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Parent–Child Interaction Therapy for Child Disruptive Behaviour Disorders: A Meta-analysis

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Abstract
Background Numerous studies have looked at the efficacy of Parent–Child Interaction Therapy (PCIT) for young children with externalizing behaviour problems.
Objective The present study compiled these results through a comprehensive review to provide greater clarity regarding the efficacy of this treatment.
Methods Using a random effects model, a meta-analysis was conducted to determine the weighted mean effect size. To be included in this analysis, studies were required to have implemented PCIT with children (ages 2–5) with clinically significant externalizing behaviour problems. Twelve studies comprising 254 treated and 118 control group children were included, with the majority of children being White males. This research also assessed whether gender and type of disruptive behaviour disorder (DBD) moderated the effectiveness of PCIT.
Results PCIT had a large effect on improving externalizing behaviour problems in children with DBD based on the effect size derived from pre- and post-treatment behavioural outcomes ($d = 1.65$, 95 % CI [1.41, 1.90], $p < .001$) and treatment and control group data ($d = 1.39$, 95 % CI [1.05, 1.73], $p < .001$). Neither gender nor diagnosis was found to significantly moderate the effectiveness.
Conclusions PCIT was found to be an efficacious intervention for child DBD, although the small number of eligible studies and lack of diversity in the sample populations suggests a need for further research. This study has important implications for both practitioners and researchers and provides an efficient summary of the research to date.

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Introduction

Disruptive behaviour is the leading reason that children are referred to mental health professionals (Kazdin 2003). As a result, a variety of psychotherapies have been developed to improve the well-being of these children and their families. Parent–Child Interaction Therapy (PCIT) is commonly used by clinicians to treat externalizing behaviour problems and a significant amount of research has looked at the efficacy of this treatment for use with young children (e.g., Eyberg et al. 2001; McCabe and Yeh 2009; Querido 2003). More specifically, these studies have focused on the effectiveness of PCIT for children with disruptive behaviour disorders (DBD), which include attention deficit hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), and conduct disorder (CD), as categorized in the Fourth Text-Revised edition of the Diagnostic and Statistical Manual of Mental Disorders [American Psychiatric Association (APA) 2000].[1] With an array of studies available on this topic, it is now time to compile the research to gain a more complete understanding of the effects of PCIT on children with DBD. In the present study, a meta-analysis was conducted in order to evaluate the use of PCIT with young children who have been diagnosed with DBD. These findings are intended to provide insight into the efficacy of PCIT for childhood DBD, investigate whether the intervention is more effective for boys or girls, and evaluate whether it is differentially effective for children with ADHD, ODD, or CD.

Disruptive Behaviour Disorders

Children with ADHD demonstrate inattentive and/or hyperactive and impulsive behaviours that are more serious and occur more regularly than behaviour displayed by peers at a similar level of development (APA 2000). While children who have been diagnosed with CD may also display impulsive behaviour, there are some important differences. Children with CD consistently exhibit behaviours that disregard social norms and violate the rights of others, including aggression, physical maltreatment, property damage, deceit, and severe rule violation. A diagnosis of CD often follows a previous diagnosis of ODD in early childhood (APA 2000). Children with ODD have difficulty with powers of authority and frequently show animosity, noncompliance, and negativity towards these individuals. While the specific behaviours that are associated with each type of DBD differ, research has shown that there is a high rate of comorbidity between ADHD, CD, and ODD (Kessler et al. 2005; Wilens et al. 2002). For this reason, it is important to uncover interventions that will not only improve behavioural outcomes for children who have been diagnosed with one type of DBD, but also for those who demonstrate symptoms characteristic of more than one DBD.

Parent–Child Interaction Therapy

PCIT is an intervention that is commonly used to treat child disruptive behaviour problems by integrating components of attachment theory and social learning theory (Eyberg 1988). This therapy involves 9–12 weekly sessions with a trained therapist, with each session

[1] Work on this meta-analysis began before the release of the DSM-5.

lasting between 60 and 90 min. The goal of PCIT is to help parents develop a loving relationship with their child by implementing elements of behavioural and child-play therapy. This process occurs through two stages: the child-directed interaction (CDI) phase and the parent-directed interaction (PDI) phase (Eyberg 1988). The CDI phase aims to improve relations between the parent and child by maximizing positive communication during child-initiated play. The most important aspect of this stage is that the child guides the direction of play and makes autonomous decisions, not the parent. Parents in this phase are reminded not to give commands, ask questions, or criticize the child; instead they are prompted to praise, imitate, and reflect on the child's actions. Once these skills have been mastered, the PDI phase follows. This stage requires the parent to engage with their child by guiding activities, providing instructions, and applying appropriate consequences for problem behaviour. In order to lead the play session, parents learn to provide their children with effective, developmentally appropriate directions. Parents are also prompted to reinforce their child's desirable behaviour and to discourage undesirable behaviour by using consistent and suitable consequences. The goal of both phases is to create a supportive environment that promotes improvement in child externalizing behaviour by enhancing the parent–child relationship and developing effective communication habits.

