically abusive or at-risk families. The current systematic review and meta-analysis contains a necessary update to what is known about the effectiveness of PCIT with our inclusion of all known experimentally or quasi–experimentally-designed trials, irrespective of publication date, intervention format, sample characteristics, or country or territory of implementation. Our primary outcome of interest was child externalizing behavior. Secondary outcomes were parent stress and observed parent-child interactions. A novel approach was taken, whereby we attended to the content and contextual adaptations of PCIT, as well as considering other methodological differences across studies.

METHODS

Search Methods and Study Criteria

Electronic searches were conducted in May 2015 and updated in September 2016 to identify potentially eligible studies. Databases searched included PubMed, PsycINFO, Education Resources Information Center, Sociological Abstracts, and A+ Education. Search terms included "parent-child interaction therapy," "pcit" "parent-directed interaction," "child-directed interaction," and "parent management training." No language restrictions were applied. The complete search strategy for PsycINFO is provided in the Supplemental Information. To minimize publication bias, known PCIT researchers were contacted, informed of the included studies, and asked to identify further trials, theses, or manuscripts that were under review, in press, or unpublished and met the inclusion

criteria. This resulted in 1 additional included study.

Studies were included if the authors had nominated PCIT as an intervention and if they included parents and their children under 18 years of age, were either RCTs or used a quasi-experimental design, had a comparison group, and had pre- and postdata on child externalizing behavior symptoms. The authors of excluded studies did not have a control group, did not measure child externalizing behavior, did not follow the 2-stage PCIT protocol, or reported cohort data already extracted from a previous study.

Study Selection and Data Extraction

All studies were screened against eligibility criteria by 2 independent reviewers. Screening of titles, abstracts, and full-text studies was conducted by using EndNote[21] and Covidence,[22] and conflicts were resolved through discussion. Data were extracted independently by 2 authors, and disagreements were resolved by discussion and consensus. Extracted data included study design, setting and participant characteristics, intervention and comparator characteristics, and child behavior, parent functioning, and parent-child interaction outcomes. In cases in which clarification of study data was required, we contacted authors and requested the relevant information. Finally, 2 authors independently assessed risk of bias for each study by using the Cochrane Collaboration Risk of Bias tool.[23]

We extracted data from measures of externalizing behavior used frequently in PCIT (ie, the Eyberg Child Behavior Inventory [ECBI] intensity scale[24] and the Child Behavior Checklist [CBCL] externalizing symptoms[25]). For parent stress and observed parent-child interactions, scales used were the Parenting Stress Index (PSI)[26] and the Dyadic Parent-Child Interaction Coding System.[27]

We extracted content and context changes in PCIT by using the coding system developed by Stirman et al.[28] The original design of PCIT was for parent-child dyads to progress from CDI to PDI, with therapy completed after parents "mastered" specific skills.[29] The number of sessions depended on how quickly the parent mastered the skills, but the clinician's guide and early studies reported the average treatment length was 12 sessions.[30–33] Data extracted to reflect PCIT content changes included whether participants were required to meet mastery criteria before progression to PDI, whether the authors of the study limited the number of sessions of PCIT, and changes regarding perceived participant population needs (group delivery, adjunct sessions, and cultural adaptations). Context changes included general child externalizing populations with other specified child populations (eg, attention-deficit/hyperactivity disorder, preterm, or Head Start) and study setting (community clinic, academic clinic, or home), which was either directly extracted from the published text or assumed to be academic if not stated.

Data Analyses

Data were analyzed by using Review Manager 5.3.[34] For analyses of child externalizing behavior, the standardized mean difference (SMD) was calculated to adjust for the difference in response options and scoring between scales; the ECBI intensity scale [24] was used most frequently (n = 21), but the CBCL[25] and the Behavior Assessment Scale for Children (BASC)[35] were used in 1 study each. If the authors of a study used multiple measures, we included only 1 in the analyses, prioritizing the ECBI, followed by the CBCL and the BASC.

For analyses of parenting stress (PSI[22]: parent and child subscales and total stress), the mean difference (MD) was used. If the authors of a study reported both PSI subscale and total scores, we prioritized subscale scores over total scores. Therefore, only subscale scores or total scores were used in the meta-analyses.

We also analyzed observed parent-child interaction data. The scoring of these data differed across studies. For example, the authors of some studies reported the proportion of subscale verbalizations relative to total verbalizations,[36] whereas others reported dichotomous "do/do not" categories[14] or reported the amount of positive talk.[11]

Whenever possible, we analyzed all relevant data measured at baseline and immediately postintervention. Child externalizing behavior follow-up data were also analyzed. For studies with more than 2 PCIT interventions or control groups, we combined the results of the appropriate group.[23] We extracted adjusted means when provided and when possible intention-to-treat (ITT) data were extracted and analyses were conducted by using these data.

Subgroup Analyses

We conducted subgroup analyses for studies in which authors assessed child externalizing behavior by comparing results from studies with content or context modifications to PCIT and studies with active versus nonactive controls. Three studies (reporting on 2 cohorts) compared 2 different PCIT forms with a control arm.[17,33,37] The PCIT outcomes of these trials were combined when compared with control group for the primary outcome and separated for subgroup analysis, as required. Both Chaffin et al[7] and Mersky et al[10] conducted 3-armed trials; however, in both studies, the PCIT groups deviated from the original PCIT format (motivation sessions

or individual sessions for Chaffin et al[7] and time-restricted PCIT for Mersky et al[10]). Therefore, data for the PCIT groups were combined and compared with the control in the subgroup analyses for PCIT modifications.

Sensitivity Analysis

We conducted sensitivity analysis to determine the robustness of child externalizing behavior outcomes when comparing RCTs to those with a quasi-experimental design and studies with high as compared with low risk of bias in regard to analyses of incomplete data.

Effect Size Heterogeneity

The I^2 statistic was used to assess variability in effect sizes among studies (heterogeneity).[23] We expected statistically significant heterogeneity because of variations in the PCIT intervention characteristics, populations and settings, and random-effects meta-analytic models used to synthesize the data. We investigated causes of heterogeneity among the studies by performing meta-regression analyses on the basis of study design, study setting, comorbidity of child problems, and types of PCIT content changes.

