

A META-ANALYSIS OF PARENT MANAGEMENT TRAINING OUTCOMES FOR
CHILDREN AND ADOLESCENTS WITH CONDUCT PROBLEMS

by

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A thesis submitted in conformity with the requirements
for the degree of Doctor of Philosophy
Department of Human Development and Applied Psychology
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A Meta-Analysis of Parent Management Training Outcomes for
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ABSTRACT

This thesis comprised a meta-analysis examining the efficacy of Parent Management Training (PMT) for children and adolescents with conduct problems (CP). A search of the published literature yielded 499 studies, of which 80 met criteria for inclusion. These 80 studies generated 461 standardized mean gain effect sizes representing pretest to posttest change on measures of child CP for 119 intervention groups comprising 3325 individual youth and 42 control groups or 1645 individual youth. Hundreds of additional effect sizes were calculated for outcome variables examining generalization and collateral effects of PMT. Follow-up data at six months, one year, and beyond one year were also available. The analysis confirmed that PMT is a successful intervention in reducing childhood CP with maintenance of gains up to at least one year. Significant differences were found depending on which source was reporting on child CP. Parent-reports were associated with the greatest improvements, independent observers saw more modest gains, and teachers reported very little change. Child characteristics, family characteristics, methodological quality, and treatment quality were found to significantly moderate outcome. Other moderators (e.g., ADHD co-morbidity, father involvement, SES) demonstrated mixed effects and require further study and replication. In terms of cost-effectiveness, self-administered training, which was the least costly form of intervention examined, was not as effective as group or individual treatment. Moreover, standard PMT was more effective than programs that also sought to provide teacher training and/or child behaviour therapy. Results suggested that

some generalization strategies as well as therapeutic enhancements directed toward parents are likely to improve treatment effects. The results are discussed in relation to previous meta-analyses and implications for research and practice.

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INTRODUCTION

Disorders of conduct and behaviour are arguably the most prevalent of childhood diagnoses (Essau, 2003). Conduct Problems (CP) in children and adolescents encompass a broad range of “acting out” behaviours from the more benign (e.g., temper tantrums, yelling) to the more severe (e.g., assault, arson). When CP begin early in childhood, they significantly impact on the quality of life of the children and their families and exert bidirectional effects on the systems in which these children function, serving to exacerbate and maintain maladaptive behaviours (Patterson & Fisher, 2002). The course and outcomes associated with CP are further influenced by a wide range of biopsychosocial risk factors (Moffitt, 2003). CP are notoriously stable, often persisting through adolescence and adulthood and resulting in significant negative sequelae, including school dropout, unemployment, mental health difficulties, and criminality (Capaldi & Stoolmiller, 1999). The cost to society can be considerable, as individuals with CP often exhaust resources available within the education, health, and justice systems.

Given the profound personal and societal cost of CP, researchers and clinicians have developed a broad range of treatments focusing on the child, the family or the school (or combinations), to address factors thought to cause or influence CP. Notwithstanding the plethora of approaches available, narrative reviews have consistently highlighted Parent Management Training (PMT) as one of the most effective interventions for children with CP and their families (Brestan & Eyberg, 1998; Kazdin, 2003), at least in the short-term. It is important to note that reviews typically cite only a handful of studies to support longer-term effectiveness (Kazdin, 1997; Nixon, 2002). Further, narrative reviews have suggested a range of variables that might serve to augment or diminish treatment outcome including child characteristics (e.g., severity of problem behaviour), parent characteristics (e.g., psychopathology), and contextual factors (e.g., low socioeconomic status). Yet the specificity and extent to which these variables influence the efficacy of PMT has not been established.

The only published meta-analysis on PMT for CP was conducted by Serketich and Dumas (1996) and included only randomized control trials of PMT. Their findings revealed a large effect size of $d = .86$ for child outcomes and a moderate effect size of $d = .44$ for parent adjustment, results consistent with narrative reviews on the efficacy of PMT (Kazdin, 1997; Nixon, 2002). However, Serketich and Dumas were limited in their ability to draw firm conclusions regarding long-term efficacy of PMT and variables that might moderate treatment outcome because of the small number of studies investigating and reporting on these issues. Since the publication of the Serketich and Dumas review, there has been a boom in treatment outcome studies on PMT, rendering a current quantitative analysis of the treatment literature on PMT a necessity.