Parent–Child Interaction Therapy and Disruptive Behaviour Disorders

Given its value as an intervention for children with DBD, extensive research has focused on the efficacy of this treatment. To date, the majority of studies looking at PCIT efficacy have implemented randomized controlled trials involving a waitlist-control group, a treatment manual, and practices that support treatment fidelity (e.g., Bagner et al. 2010; Nixon et al. 2003; Schuhmann et al. 1998). Across these studies, the two most common measures of externalizing behaviour are the Eyberg Child Behavior Inventory (ECBI; Eyberg and Pincus 1999) and the Externalizing Problems Scale of the Child Behavior Checklist (CBCL; Achenbach and Rescorla 2000). Both the Problem and Intensity scales of the ECBI have been reported to have high internal consistency, falling within the .90 s, and test–retest reliability, falling between .70 and .80 (Meikamp 2003). The CBCL also generally has excellent psychometric properties, with the internal consistency falling within .66 to .96 and the test–retest reliability falling between .57 and .92 (Flanagan 2005).

With such a vast array of research in this area, it is not surprising that several systematic reviews have assembled these findings. Thus far, meta-analyses that have looked at PCIT have compared its effectiveness with different prevailing interventions (e.g., Bradley and Mandell 2005; Thomas and Zimmer-Gembeck 2007). While these studies offer valuable insights into the usefulness of various interventions in comparison to one another, they have not examined whether any external factors moderate the efficacy of each treatment. Furthermore, Bradley and Mandell (2005) looked at the efficacy of several prominent treatments for ODD, and only two of the seven studies in their meta-analysis implemented PCIT. Thomas and Zimmer-Gembeck (2007) provide the most comprehensive meta-analytic overview of PCIT to date, incorporating thirteen studies to uncover the influence of PCIT on children with behaviour problems; however, they did not exclude children who were victims of abuse, leading to a potential "apples and oranges" problem (Lipsey and Wilson 2001, p. 2), which arises from compiling studies that focus on different constructs. For example, when compared to children with ADHD who have not experienced maltreatment, children with ADHD who are also victims of child maltreatment have demonstrated elevated PTSD symptoms (Ford et al. 2000), significant increases in externalizing behaviours and peer rejection (Briscoe-Smith and Hinshaw 2006), and an

increased risk for later criminality in adolescence (De Sanctis et al. 2012). Further, sources of stress within the parent–child relationship differ in families of hyperactive children—where the primary source is child characteristics—than in families involving child maltreatment—where the primary contributor is parental characteristics (Mash and Johnston 1990). It is necessary to establish consistency in the presenting problems of participants in order to make accurate predictions regarding PCIT efficacy. Furthermore, Thomas and Zimmer-Gembeck did not limit their sample to those with clinically significant behaviour problems. Finally, this analysis did not include unpublished studies, which increased the possibility of publication bias (Sutton et al. 2000). Thomas and Zimmer-Gembeck found that PCIT was associated with medium to large effects on improving problem behaviour. These findings align with the results of a systematic review by Gallagher (2003), who examined the use of this therapy for children with DBD. She reviewed 17 studies and found that PCIT led to statistically significant behavioural improvements in every study and clinically significant improvements in 14 studies; however, this study did not involve a statistical synthesis of the data and thus, cannot reveal the overall efficacy of PCIT.

The Current Study

It is evident that there are several aspects of PCIT that research has yet to explore; a more in-depth quantitative analysis of studies is needed in order to increase confidence in this intervention and its use by practicing clinicians. The present meta-analysis addresses each of the previously discussed methodological limitations of Thomas and Zimmer-Gembeck's (2007) study and updates the literature by incorporating all relevant research that has been published since 2004.[2] In addition, separate moderator analyses were performed to investigate whether the intervention is more effective for boys or girls and whether it is more appropriate for children with ADHD, ODD, or CD; these analyses were intended to provide important information regarding which specific populations respond best to this treatment. Based on the findings of Thomas and Zimmer-Gembeck, Gallagher (2003), and a preliminary review of current research, it was anticipated that PCIT, when used to treat childhood DBD, would reveal a large effect size, as measured by Cohen's *d*. Secondly, given the differing symptoms across diagnoses, it is possible that certain diagnostic populations would respond more readily to PCIT than others. More specifically, PCIT was expected to be more effective as an intervention for samples diagnosed with ODD and CD than for ADHD given that behavioural parent management training and pharmacological treatments are the only interventions that have evidence supporting their effectiveness with ADHD (Pliszka 2007). No prediction was made regarding whether PCIT efficacy is influenced by gender given the lack of data on this topic.