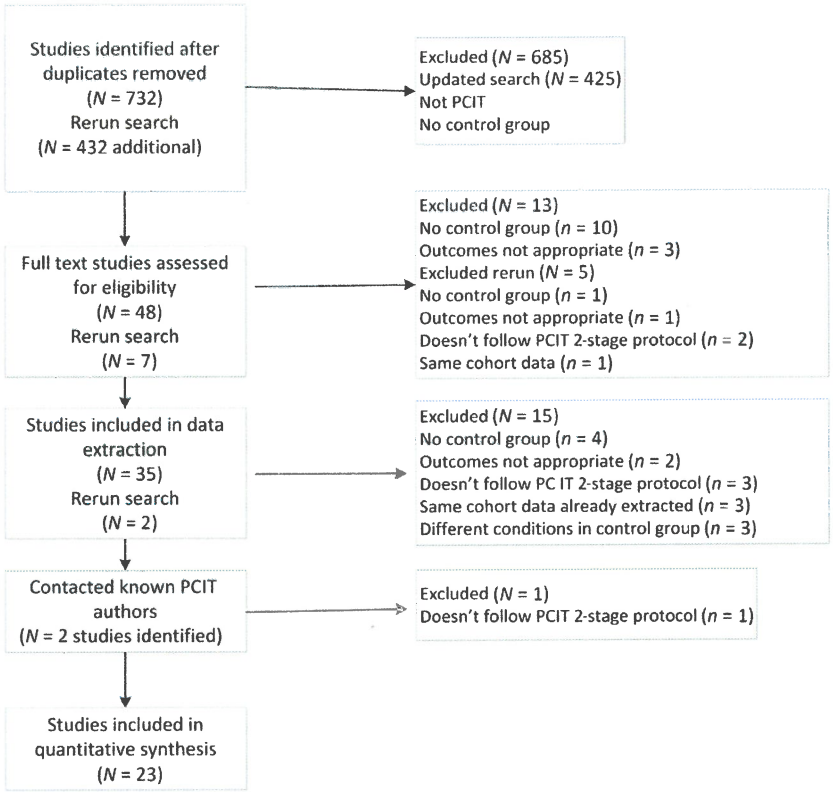

FIGURE 1
Preferred Reporting Items for Systematic Reviews and Meta-Analyses flowchart of citations and studies through screening and data extraction.

RESULTS

Study Characteristics

Our searches yielded 1164 publications (Fig 1), with 23 studies[7–17,32,33,36–46] and 22 independent samples included in the systematic review and meta-analyses. Of the included studies, 17 were RCTs and 5 used a quasi-experimental design (Table 1). Most were conducted in academic clinics (65%, 13 of 20), with 27% (6 of 22) in community clinics and 1 study conducted in homes. Setting was assumed to be academic in 2 studies that did not clearly describe the setting. Most of the included studies modified aspects of PCIT content (56%, 13 of 23). Twelve studies (52%) compared PCIT with an inactive waitlist condition and 15 (65%) were conducted in the United States.

The average age of children in the included studies ranged from 3 to 8 years (range: 1.5–15 years). All but 1 study (Mersky et al[10]) had a higher proportion of boys than girls. The participants of all included studies (with the exception of Querido[43]) reported the average child externalizing behavior scores in the clinical range at preassessment on the EBCI, CBCL, or BASC. In Querido,[43] the PCIT group had an average score for externalizing behaviors within the normal range and the Standard Care group's average score was within the borderline range.

Because all participants and therapists were aware of the type of treatment they were receiving or delivering, all studies were rated as having a high risk of bias for blinding of participants and study personnel. Also, all data abstracted for the primary analysis were parent-reported and, therefore, a high risk of bias for all studies was apparent, given the lack of blinding. Because all studies rated high on this risk of bias assessment item, it is not displayed on forest plots. We displayed risk of bias outcomes in the forest plots for random sequence generation, allocation concealment, and incomplete outcome data.

Child Externalizing Behaviors

Externalizing child behavior outcomes were extracted for 1144 participants (647 PCIT and 497 comparison). Overall, PCIT was effective in reducing externalizing behavior; the decrease in externalizing behavior was greater

TABLE 1 Characteristics of Studies Included in Meta-analyses

Authors, y	Design	Setting	Study Population[a]	Sample Size	Age Range, y	Boys, %	Country or Territory of Implementation	Content[b] Modifications	Comparator
Abrahamse et al,[13] 2016	RCT	Community clinic	None specified	45	2–8	58	Netherlands	None	Family creative therapy
Bagner and Eyberg,[14] 2007	RCT	Academic clinic	Mild to moderate intellectual impairment	30	3–6	77	United States	TL	Waitlist
Bagner et al,[38] 2010	RCT	Academic clinic	Children born <37 wk	28	1.5–5	72	United States	TL	Waitlist
Brestan et al,[39] 1997	RCT	Academic clinic	None specified	30	3–6	83	United States	None	Waitlist
Chaffin et al,[7] 2004	RCT	Unclear	Physical abuse and/or maltreatment	110	4–12	NR	United States	SP	Community parenting group
Danko,[16] 2015	RCT	Home	Foster children	16	2–5	69	United States	TL and NM	Bibliotherapy
Eyberg et al,[40] 1995	RCT	Unclear	None specified	41	3–6	80	United States	None	Waitlist
Foley,[11] 2011	Quasi	Community clinic	Maltreatment and DV	49	1–15	61	United States	TL, NM, and SP	Group TAU
Leung et al,[41] 2009	Quasi	Community clinic	None specified	130	2–8	76	Hong Kong	None	Waitlist
Leung et al,[42] 2015	RCT	Community clinic	None specified	111	2–7	74	Hong Kong	None	Waitlist
Matos et al,[12] 2009	RCT	Academic clinic	ADHD (not inattention)	32	4–6	NR	Puerto Rico	TL, NM, and SP	ADHD psycho-education and waitlist
McCabe et al[17,37]; 2009, 2012	RCT	Community clinic	None specified	58	3–7	70	United States	None and SP	TAU
McNeil et al,[32] 1999	Quasi	Academic clinic	None specified	32	2.5–8.6	75	United States	None	Waitlist
Mersky et al,[10] 2016	RCT	Academic clinic	Foster children	91	3–6	46	United States	TL, NM, and SP	TAU
Nixon et al,[33] 2003	RCT	Academic clinic	None specified	54	3–5	70	Australia	TL, NM, and SP	Waitlist
Querido,[43] 2004	RCT	Academic clinic	Head Start families	26	3–5	58	United States	SP	Standard care
Schuhmann et al,[36] 1998	RCT	Academic clinic	None specified	64	3–6	81	United States	None	Waitlist
Solomon et al,[15] 2008	Quasi	Academic clinic	Autism spectrum	19	5–12	100	United States	None	Waitlist
Stokes,[44] 2014	Quasi	Community clinic	63% disruptive behavior disorder	30	2–7	57	United States	None	Behavioral health rehabilitation service
Terao,[45] 1999	RCT	Academic clinic	Physical abuse	34	2–7	65	United States	TL	TAU
Thomas and Zimmer-Gembeck,[46] 2011	RCT	Academic clinic	Risk for maltreatment	150	2–8	71	Australia	None	Waitlist
Thomas and Zimmer-Gembeck,[9] 2012	RCT	Academic clinic	Risk for maltreatment	101	2–7	67	Australia	TL, NM, and SP	Waitlist
Webb et al,[8] 2016	Quasi	Academic clinic	Risk for maltreatment	94	2–7	65	Australia	TL, NM, and SP	Waitlist

ADHD, attention-deficit/hyperactivity disorder; DV, domestic violence; NM, nonmastery; NR, not reported; SP, specific population; TAU, treatment as usual; TL, time-limited.

[a] Context modifications include intervention setting and children with disruptive behaviors and other comorbid problems and does not relate to ethnicity.

[b] Content modifications include TL, NM, and SP changes.