The purpose of this research was to use meta-analytic methodology for summarizing the results of the empirical outcome studies on PMT for CP conducted up to September 2005. There were three primary goals for this meta-analysis. The first goal was to obtain an overall estimate for the short-term and long-term efficacy of PMT. The two primary outcome variables examined were child CP and negative parenting practices as they were directly targeted in treatment and are fundamental to coercion theory that forms the conceptual basis of PMT. The development of prosocial child behaviour and positive parenting practices are also an important focus in PMT and thus were examined in the present meta-analysis. Generalization of treatment effects to other domains of child functioning (e.g., school, peers) and the collateral effects of PMT (e.g., changes in parent stress) were also evaluated. In contrast to Serketich and Dumas (1996), the current data base of treatment outcome studies is extensive and varied, ranging from traditional highly controlled clinical trials to program evaluations (i.e., one-group pre-post designs), providing greater opportunity to answer questions on treatment effectiveness (as opposed to efficacy) and facilitating dissemination of PMT from the laboratory setting to actual clinical practice.

The second goal was to more clearly delineate the variables that moderate treatment outcome and determine how such variables might interact to influence behaviour change in children and their parents. The moderators investigated in the present meta-analysis included child and family characteristics (e.g., age, SES) as well as treatment (e.g., therapist supervision and training) and methodological characteristics (e.g., assignment to conditions).

The final goal was to conduct an evaluation of the cost-effectiveness of PMT. Whether treatment variations (e.g., self-administered versions) designed to reduce costs or therapeutic enhancements (e.g., child behaviour therapy, marital therapy) added to maximize effects in hard-to-serve populations, continue to demonstrate the efficacy of PMT remains an empirical question. Such issues concerning the cost-effectiveness of PMT are of particular significance for administrators and policy makers who are constrained by limited budgets. Further elucidating the variables that impact both treatment efficacy and treatment effectiveness will help to bridge the gap between research and practice and provide children with CP and their families improved adjustment and hope for the future.

LITERATURE REVIEW

Definition of Conduct Problems

The DSM-IV-TR characterizes CP under the umbrella of Disruptive Behaviour Disorders, which include Oppositional Defiant Disorder (ODD), Conduct Disorder (CD), and Attention Deficit Hyperactivity Disorder (ADHD). ODD is characterized by “a recurrent pattern of negativistic, defiant, disobedient and hostile behaviour toward authority figures” (American Psychological Association, 2000, pp. 100). To meet criteria for this diagnosis, difficulties must last at least 6 months, during which time four (or more) of the following symptoms must be present: often loses temper, often argues with adults, often actively defies or refuses to comply with adults' requests or rules, often deliberately annoys people, often blames others for his or her mistakes or misbehavior, is often touchy or easily annoyed by others, is often angry and resentful, is often spiteful or vindictive. Although children may display certain characteristics of ODD at different stages as a natural course of development, the diagnostic criteria stipulate that ODD symptoms must occur at a rate that is developmentally inappropriate and must cause clinically significant impairment in social, academic, or occupational functioning. Symptoms falling within the scope of ODD such as temper tantrums, defiance, and non-compliance are the most frequent referral complaints to treatment providers, representing a third to one half of all clinical referrals for children and families (Barkley, 1997; Kazdin, 1995).

CD involves “a repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate societal norms or rules are violated” (American Psychological Association, 2000, pp. 102). CD requires the presence of symptoms in three (or more) domains in the past 12 months, with symptoms in at least one domain occurring in the past 6 months. Symptom domains include: (1) aggression to people and animals (e.g., bullies, threatens, or intimidates others, initiates physical fights), (2) destruction of property (e.g., deliberately

engages in fire setting with the intention of causing serious damage, deliberately destroys others' property), (3) deceitfulness or theft (e.g., breaks into someone else's house, building, or car), and/or (4) serious violations of rules (e.g., often stays out at night despite parental prohibitions, is often truant from school).

While ADHD is the other disruptive behaviour disorder, it will not be described here in detail as it was not the focus of the current study. Given the high rates of co-occurrence amongst disruptive behaviour disorders, ADHD will be addressed in a later section specifically discussing co-morbidity.

Prevalence

Recent and horrific acts of violence committed by youth, including a glut of school shootings and cases of bullying leading to murders or suicide of the victims, have been well documented in the media. These occurrences prompt the question: Are CP in youth on the rise? Since the seminal large scale epidemiological study on childhood psychiatric disorders carried out in the 1960s on the Isle of Wight (Rutter, 1979, 1989), over 52 studies have been conducted to estimate the prevalence of child and adolescent psychiatric disorders with rates ranging from 1% to nearly 51% depending on the criteria used for diagnosis and the range of symptom severity in the sample (Roberts, Atkisson, & Rosenblatt, 1998). Epidemiological studies providing specific information on the prevalence of CD/ODD generally show overall rates falling between three and eight percent (Essau, 2003; Loeber, Burke, Lahey, Winters, & Zera, 2000). ODD and CD taken together are arguably the most prevalent of childhood diagnoses (Canino, Shrout, Rubio-Stipec, Bird, Bravo et al., 2004; Costello, Messer, Bird, Cohen, & Reinherz, 1998; Ford, Goodman, & Meltzer, 2003; Verhulst, van der Ende, Ferdinand, & Kasius, 1997) and they account for a much higher proportion of clinic referrals than disorders of mood or anxiety, another high incidence clinical population (Garland, Hough, McCabe, Yeh, Wood, & Aarons, 2001).