Methods

Criteria for Study Inclusion and Exclusion

To be included in this meta-analysis, studies must have been published or prepared before June 2013 and were required to be reported in English; unpublished studies were included in this meta-analysis. In addition, studies needed to meet the following inclusion criteria: (a) the mean age of the child sample was between two and five years; (b) the children had

[2] Thomas and Zimmer-Gembeck (2007) meta-analysis included studies dated up to 2004.

been diagnosed with ADHD, ODD, and/or CD or fell above the clinical cut-off on a rating scale; (c) the majority of the sample did not have Pervasive Developmental Disorders, chromosomal abnormalities, or a history of maltreatment or abuse[3]; (d) PCIT was implemented; (e) PCIT was not significantly modified or shortened; (f) the quantitative relationship between PCIT and child externalizing behaviour outcomes was assessed; and (g) the study provided pre-post treatment comparisons or contrasted the treatment group to a no-treatment control group. Both efficacy and effectiveness studies were included. The use of such clear eligibility guidelines allowed for a successful search of the literature and ensured that the studies that were incorporated in the present meta-analysis were relevant to the goals of this research.

Literature Search Procedure

The present study followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines regarding identification, screening, and determining eligibility of included studies (Liberati et al. 2009). An undergraduate student, who had undergone extensive training, was responsible for determining study eligibility. Initially, all relevant research was obtained by searching PsycINFO, Medline, ERIC, Proquest Dissertations & Theses, and Google Scholar for published and unpublished research. The following keywords were used to search these databases: parent child interaction therapy, parent–child interaction therapy, PCIT, attention deficit disorder, attention deficit disorder with hyperactivity, ADHD, conduct disorder, oppositional defiant disorder, behavior problem, and problem behavior. Figure 1 provides a detailed summary of the results of this database search and the screening process.

After conducting each search, the articles were screened by title and abstract to determine whether they met the predetermined eligibility criteria. All articles that clearly failed to meet criteria at this point were excluded. The next screening involved determining the eligibility of the remaining articles by assessing them based on their full content. In instances where more than one report was available on a particular research study, the article with the most complete and comprehensive data was retained for this meta-analysis.

Every study that passed the second screening was then used to identify other potential studies through backwards and forwards reference searching; this strategy was intended to catch any studies that had been missed in the initial search. In addition, previous reviews (Cavalieri n.d.; Gallagher 2003; Thomas and Zimmer-Gembeck 2007) were consulted to uncover any studies that may have been missed initially. Finally, Eyberg, the developer of PCIT, was contacted to ask if she was aware of any other studies that may fit the eligibility criteria. None of these secondary search strategies revealed studies that the initial database searches did not also uncover, a finding that speaks to the strength of the literature search that was conducted.

It is crucial to ensure that meta-analytic results are not biased by the inclusion of multiple effects acquired from the same study. Based on the suggestions of Wood (2008), studies sharing one or more authors with parallels in methodological and sample characteristics were assumed to involve the same sample and thus, were assumed to not contribute independent research. In these instances, the original manuscript was included if it could be conclusively determined; if the primary study was not apparent, the most comprehensive manuscript (based on sample size and reported measures) was included. In one

[3] The purpose for excluding these studies was to prevent what Lipsey and Wilson (2001) describe as an "apples and oranges" problem.