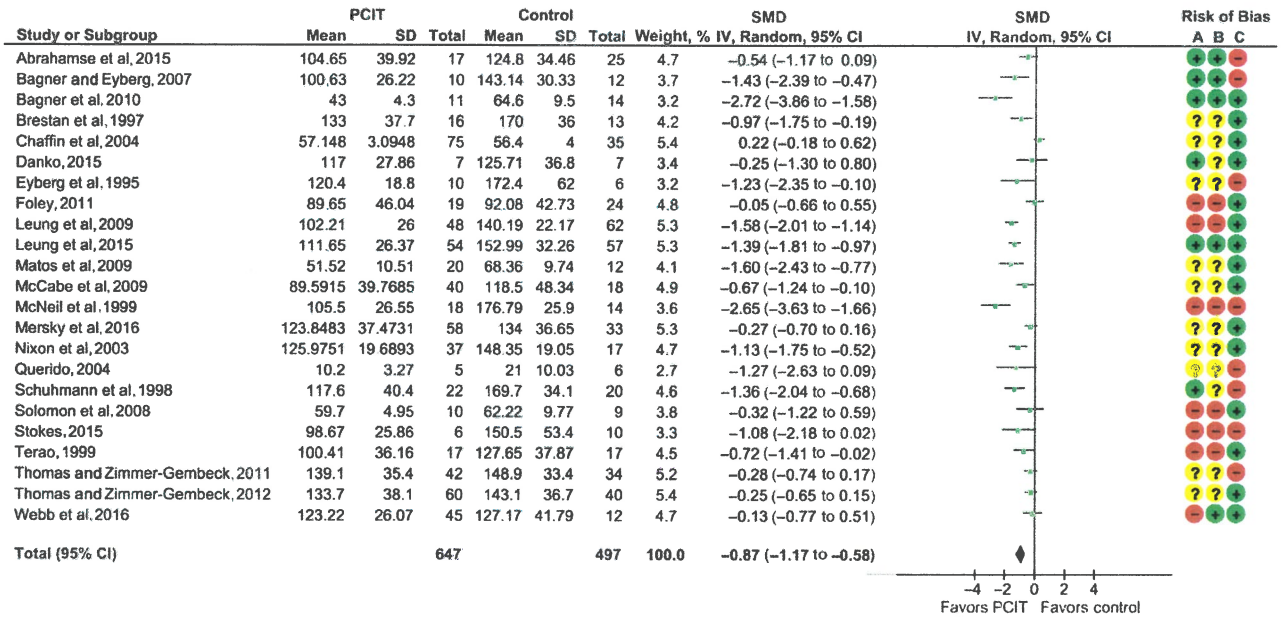

FIGURE 2

Comparing PCIT with control for child externalizing behavior outcomes. Tests for heterogeneity revealed the following results: $\tau^2 = 0.39$, $\chi^2 = 109.28$, degrees of freedom = 22 ($P < .00001$); $I^2 = 80\%$. For the test for overall effect, $z = 5.72$ ($P < .00001$). A = random sequence generation (selection bias); B = allocation concealment (selection bias); C = incomplete outcome data (attrition bias).

in PCIT compared with comparison groups (SMD: −0.87, 95% confidence interval [CI]: −1.17 to −0.58; Fig 2). As expected, there was high heterogeneity in study effect sizes ($I^2 = 80\%$). Sensitivity analyses were conducted to compare effects between studies with complete or incomplete outcome data, for RCTs compared with quasi-experimental designs, and for active control versus inactive waitlist control. The study variable that had the greatest influence on the effect size was whether PCIT was compared with an active versus inactive control group. Greater reductions in externalizing behavior were reported in studies that compared PCIT with an inactive waitlist control (SMD: −1.12, 95% CI: −1.53 to −0.71) compared with studies with active control groups (SMD: −0.51, 95% CI: −0.86 to −0.17, $P = .03$; Supplemental Fig 12). Studies that used active control groups also had less heterogeneity ($I^2 = 62\%$) compared with those with waitlist controls ($I^2 = 81\%$).

There was no significant difference in externalizing behavior outcomes between studies rated as having a high or low risk of bias because of incomplete data. Declines in externalizing behaviors in PCIT were significant in trials with both low and high risks of bias (Supplemental Fig 13). Regarding RCTs as compared with studies with quasi-experimental designs, there was no statistically significant difference (RCT: SMD: −0.85, 95% CI: −1.17 to −0.53; Quasi: SMD: −0.94, 95% CI: −1.72 to −0.16). Although still significant, heterogeneity decreased ($I^2 = 77\%$) when only RCTs were included in the analyses (Supplemental Fig 14).

Parent Stress

Parent stress was measured in 17 studies, with 8 studies reporting PSI subscale scores for parent-related stress (eg, feeling capable as a parent, feeling trapped by parenting responsibilities) and child-related stress (eg, feeling disliked by the child, feeling qualities of their child inhibit effective parenting). One study reported child-related stress only, whereas 8 studies reported total parent stress only. There were greater decreases in parent-related stress (MD: −6.98, 95% CI: −11.69 to −2.27), child-related stress (MD: −9.87, 95% CI: −13.64 to −6.09), and total stress (MD: −12.17, 95% CI: −19.27 to −5.08; Figs 3 and 4) in PCIT compared with control groups. There was moderate heterogeneity of effect sizes across studies, ranging from 49% to 59%.

Observed Parent-Child Interactions

Observational data were pooled for 5 studies (124 participants). Children in PCIT were more compliant with their parents' requests after intervention compared with children in control groups (SMD: 0.89, 95% CI: 0.50 to 1.28; Fig 5). We were able to pool data for "CDI do skills" (parent praise, descriptions, and reflections) and "CDI Don't skills" (parent commands, criticisms and negative talk) for 4 studies (Supplemental Figs 15 and 16). Use of "CDI Do skills" were more frequent (MD: 17.70, 95% CI: 8.71 to 26.69) and "CDI Don't skills" were less frequent (MD: −18.60, 95% CI: −25.04 to −12.17) in PCIT compared with controls.