Perhaps not surprisingly, establishing clear prevalence rates is difficult with several methodological factors impacting to influence these rates from study to study. First, thresholds required to establish diagnosis change over time. In the Ontario Child Health Study (Boyle, Offord, Racine, Szatmari, Fleming, & Sanford, 1996), for example, using a categorical definition of CD (in this case the DSM-III-R) in which three or more symptoms were rated by parents as occurring “often” or of being “very true” of their child on an established standardized rating scale, the prevalence rate was found to be only 0.1%. On the other hand, with use of a dimensional approach whereby the threshold for diagnosis was set at one standard deviation above the mean on the same standardized rating scale, prevalence rates for CD jumped to 3.6% (Boyle et al., 1996). Moreover, the inclusion of a measure of severity of impairment in addition to symptom criteria generally served to reduce the rates of ODD and CD (Canino et al., 2004; Essau, 2003). The sole exception is the study by Romano, Tremblay, Vitaro, Zoccolillo, and Pagani (2001) where no significant differences were found in prevalence rates when diagnoses were based on symptom and impairment criteria versus symptom criteria alone.

Second, the setting in which children are recruited impacts on prevalence. Rates of ODD were significantly higher in mental health settings and special education settings compared to child welfare and juvenile justice sectors, whereas rates of CD were elevated for juvenile justice as well as mental health and special education (Garland et al., 2001). Third, the source of the diagnostic information is important. Children and adolescents reported higher rates of CP compared to their parents, with the most notable discrepancy between the two observed in Verhulst et al. (1997). In this study, the 6-month prevalence for CD based on self-report was 5.6% compared to 1.2% based on parent report. Interestingly, the discrepancy disappeared when severity of impairment was taken into consideration (Verhulst et al., 1997).

Gender also plays a significant role. In almost all studies, school-age boys display significantly more CP than same-aged girls (Essau, 2003; Loeber et al., 2000), particularly

physical aggression (Tiet, Wasserman, Loeber, McReynolds, & Miller, 2001) and physical harm to others (Lahey et al., 1998). Relational aggression has been postulated to account for differential findings related to gender. Because girls develop verbal skills at an earlier age than boys, they may be more likely to engage in indirect or relational types of aggression (Essau, 2003). Moreover, girls might also resort to relational aggression because direct aggression is traditionally socially discouraged (Lagerspetz & Bjorkqvist, 1994). Whatever the reasons, relational aggression requires a degree of maturation and the existence of a social network that may not be fully developed until later (Essau, 2003). Given the potentially differing phenotype of CD in girls and current diagnostic criteria of CD that might be thus considered gender-biased, it is probably safe to say that the true prevalence of CD in girls is not known at the present time (Pepler & Craig, 2005).

Several studies have sought to examine prevalence rates to ascertain whether CP in children and adolescents has changed over time. By combining three large general population samples of UK adolescents, Collishaw, Maughan, Goodman, and Pickles (2004) showed that CP increased significantly from 1974 to 1999 in both girls and boys. Moreover, the rates of more serious CP (measured by using higher cut-point scores on symptom rating scales) more than doubled over 25 years. A similar trend was noted in teen self-reports of offending with a 14 percent increase in the proportion of offence admissions between 1992-1993 and 1998-1999. However, these findings are by no means consistent. In their efforts to re-norm the Child Behavior Checklist (CBCL), Achenbach and his colleagues (Achenbach, Dumenci, & Rescorla, 2003) found an increase in indicators of CP (e.g., externalizing, rule-breaking, and aggressive behaviour subscales) from 1976 to 1989 but a decrease thereafter until 1999. Although the DSM-Oriented Scale of Oppositional Defiant Problems on the CBCL increased from 1989 to 1999, the DSM-Oriented Scale of Conduct Problems on the CBCL showed a significant decrease in prevalence over the same period.

An extensive analysis of official statistics on juvenile crime records in Europe and North America revealed a similar trend (Rutter, Giller, & Hagell, 1998). Increases in juvenile crime rates were evident from 1950 through the mid 1990s; however, in the United States the total number of juvenile arrests for violent crime has dropped annually from 1994 to 2000 (Howell, 2003). Although more research that attends to the variety of factors impacting prevalence rates (some of which were discussed above) is warranted, it is undeniable that CP affect a large number of children in our society. While the rates of CP or perhaps its early indicators are arguably on the rise, even the current prevalence estimates mean that the personal and societal costs of CP in children are substantial.