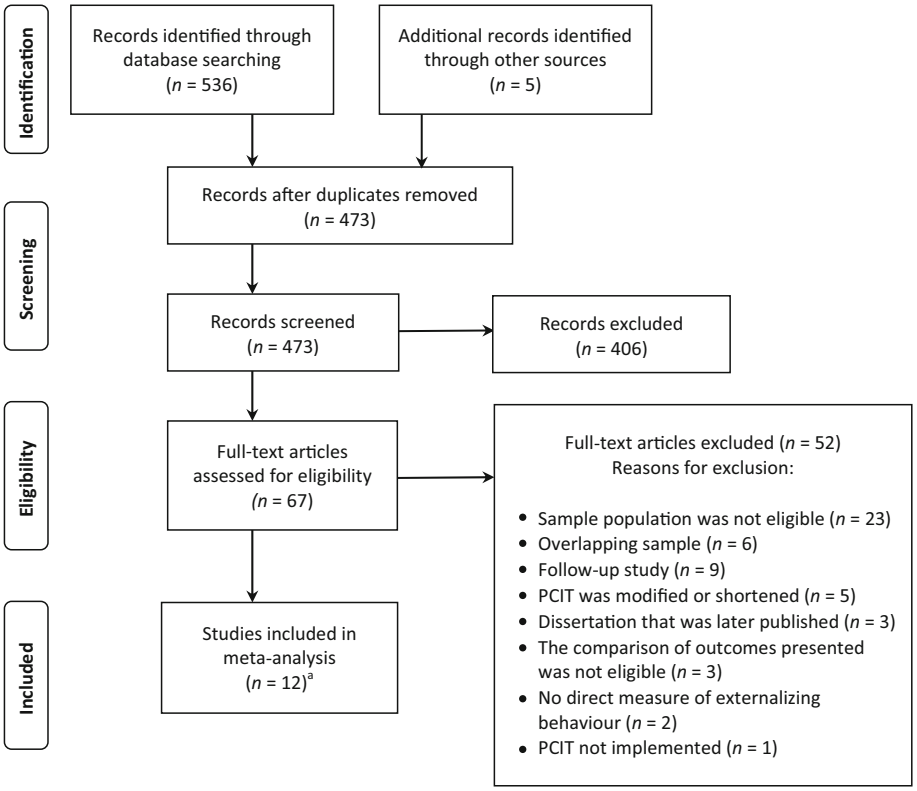

Fig. 1 A flow diagram illustrating the database search and screening stages involved in this meta-analysis. Adapted from Moher et al. (2009). [a] The number of studies included and the number of full-text articles excluded does not total the number of full-text articles assessed for eligibility as four separate dissertations were aggregated to contribute one overall study to the meta-analysis

instance involving four dissertations (i.e., Brinkmeyer 2006; Chase 2005; Floyd 2005; Perez 2008), the most comprehensive study was not readily apparent; each study reported different aspects of a larger study and, based on demographic information and/or textual comments, it was clear that a common sample was used. Instead, the results of the four dissertations were aggregated to produce one overall effect size,[4] allowing for individual research to be represented without biasing the results with duplicate data.

Overall, six studies were excluded from this meta-analysis due to suspected overlapping samples. For all but one of these studies, the original manuscript was included in the analysis; a study by Bagner and Eyberg (2003) drew participant data from two unnamed studies and because it was unclear whether these studies were already represented in the analysis, this manuscript was excluded. A leading researcher in this area was contacted to ask for further clarification regarding studies that were suspected to have overlapping samples but no response was attained. An additional nine studies that would have otherwise met criteria, were excluded because they only provided follow-up information to previous research and as such did not meet inclusion criteria. Lastly, for three studies, both

[4] From this point forward these four manuscripts will be collectively referred to as one study.

a dissertation and a published journal article were available. In these cases, the published manuscript provided the most comprehensive data and was chosen. In total, 18 studies were excluded because they did not present original research.

Following this exhaustive screening process, two unpublished[5] and 10 published studies were included in this meta-analysis. Overall, the year of publication ranged from 1991 to 2010 and the studies comprised a total of 254[6] treated and 118 control group children. Interestingly, Eyberg, the developer of PCIT, was found to be involved in 11 of the 12 eligible studies (as a co-author, grant consultant, previous collaborator, and/or dissertation committee chair).[7] This finding corresponds with the fact that all but one study was conducted in the United States; Nixon et al. (2003) investigated PCIT efficacy in Australia. Additionally, a large majority of the participants were Caucasian in all but two studies; both studies that did not demonstrate this trend had specifically implemented PCIT with minority populations (Matos et al. 2009; McCabe and Yeh 2009). Overall, study samples consisted largely of boys, a finding that is consistent with the gender ratios of DBD (APA 2000), and the most frequent diagnosis held by participants was ODD. The characteristics of each study are further described in Table 1.

Coding and Reliability

A coding manual prompted the coder to record details about each study's publication information, sample characteristics, and statistical findings. The primary coder was a Master's student who was trained thoroughly in coding procedure and had experience with several other meta-analyses. In instances where studies were missing crucial statistical or sample information, the authors were contacted. If necessary information could not be attained through this process, the study was excluded from any analysis that required this data. The full coding manual can be requested from the corresponding author for further detail.

To ensure reliability in coding, a second coder examined 25 % of the eligible studies. This coder was an undergraduate student with prior meta-analytic experience. A comparison of the responses submitted by both coders revealed 100 % agreement. Once such strong agreement was met between both coders, the data was inputted into Comprehensive Meta-Analysis (CMA) Version 2 (Borenstein et al. 2005). This software is designed specifically for the computation of statistics related to meta-analyses.