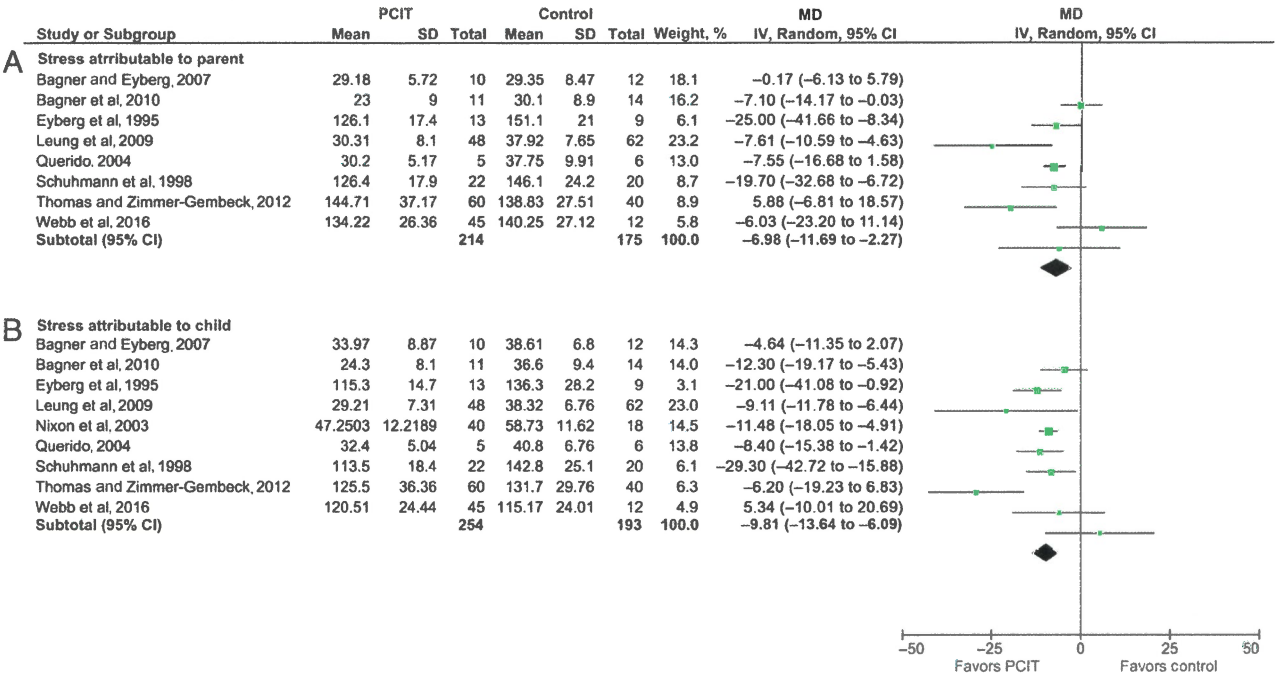

FIGURE 3

Comparing PCIT with control for parent- and child-related stress. Tests for subgroup differences revealed the following results: $\chi^2 = 0.88$, degrees of freedom (df) = 1 ($P = .35$), $I^2 = 0\%$. A, Stress attributable to parent. Tests for heterogeneity revealed the following results: $\tau^2 = 22.62$, $\chi^2 = 17.28$, df = 7 ($P = .02$); $I^2 = 59\%$. For the test for overall effect, $z = 2.91$ ($P = .004$). B, Stress attributable to child. Tests for heterogeneity revealed the following results: $\tau^2 = 14.27$, $\chi^2 = 16.63$, df = 8 ($P = .03$); $I^2 = 52\%$. For the test for overall effect, $z = 5.12$ ($P < .00001$).

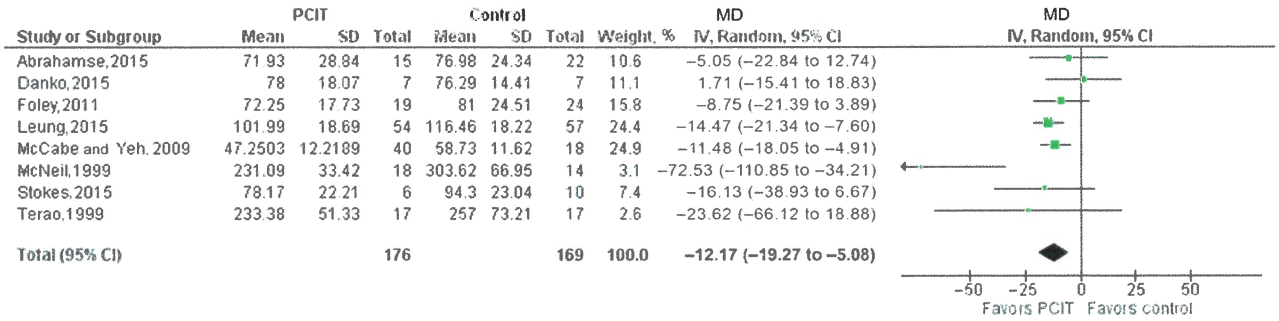

FIGURE 4

Comparing PCIT with control for total stress outcomes. Tests for heterogeneity revealed the following results: $\tau^2 = 41.36$, $\chi^2 = 13.82$, degrees of freedom = 7 ($P = .05$); $I^2 = 49\%$. For the test for overall effect, $z = 3.36$ ($P = .0008$).

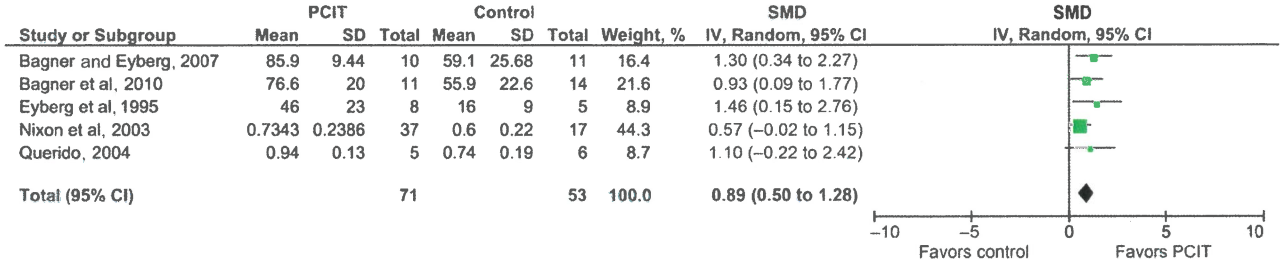

FIGURE 5

Comparing PCIT with control for observed child compliance. Tests for heterogeneity revealed the following results: $\tau^2 = 0.00$, $\chi^2 = 2.71$, degrees of freedom = 4 ($P = .61$); $I^2 = 0\%$. For the test for overall effect, $z = 4.49$ ($P < .00001$)