Computation of Effect Sizes

After entering the data into CMA, two separate meta-analyses were conducted to determine the efficacy of PCIT when used with children with DBD. One analysis examined the pre- and post-treatment findings and the other compared the treatment and control group results. It was necessary to conduct two separate analyses because more studies provided pre- and post-treatment data but treatment–control studies better account for maturational effects, making them less likely to overestimate the effect size (Becker et al. 2003). By conducting two different analyses, this study was able to account for the unique advantages presented by each set of data. The standardized mean difference, Cohen's *d,* was used in each analysis to calculate the overall effect size of this treatment. The following guidelines were

[5] The four aggregated dissertations represented one of the two unpublished studies.

[6] The four aggregated dissertations were accounted for in this calculation by using the dissertation with the largest reported sample size (after attrition).

[7] Nixon et al. (2003) had no apparent connection with the developer of PCIT.

Table 1 Participant characteristics of included studies

Study	N[a]	Age in months M (SD)[b]	% Female[b]	% White[b]	DBD (%)[b]	Study design
Bagner et al. (2010)	28	38.1 (13.4)	28.6	82		Randomized controlled trial
Brestan et al. (1997)	30	54.4 (10.8)	16.7	70	ADHD (70) ODD (100) CD (13.3)	Randomized controlled trial
Brinkmeyer (2006)[c]	49	53 (13.1)	30	81	ADHD (74) ODD (100) CD (47)	Pre-post design
Chase (2005)[c]	64	53.8 (13.6)	34.4	77	ODD (100)	Pre-post design
Eisenstadt et al. (1993)	24	54	8	88	ADHD (70.8) ODD (62.5) CD (25)	Pre-post design
Eyberg et al. (1995)	16	54	20	80	ADHD (33.3) ODD (100)	Randomized controlled Trial
Floyd (2005)[c]	40	50.3 (13)	37	80	ADHD (47.6) ODD (100) CD (0)	Pre-post design
Matos et al. (2009)	32	59.1[d] (6.8)	31.3[d]	0	ADHD (100) ODD (96.9)	Randomized controlled trial
McCabe and Yeh (2009)	19	48.9 (9.2)	26.3	0		Randomized controlled trial
McNeil et al. (1991)	18	53.4	15	75		Treatment–control design no random assignment
McNeil et al. (1999)	32	60	25	87.5		Treatment–control design no random assignment
Nixon et al. (2003)	34	46.8 (6.6)	26.5	97.1		Randomized controlled trial
Perez (2008)[c]	61	57.6	31	81	ODD (100)	Pre-post design
Querido (2003)	11	52.4 (8.8)	42	61.5	ADHD (69.2) ODD (76.9) CD (7.7)	Randomized controlled trial with matching
Schuhmann et al. (1998)	64	59.2 (12.4)	19	76.6	ADHD (66) ODD (100) CD (22)	Randomized controlled trial

DBD disruptive behaviour disorders, *ADHD* attention deficit hyperactivity disorder, *ODD* oppositional defiant disorder, *CD* conduct disorder

[a] This sample size represents the total of the PCIT treatment group and the control group participants that were included in the analysis

[b] This demographic information is based on participants in the PCIT treatment group or the control group who completed the study; if this information was unavailable, demographic information representing the overall sample—including those in other treatment groups and/or those who dropped out of the study early—was used. This strategy was implemented in order to provide sample demographics that most accurately represented the participants included in the analysis

[c] One of four dissertations that collectively represented one study in this analysis

[d] Participant information was not reported in manuscript and instead was attained from Matos-Román (2006)

used to interpret these results: <.20, small; .50, medium; >.80, large (Lipsey and Wilson 2001). A random effects model was used to conduct both meta-analyses because it was anticipated that there would be variation between the studies, with no two studies being replications of each other. Essentially, this model allows for variation by exploring each study's individual effects and finding the mean of the distribution of effect sizes (Borenstein et al. 2010).

The impact of each moderator on the effect size was examined using separate meta-regressions. Mixed effects models (method of moments) were used for each analysis and only studies that contained sufficient information regarding each moderator variable were included in the corresponding analysis. To uncover differences in the efficacy of PCIT when used with boys versus girls, a meta-regression was conducted by evaluating the percentage of girls in each sample relative to its effect size. To evaluate the influence of DBD diagnosis on the overall effect size, a separate meta-regression was conducted for each diagnosis by using information about the percentage of participants in each study with ADHD, ODD, and/or CD; this approach provided information on whether each of these diagnoses individually moderate PCIT efficacy. Overall, the effect size computation methods that were implemented in this meta-analysis supported the goal of uncovering reliable answers to each of the outlined research questions.

Results

PCIT and Child DBD

Two separate meta-analyses were conducted to determine the efficacy of PCIT. The number of effects provided by each study varied depending on the number of behavioural outcomes measured, and so it was necessary to aggregate these results by calculating a mean effect size for each individual study. This process ensured that each study only contributed one effect to the meta-analysis, thus maintaining assumptions of independence.