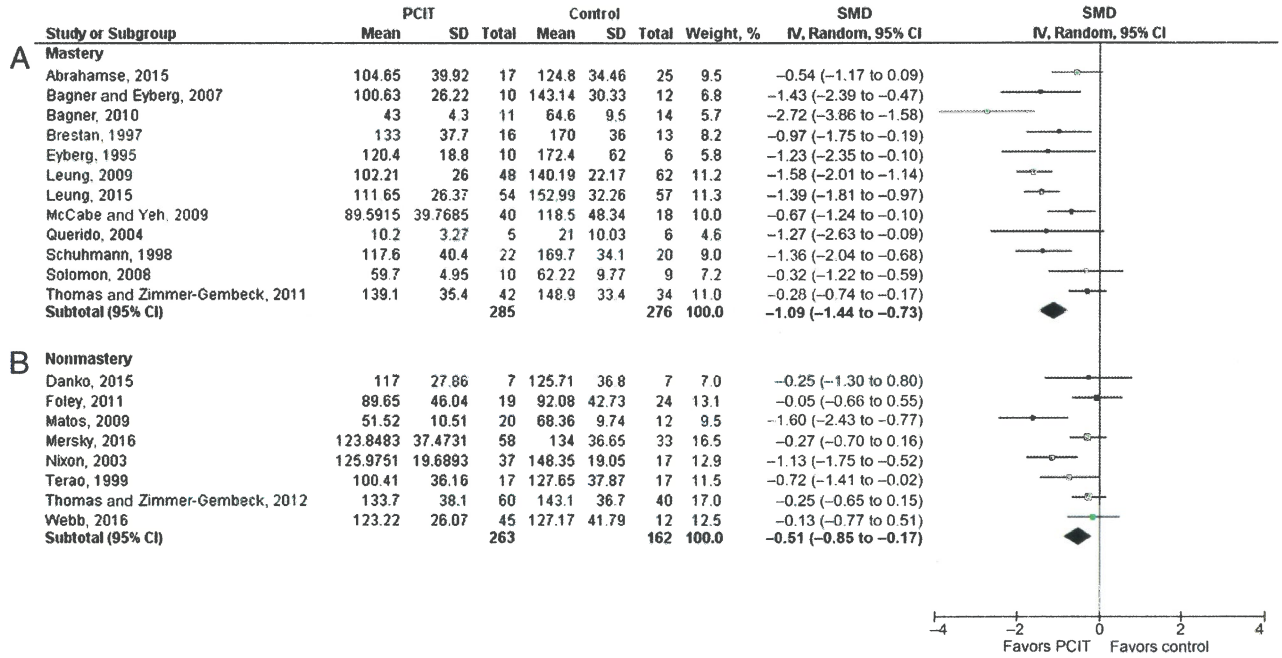

FIGURE 6

Subgroup analyses comparing PCIT studies with skills mastery versus nonmastery for child externalizing behavior. Chaffin et al,[7] McNeil et al,[32] and Stokes[44] are categorized as "unclear." Tests for subgroup differences revealed the following results: $\chi^2 = 5.31$, degrees of freedom (df) = 1 ($P = .02$), $I^2 = 81.2\%$. A, Mastery. Tests for heterogeneity revealed the following results: $\tau^2 = 0.25$, $\chi^2 = 35.92$, df = 11 ($P = .0002$); $I^2 = 69\%$. For the test for overall effect, $z = 5.96$ ($P < .00001$). B, Nonmastery. Tests for heterogeneity revealed the following results: $\tau^2 = 0.13$, $\chi^2 = 17.10$, df = 7 ($P = .02$); $I^2 = 59\%$. For the test for overall effect, $z = 2.95$ ($P = .003$).

Subgroup Analyses of Child Externalizing Behavior

Content

There was a significantly greater decrease in child externalizing behavior in studies in which mastery criteria attainment relative to those that did not require mastery were implemented (SMD: −1.09, 95% CI: −1.44 to −0.73 vs SMD: −0.51, 95% CI: −0.85 to −0.17; $P = .02$; Fig 6). However, there was high heterogeneity of findings in both studies of Mastery PCIT and Nonmastery PCIT ($I^2 = 69\%$ and 59%, respectively).

Similarly, those studies in which the content of PCIT was altered on the basis of perceived needs of a specific population (eg, adjunct sessions, cultural changes, and delivery mode) showed a smaller reduction in externalizing behavior (SMD: −0.34, 95% CI: −0.54 to −0.13) compared with studies in which specific population changes were not made (SMD: −0.94, 95% CI: −1.09 to −0.78; $P < .001$; Fig 7). There was no difference in externalizing behavior in studies in which the number of PCIT sessions was restricted and in those in which it was not (Fig 8).

Context

Decreases in externalizing behavior did not differ when studies conducted in an academic setting were compared with those conducted in a community setting (Fig 9). In each setting, there were significantly greater decreases in externalizing behavior relative to controls (SMD: −0.90, 95% CI: −1.28 to −0.53 vs SMD: −0.84, 95% CI: −1.31 to −0.36, respectively). There was also high heterogeneity in effect sizes for studies in each setting ($I^2 = 80\%$ and 76%).

Although the finding was not statistically significant, there was a greater decrease in child externalizing behaviors for children with disruptive behavior problems only (SMD: −1.12, 95% CI: −1.48 to −0.76) compared with disruptive behaviors comorbid with other conditions (eg, autistic spectrum disorders, maltreatment, children born prematurely [SMD: −0.61, 95% CI: −0.99 to −0.22; $P = .06$; Fig 10]). There was also high heterogeneity in findings among the studies in each grouping ($I^2 = 72\%$ and 74%).

Long-term Child Externalizing Behavior Outcomes

Four studies had medium to long-term follow-up (ranging from 3 to 24 months) of child externalizing behavior as measured by the ECBI (Fig 11). The authors of all studies reported no significant differences between postassessment and follow-up assessment in the PCIT group, suggesting maintenance of treatment effects.

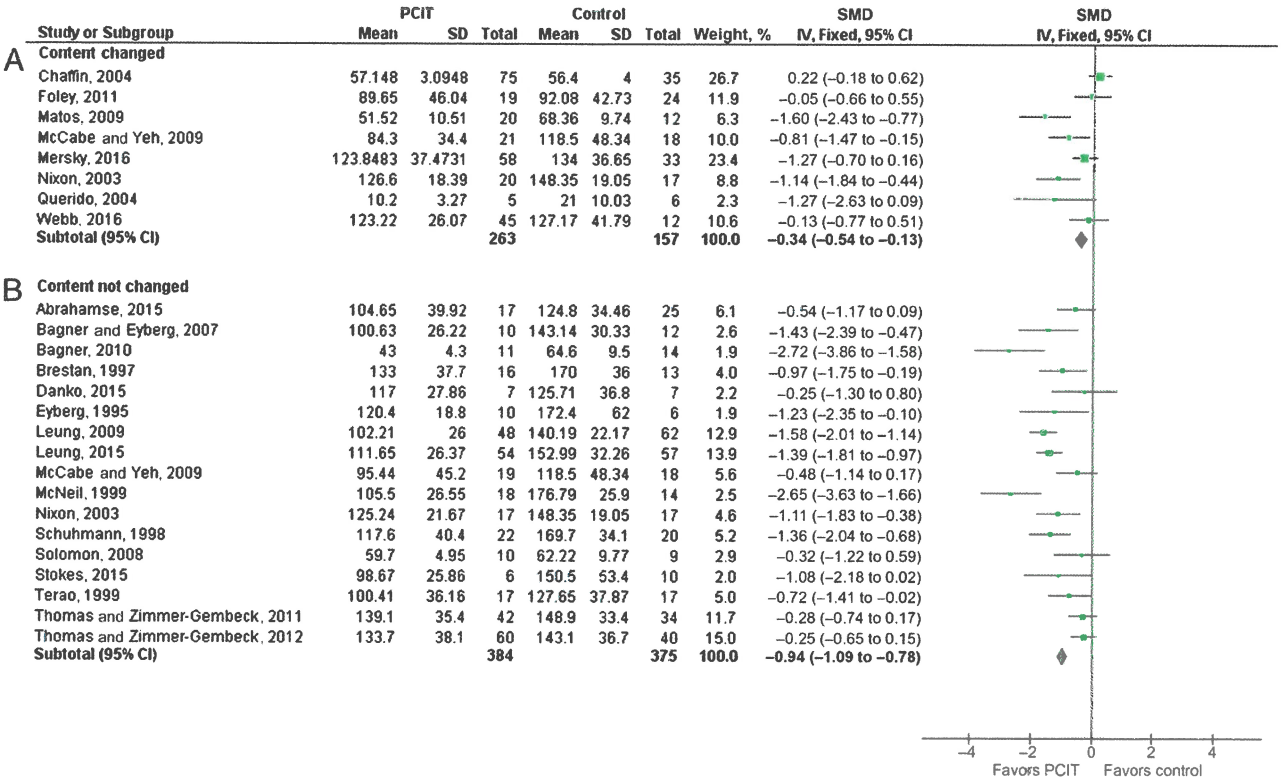

FIGURE 7

Subgroup analyses comparing PCIT studies in which content was altered for specific population requirements for child externalizing behavior and those in which it was not. Tests for subgroup differences revealed the following results: $\chi^2 = 20.63$, degrees of freedom (df) = 1 ($P < .00001$), $I^2 = 95.2\%$. A, Content changed. Tests for heterogeneity revealed the following results: $\chi^2 = 26.40$, df = 7 ($P = .0004$); $I^2 = 73\%$. For the test for overall effect, $z = 3.17$ ($P = .002$). B, Content not changed. Tests for heterogeneity revealed the following results: $\chi^2 = 63.52$, df = 16 ($P < .00001$); $I^2 = 75\%$. For the test for overall effect, $z = 11.83$ ($P < .00001$).

Impact of Study Variables on Child Externalizing Behavior

We conducted multivariable analysis to explore study variables that may have contributed to the heterogeneity of the included studies. In studies that provided PCIT to children with disruptive behaviors only, there was a greater decrease in child externalizing behavior (post-PCIT scores were on average 10% lower, $r = 0.91$, $P = .04$) than studies that provided PCIT to children with disruptive behavior problems comorbid with other difficulties. No other study variables were significant.

DISCUSSION

We found robust declines in parent-reported child externalizing behavior and parents' self-reported stress in this systematic review and meta-analyses of 23 studies in which PCIT was compared to control conditions. In addition, observed parent-child interactions were found to be more positive among families in PCIT compared with controls. Overall, the findings suggest that PCIT is an effective and solid program for improving young children's behavior and parents' stress and should continue to be disseminated.

A novel contribution of this study was the comparison of PCIT effects on child externalizing behavior among subgroups of studies, including those with alterations to PCIT content and context, study designs, and sample characteristics, as well as attention to study bias. Externalizing behavior declined more in PCIT when compared with an inactive waitlist control, but externalizing behavior also declined in PCIT when compared with active control groups. Moreover, the effectiveness of PCIT in reducing externalizing behavior holds regardless of whether a study was an RCT or quasi-experimental design. In meta-analyses of the Triple P-Positive Parenting Program (Triple P)[47] and The Incredible Years program,[48] effect sizes were not compared between studies that used active and inactive comparison groups. In contrast to our findings, study design was found to moderate the effects of the Triple P and The Incredible Years programs, whereby RCTs were demonstrated to have stronger effects than other designs on child social, emotional, and behavioral outcomes.

There is growing evidence that variants of already efficacious interventions do not yield further

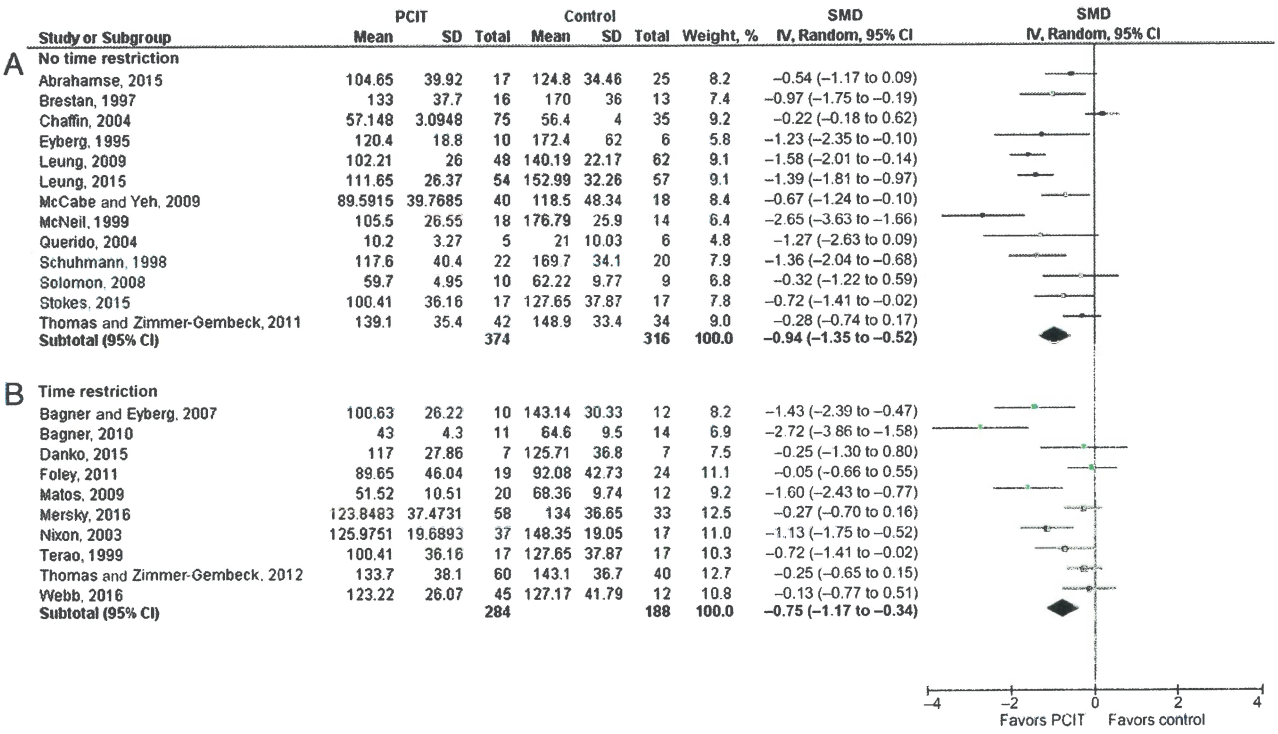

FIGURE 8

Subgroup analyses comparing PCIT studies with session restrictions and no restrictions on child externalizing behavior. Tests for subgroup differences revealed the following results: $\chi^2 = 0.37$, degrees of freedom (df) = 1 ($P = .54$), $I^2 = 0\%$. A, No time restriction. Tests for heterogeneity revealed the following results: $\tau^2 = 0.45$, $\chi^2 = 69.02$, df = 12 ($P < .00001$); $I^2 = 83\%$. For the test for overall effect, $z = 4.41$ ($P < .0001$). B, Time restriction. Tests for heterogeneity revealed the following results: $\tau^2 = 0.31$, $\chi^2 = 35.39$, df = 9 ($P < .0001$); $I^2 = 75\%$. For the test for overall effect, $z = 3.55$ ($P = .0004$).

improved outcomes.[49] In our study, all PCIT variants in all contexts significantly reduced child externalizing behavior compared with controls. However, effect size was significantly larger in studies in which participants were required to achieve PCIT skill mastery and when PCIT was not altered for specific populations (eg, group or adjunct sessions, and cultural adaptations). Yet, there was no difference in effect sizes between studies in which the authors restricted PCIT sessions to a specified number and those in which the authors did not, between studies conducted in academic settings and those conducted in other settings, and between those conducted with children with disruptive behaviors only and those with children who had disruptive behaviors with comorbid conditions.

We had planned to compare studies in which the authors modified PCIT overall to those in which the authors did not. However, the varieties of modified versions of PCIT are numerous and often include different changed content (eg, adjunct sessions, mastery) and contexts (ie, settings, child symptoms). This prohibited direct comparisons of PCIT variants and hampered efforts that would lead to clearer recommendations about modifying already effective interventions.