The first analysis used the effect sizes derived from pre- and post-treatment behavioural outcomes. All 12 studies met criteria for inclusion and a total of 58 effects were combined to create 12 individual effect sizes, or one for each study. For greater detail regarding each study and its corresponding effects see Table 2. Overall, this meta-analysis revealed a very large weighted mean effect size, $d = 1.65$, 95 % CI [1.41, 1.90], $p < .001$. The heterogeneity between studies was not statistically significant and thus, the null hypothesis of homogeneity was not rejected, $Q(11) = 8.85$, $p = .64$; however, this test is underpowered (Huedo-Medina et al. 2006) and a random-effects model still remains appropriate because in the absence of heterogeneity this model would reveal the same findings as a fixed-effect model (Borenstein et al. 2010). In summary, these findings revealed that PCIT had a large and significant effect on improving problem behaviours in children with DBD.

To provide further support for the efficacy of this intervention, a second analysis was conducted by using effect sizes that were drawn from comparisons between treatment and control groups. Only nine studies included control group data and were eligible to be included in this analysis; a total of 34 effect sizes were combined to create an individual effect size for each of the nine studies. Further details regarding the effects of each study included in this analysis are presented in Table 3. The findings from this meta-analysis build on the pre-post findings by also revealing a very large weighted mean effect size, $d = 1.39$, 95 % CI [1.05, 1.73], $p < .001$, thus increasing the confidence that can be held in these results. Again, the heterogeneity between studies was not significant and the null hypothesis

Table 2 Meta-analysis using pre- and post-treatment data

Study	Mean effect size *d*	*p*	95 % CI		Effect size weightings
			LL	*UL*	
Bagner et al. (2010)	2.39	<.001	1.29	3.49	4.94
Brestan et al. (1997)	1.18	.009	.29	2.06	7.64
Eisenstadt et al. (1993)	1.79	<.001	1.10	2.49	12.39
Eyberg et al. (1995)	1.73	.001	.68	2.78	5.4
Matos et al. (2009)	1.86	<.001	1.11	2.60	10.80
McCabe and Yeh (2009)	1.47	<.001	.74	2.19	11.29
McNeil et al. (1991)	1.62	.002	.59	2.65	10.32
McNeil et al. (1999)	1.61	<.001	.85	2.36	5.58
Nixon et al. (2003)	1.28	.001	.53	2.03	10.59
Querido (2003)	.78	.370	−.92	2.47	2.07
Schuhmann et al. (1998)	1.40	<.001	.62	2.19	9.68
Overlapping dissertations (2005–2008)[a]	2.35	<.001	1.55	3.15	9.31
Weighted mean effect size	1.65	<.001	1.41	1.90	

CI confidence interval, *LL* lower limit, *UL* upper limit

[a] The data from Chase (2005), Floyd (2005), Brinkmeyer (2006), and Perez (2008) was suspected as overlapping and was aggregated

Table 3 Meta-analysis using treatment and control group data

Study	Mean effect size *d*	*p*	95 % CI		Effect size weightings
			LL	*UL*	
Bagner et al. (2010)	2.31	<.001	1.29	3.33	9.43
Brestan et al. (1997)	1.11	.019	.18	2.05	11.05
Eyberg et al. (1995)	.94	.099	−.17	2.05	8.17
Matos et al. (2009)	1.76	<.001	.92	2.60	13.18
McNeil et al. (1991)	1.62	.002	.58	2.66	13.05
McNeil et al. (1999)	1.83	<.001	.99	2.67	9.19
Nixon et al. (2003)	.75	.035	.05	1.45	17.44
Querido (2003)	1.26	.127	−.36	2.87	4.13
Schuhmann et al. (1998)	1.19	.003	.40	1.94	14.37
Weighted mean effect size	1.39	<.001	1.05	1.73	

CI confidence interval, *LL* lower limit, *UL* upper limit

of homogeneity was not rejected, $Q(8) = 9.55, p = .30$. Collectively, both analyses provide support for PCIT by demonstrating the strong and significant effect that this intervention has on improving externalizing behaviour problems in children with DBD.