In a meta-analysis of intervention components associated with reductions in child externalizing behavior,[50] lower effect sizes were found for interventions that provided ancillary services in addition to already effective interventions. However, a meta-analysis of The Incredible Years[48] found no difference in effect sizes between the standard program and program variants. Three separate PCIT research teams have compared content and context changes with the same participant cohort. The authors of 2 studies[7,8] supplemented PCIT with adjunct sessions and found no added benefit for behavior outcomes or attrition. In another study,[17,37] researchers directly compared cultural adaptations of PCIT to a traditional PCIT format and found equivalent behavior outcomes, attrition, and satisfaction. The authors of a final study[9] indirectly compared a time-limited, nonmastery PCIT with a time-unlimited, mastery PCIT by using a similarly referred sample and reported that time-limited, nonmastery PCIT had better outcomes on some measures (eg, externalizing behavior), equivalent outcomes on others, and improved study retention in time-limited, nonmastery PCIT. Although it is possible that all modifications of PCIT are not known given incomplete reporting about treatment fidelity,

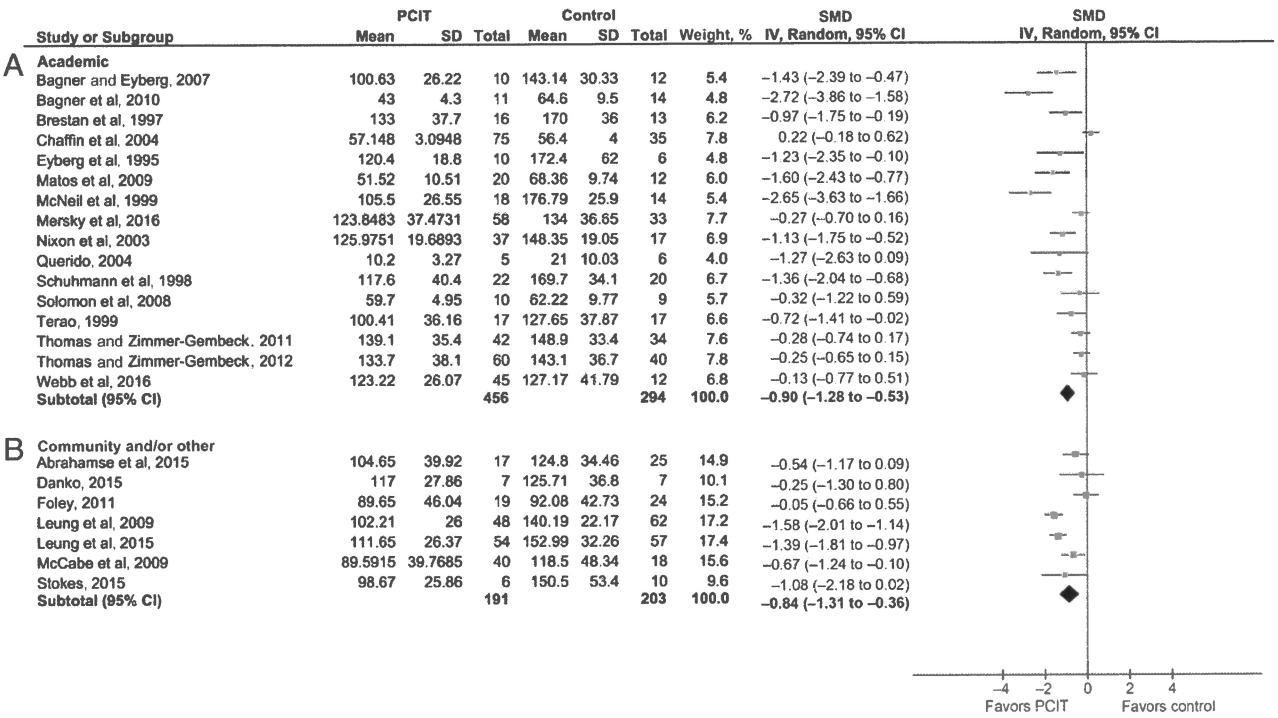

FIGURE 9

Subgroup analyses comparing PCIT studies conducted in academic versus community settings for child externalizing behavior outcomes. Tests for subgroup differences revealed the following results: $\chi^2 = 0.05$, degrees of freedom (df) = 1 ($P = .83$), $I^2 = 0\%$. A, Academic. Tests for heterogeneity revealed the following results: $\tau^2 = 0.42$, $\chi^2 = 74.55$, df = 15 ($P < .00001$); $I^2 = 80\%$. For the test for overall effect, $z = 4.74$ ($P < .00001$). B, Community and/or other. Tests for heterogeneity revealed the following results: $\tau^2 = 0.29$, $\chi^2 = 25.03$, df = 6 ($P = .0003$); $I^2 = 76\%$. For the test for overall effect, $z = 3.46$ ($P = .0005$).

by comparing PCIT variants, our data build on the literature that suggests modifications of effective interventions may not be needed to produce effects similar to the large effects found when using standard treatment or program designs.[49,50] Future research that directly compares modified and unmodified PCIT should be conducted.

It is important to note that the only variable that helped explain heterogeneity in effect sizes was presenting child symptoms. PCIT studies in which children who had problems comorbid with disruptive behavior were included, compared with studies in which children who only had disruptive behaviors were included, had smaller effects for child externalizing behavior. Study design, study setting, and PCIT content changes did not significantly explain heterogeneity. We did not examine practitioner factors (eg, training, experience) or parent and/or family characteristics (eg, mental health, violence in the home). Both sets of factors might be examined in future meta-analyses of PCIT.

PCIT is an effective intervention for reducing child externalizing behavior and parents' stress. This conclusion is bolstered by the methodological strengths of the current study. Study strengths include efforts to contact PCIT researchers for data clarification or for unpublished data; the screening, data extraction, and analysis of risk of bias by 2 independent reviewers; and that this is the first PCIT meta-analysis to directly examine and report on study quality, sensitivity analysis, and subgroup analysis. We also coded our PCIT variants by using a published coding framework.[28] However, only 4 of the 23 studies exceeded Coyne et al's[51] (somewhat controversial) criteria for study power of ≥35 cases per group, highlighting the possibility of inflated effect sizes. Small sample sizes in original studies hamper the generalizability of our findings. Future research studies on PCIT that include larger numbers of participants would be extremely beneficial.

The risk of bias tool[23] identified some systematic and inconsistent problems in study quality or reporting standards. All studies were rated as having a high risk of bias for blinding. The inability to blind participants and personnel is understandable, given the nature of psychological research and given that most outcomes are measured with self-report. Although the Dyadic Parent-Child Interaction Coding System observation coding measure can be conducted with blinded assessors,[46,47] a comparison between

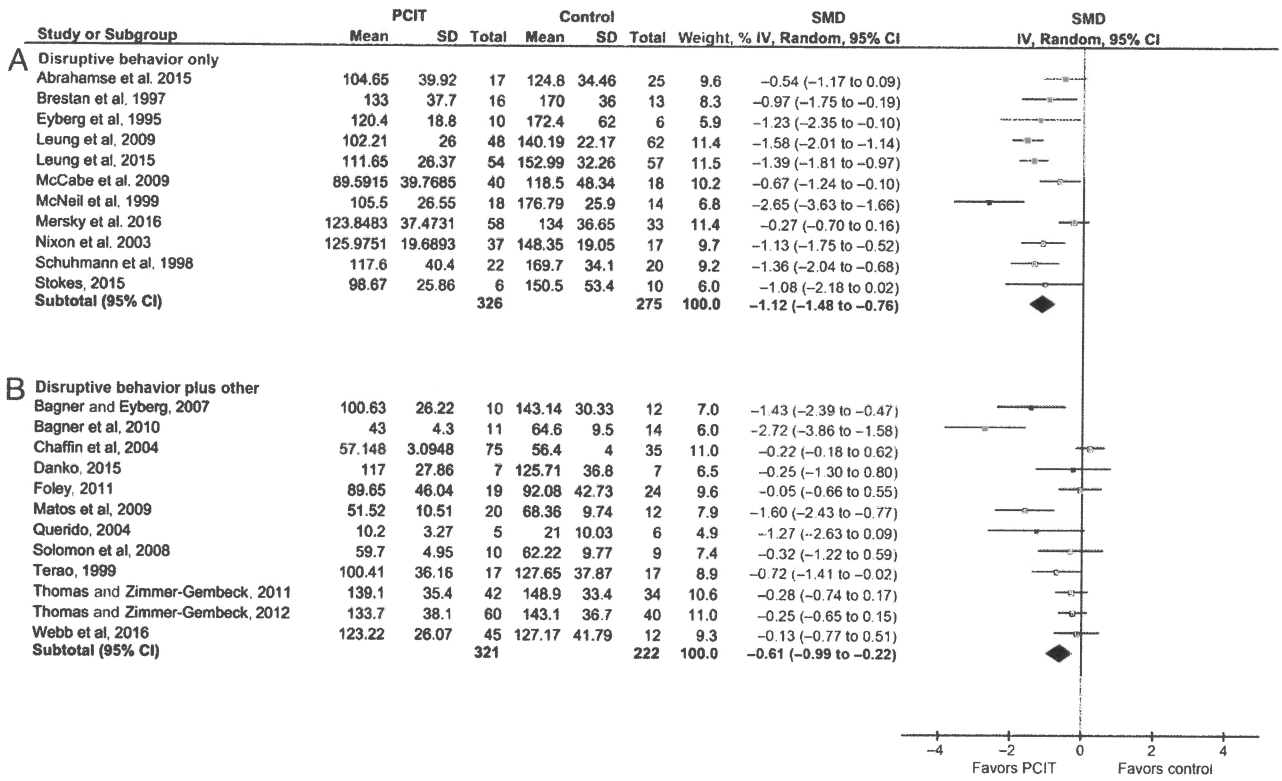

FIGURE 10

Subgroup analyses comparing PCIT studies conducted with children with disruptive behavior only versus disruptive behavior and other symptoms for child externalizing behavior. Tests for subgroup differences revealed the following results: $\chi^2 = 3.67$, degrees of freedom (df) = 1 ($P = .06$), $I^2 = 72.8\%$. A, Disruptive behavior only. Tests for heterogeneity revealed the following results: $\tau^2 = 0.25$, $\chi^2 = 36.26$, df = 10 ($P < .0001$); $I^2 = 72\%$. For the test for overall effect, $z = 6.09$ ($P < .00001$). B, Disruptive behavior plus other. Tests for heterogeneity revealed the following results: $\tau^2 = 0.31$, $\chi^2 = 42.51$, df = 11 ($P < .0001$); $I^2 = 74\%$. For the test for overall effect, $z = 3.08$ ($P = .002$).

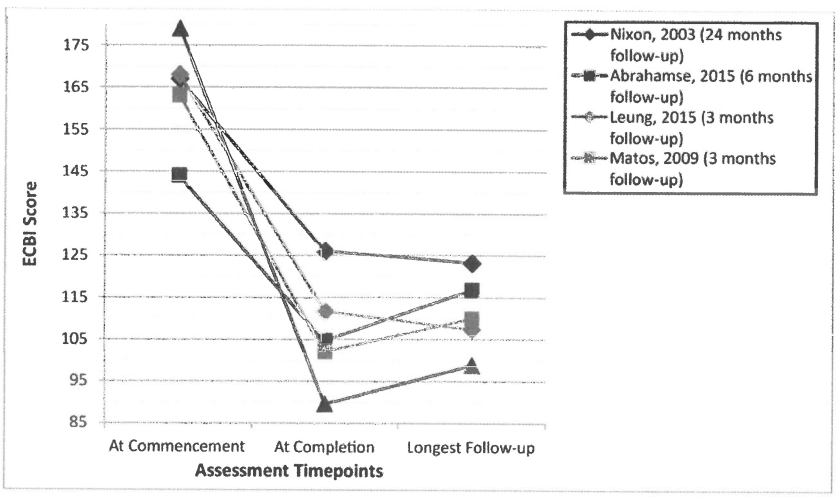

FIGURE 11

Long-term PCIT group follow-up data for child externalizing behavior problems.

studies that used blinding or not was limited by a lack of consistency in how these data were scored and reported. We recommend that PCIT researchers move toward an agreed-on reporting standard for the Dyadic Parent-Child Interaction Coding System.

The authors of future PCIT RCTs should report how the randomization was generated and how participants were allocated to groups. Eleven of the 23 studies were rated as unclear when reporting how the sequencing of randomization occurred, and 13 were rated unclear on the techniques used to ensure that allocation to groups was concealed. The authors of 15 studies reported adequate procedures that accounted for incomplete data by using ITT principles or ITT with imputation. Finally, PCIT researchers should describe PCIT interventions (standard or modified) more completely, either in the published manuscript or by providing a link to an accredited PCIT Web site. This would facilitate clinicians' understanding of PCIT, the training requirements of PCIT, and,

consequently, research translation of PCIT through dissemination.

Ameliorating child externalizing behavior problems in young children would not only improve family functioning but could also reduce the burden of disease brought to society through future cascading problems and the need for later, and possibly costlier, interventions.[52–54] Our findings highlight that PCIT is effective in reducing child externalizing problems, decreasing parenting stress, and increasing child compliance. The strongest effects for child externalizing behavior were found when PCIT studies required parental mastery of skills and when studies did not alter PCIT content for perceived population needs. In 2009, the US Substance Abuse and Mental Health Services Administration[55] rated the quality of PCIT research findings as high and identified PCIT as ready for dissemination. Because of our findings, we concur. PCIT training should be supported by government agencies committed to evidence-based practices, and it should be more widely disseminated to practitioner training and community treatment programs.

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ABBREVIATIONS

BASC: Behavior Assessment Scale for Children
CBCL: Child Behavior Checklist
CDI: child-directed interaction
CI: confidence interval
ECBI: Eyberg Child Behavior Inventory
ITT: intention to treat
MD: mean difference
PCIT: parent-child interaction therapy
PDI: parent-directed interaction
PSI: Parenting Stress Index
RCT: randomized controlled trial
SMD: standardized mean difference

This trial has been registered with the PROSPERO International prospective register of systematic reviews (http://www.crd.york.ac.uk/PROSPERO) (identifier CRD42014013644).

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