Moderator Analyses

Four separate meta-regressions were conducted using the pre- and post- treatment data to determine whether gender and diagnosis influence PCIT efficacy. Just as in the meta-

analyses, a mean effect size was determined for each study by averaging the various effects provided in each individual study. Due to differing sample sizes, there was little consistency in the sample characteristics reported in the four overlapping dissertations and so they were excluded from the moderator analyses and will not be discussed in this section. Eleven studies provided consistent information regarding their sample's gender composition and were included in this moderator analysis. Gender was not found to be a significant moderator, $N = 190$, $Q_R(1) = .03$, $p = .86$. The impact of each DBD on PCIT efficacy was assessed individually by evaluating the percentage of participants with either ADHD, ODD, or, CD in each sample relative to its effect size. Overall, none of the DBD diagnoses were found to moderate PCIT efficacy: ADHD, $N = 88$, $Q_R(1) = .19$, $p = .67$; ODD, $N = 105$, $Q_R(1) = .47$, $p = .49$; and CD, $N = 58$, $Q_R(1) = 1.71$, $p = .19$. Many studies were excluded from these meta-regressions because they did not include adequate information regarding the proportion of participants who had been diagnosed with each DBD; seven studies were included in the ODD meta-regression, six studies in the ADHD meta-regression, and only four studies met criteria for the CD meta-regression. Each meta-regression was also limited by the lack of heterogeneity between studies, which made it difficult to obtain the level of power that is necessary to uncover significant moderators. In conclusion, neither gender nor diagnosis were found to be significant moderators of PCIT efficacy.

Discussion

While only one of our initial hypotheses was confirmed by the results of this meta-analysis, many important findings were revealed. As anticipated, PCIT was found to be an efficacious intervention for improving externalizing behaviour in children with DBD. This is consistent with the conclusions of Thomas and Zimmer-Gembecks's meta-analysis from 2007. Interestingly, their meta-analysis incorporated 13 studies while the present analysis only included 12. Given that the present study incorporated research that had been published since 2004 in addition to older research, this smaller study sample seems counter-intuitive, but can be explained by several observations. The present analysis excluded populations who were victims of abuse and only included populations with clinically significant behaviour problems. Additionally, this meta-analysis excluded follow-up studies, while the 2007 meta-analysis included four follow-up studies. Furthermore, this meta-analysis incorporated six studies that were not present in Thomas and Zimmer-Gembeck's research, two of which were unpublished.

The prediction that PCIT would have a greater effect on children with ODD and CD than on children with ADHD was not confirmed, as diagnosis was not a significant moderator. The small number of studies included in these analyses restricted the conclusions that could be drawn; there was simply not enough research available to provide a convincing answer as to whether DBD diagnosis moderates PCIT efficacy. In addition, every study included in the ODD moderator analysis had samples with over 60 % of the participants holding a diagnosis of ODD; five of these studies involved samples where over 95 % of the participants were diagnosed with ODD, a finding that presents a restricted range problem. As can be seen in the diagnostic information provided in Table 1, this was likely a limitation of both the ADHD and CD meta-regressions as well. Gender was also not found to significantly influence PCIT efficacy; however, it is probable that restricted range problems similarly influenced this meta-regression, with

nine of the eleven studies involving samples where less than 30 % of participants were female. These limitations are further supported by the lack of heterogeneity between studies, which highly restricts the process of determining whether each of these factors is a significant moderator. Essentially, it is necessary to have variation in order to determine which circumstances provide the best platform for this intervention to be most effective. It is clear that more research is needed to further explore the influence of gender and diagnosis on PCIT.

Beyond simply answering the outlined research questions, the present meta-analysis uncovered some important findings regarding the current state of PCIT literature. First, the small number of eligible studies included provides a realistic picture of the available literature in this area. Between the follow-up studies, the studies with overlapping samples, and the three dissertations that were later published, 18 research manuscripts were excluded because they did not assess independent samples. It is essential to only include studies that contribute findings based on data drawn from new participants; this approach ensures that various studies reporting on the same population do not skew the results by contributing multiple effect sizes to the meta-analysis. While the overlapping samples reduced the number of studies eligible for inclusion in this meta-analysis, they present an interesting finding of this research: the current literature on PCIT efficacy is less expansive than one might expect for a widespread and well-accepted intervention. Another limitation of the literature supporting PCIT is that Eyberg was found to be involved in 11 of the 12 studies included in this meta-analysis (as a co-author, grant consultant, previous collaborator, and/or dissertation committee chair). A task force, convened by Division 12 of the American Psychological Association, that was brought together to outline the elements of effective therapies, emphasized the importance of research that is conducted by independent investigators (Chambless et al. 1998). More specifically, they state that *well-established interventions* must be supported by research from two or more separate investigators. It is necessary to emphasize that the limitations of the current literature do not indicate that PCIT is an ineffective intervention. In fact, with such a strong effect size revealed through this meta-analysis, it is highly likely that future independent research will continue to support the strength of this intervention for child externalizing behaviour problems. Instead, these findings provide important information about the current state of the literature and about the platform on which future research should build in order to further strengthen the evidence base of this intervention.

Strengths and Limitations

The predominant limitation to this meta-analysis was the limited number of studies eligible for inclusion in the moderator analyses. In addition, the restricted range problems that arose significantly limit the confidence that can be held in each of the moderator analyses. Both of these limitations were unanticipated and can only be solved with the expansion of research in this area. Another limitation of the present meta-analysis was that treatment fidelity and attrition rates were not assessed. Poor performance in either of these areas could potentially influence the impact of PCIT on externalizing behaviour problems, thus influencing the size of the effect that was revealed. While this is a valid concern, the lack of variation between each study's effect size suggests that it is unlikely these aspects would have had a large impact on the results. In fact, only one study—a dissertation conducted by

Querido (2003)—did not reach significance in both the pre-post and treatment–control meta-analyses, and every study fell within the 95 % confidence interval. Lastly, the inclusion of unpublished research introduces both a strength and limitation to this meta-analysis. The advantage of including unpublished research is that it reduces the potential for publication bias to influence the results (Sutton et al. 2000). Because these studies have not been peer-reviewed and the research may have involved problematic methodology, it also provides a potential weakness. One final limitation is that the diagnosis-based moderator analysis was unable to account for DBD comorbidity. Instead, due to procedural constraints, three analyses were conducted that looked separately at the percentage of children with ADHD, ODD, and CD in the sample. This is problematic as it fails to provide information regarding the impact of comorbidity across DBD, which is a highly common occurrence within these diagnostic populations. Additionally, it limits the interpretability of each diagnosis-based moderator analysis. For example, samples within the ADHD moderator analysis may have also had coexisting ODD and/or CD, and so it is unclear how comorbidity is impacting the results. Although, given the small sample size and restricted range problems present in each moderator analysis, this analysis was rendered non-significant and the results should be interpreted with caution regardless.

While it is important to address the limitations of this meta-analysis, there are also several key strengths to acknowledge. A number of secondary search strategies were implemented with none revealing additional eligible studies. This finding speaks to the strength of the literature review that was conducted and supports that these searches were exhaustive. Another methodological strength of this meta-analysis was the high inter-rater reliability demonstrated in the coding of manuscripts. The strong level of agreement between coders increased the likelihood that the information extracted from each manuscript was correct, thus increasing confidence in the accuracy of the meta-analysis. Lastly and most importantly, this meta-analysis was the first in-depth quantitative review looking specifically at the efficacy of PCIT for children with DBD. This research synthesized the findings of twelve separate studies, representing far more of the PCIT literature than previous broader meta-analyses that focused on multiple interventions for DBD. This analysis also extended beyond previous meta-analyses by analyzing the influence of gender and diagnosis on PCIT efficacy.

Suggestions for Future Research

Based on the limitations that have been discussed and the findings of this research, there are many possibilities for future research to explore. It would be beneficial for future research to continue to examine the efficacy of PCIT with independent samples and in independent labs. Furthermore, greater variation in the sample characteristics of participants is needed. With the majority of studies taking place in the United States and involving White males, it is difficult to generalize the findings of this analysis to all children with DBD. In addition, many of the studies in this meta-analysis did not include adequate DBD diagnostic information making it difficult to determine whether PCIT is differentially effective for ADHD, ODD, or CD. Finally, it would be beneficial for future research to explore the efficacy of cultural variations and shortened versions of PCIT to determine their efficacy, as the findings of the current analysis can only be applied to the standard intervention. It is crucial for future research to further explore how PCIT is influenced by gender, diagnosis, ethnicity, and treatment modifications because it provides clinicians with the opportunity to tailor treatment decisions to the child.

Implications and Conclusions

This comprehensive review of the literature has important implications for practitioners in the field. This meta-analysis provides a thorough overview of the entire body of research examining PCIT efficacy for children with DBD, indicating strongly that it is effective. While the results of this meta-analysis support PCIT as an efficacious intervention for improving child externalizing behaviour problems, it is also evident that more research needs to be done.

This study uncovered several important gaps in the literature that need to be addressed by future research in order to gain greater confidence in PCIT as an evidence-based treatment and to better understand the circumstances in which PCIT is most effective. It is still unclear which populations benefit the most from this intervention based on gender and diagnosis. Furthermore, researchers conducting a quick search of the literature when researching this topic would be unlikely to discover how many studies had overlapping samples.

In conclusion, this meta-analysis provides support for PCIT as an efficacious intervention for improving externalizing behaviour in children with DBD. This study effectively highlights the importance of continuing research in this area in order to strengthen the evidence base of this intervention and the optimal conditions for its use. Most importantly, this meta-analysis contributes to the growing body of intervention research hoping to improve the lives of families who struggle each day with disruptive behaviour problems.

Compliance with Ethical Standards

Conflict of interest None.

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