Pathways to Conduct Disorder and Antisocial Personality

The stability of CP is well established in the literature with difficult temperament in infancy predicting non-compliance and aggression in early and later childhood (Campbell, 1995; Keenan, Shaw, Delliquadri, Giovannelli, & Walsh, 1998), childhood CP predicting adolescent delinquency (Broidy et al., 2003), and adolescent CP predicting antisocial personality disorder in adulthood (Farrington, 2005). Moreover, ODD in early childhood has been identified as a significant predictor of antisocial behaviour in adulthood (Langbehn, Cadoret, Yates, Throughton, & Stewart, 1998). Given the continuity of CP that begins in early childhood, an early-starter pathway, also referred to as life-course-persistent antisocial behaviour, has been proposed (Moffitt, 1993, 2003). Diagnostically, this pathway most closely corresponds to the DSM-IV specifier of childhood-onset CD (with symptoms occurring before the age of 10). Moffitt (1993, 2003) proposed that individuals with this disorder display changing manifestations of antisocial behaviour as environmental circumstances change. As an example of such development, the toddler may bite and hit more often than their peers by age 4, shoplift and skip school by age 10, sell drugs and steal cars by age 16, engage in robbery or rape by age 22, and commit fraud or child abuse by age 30 (Moffitt, 1993).

A late-starter pathway, also referred to as adolescent-limited antisocial behaviour or adolescent-onset CD (for which the DSM-IV specifies an onset age of 10 years or later), has also been proposed and carries with it a much better prognosis but relatively less research. Moffitt (2003) described this group of adolescents as having no notable history of CP and instability in their display of CP across settings. For example, they may shoplift in stores but adhere to school rules, and desist in CP by early adulthood. Although the causes and characteristics of the adolescent-limited group have received little study, Moffitt (2003) proposed a catalyst whereby a “maturity gap” prompts young adolescents to look toward their older peers as models. This maturity gap occurs during puberty as adolescents make the transition to high school and it reflects the tension between financial and social dependence on parents and a desire for autonomy, self-reliance, and respect from adults. Social mimicry of delinquent behaviour is most attractive because it damages the quality of intimacy with parents (enabling the assertion of independence) and looks “older” (e.g., smoking, drinking, being tattooed). Studies supporting this aspect of Moffitt’s theory report elevated levels of depressive symptoms and worries about appearing immature associated with increased levels of delinquency in adolescence (Aguilar, Sroufe, Egeland, & Carlson, 2000; Zebrowitz, Andreoletti, Collins, Lee, & Blumenthal, 1998). Epidemiological studies indicate that almost all adolescents commit some illegal acts (Moffitt, Caspi, Dickson, Silva, & Stanton, 1996); however, a minority of adolescents refrain from engaging in antisocial activities altogether. Moffitt (1993) hypothesized that these teens either have delayed puberty, access to roles that are respected by adults, environments that limit opportunities for learning about delinquency, and/or personal characteristics that exclude them from antisocial peer networks (Shedler & Block, 1990). In Moffitt’s theory, adolescent-limited CD desists after a certain period because adolescents move out of the maturity gap and the costs of their delinquent behaviour begin to outweigh the benefits. Having had no history of CP, these teens are able to develop a repertoire of prosocial behaviour and achievements that enable them

to be responsive to shifting contingencies in their environment as they move from adolescence into adulthood.

The research delineating early versus late pathways for CD and antisocial personality has been based largely on data obtained from boys; girls may not follow the same trajectory. It has been suggested that girls experience a delayed onset of CD but with sequelae as severe as with early-starter boys (Silverthorn & Frick, 1999). Rather than age, the timing of puberty may play a more central role in the onset of CD with girls (Keenan, Stouthamer-Loeber, & Loeber, 2005). Girls with CD appear to enter puberty at an earlier age (Connolly, Pepler, Craig, & Taradash, 2000) and are thus exposed to risk processes that they might not be fully prepared to handle. For example, although these girls may fit in physically with older mixed-sex groups, they may not have attained a level of emotional maturity sufficient to meet the social demands of such interactions. They may also be more vulnerable to entering romantic relationships before they are ready, because older boys might be attracted to their advanced sexual development. Moreover, vulnerable girls might themselves be attracted to older delinquent males who can obtain things (e.g., stealing cars and clothes) that are otherwise inaccessible to most teens (Caspi, Lynam, Moffitt, & Silva, 1993), thereby setting the stage for peer deviancy training and opportunities to engage in antisocial activities.

Types of CP

Subtyping of CP based on age has been criticised because of the complexity and multitude of factors influencing the development of CP, the difficulty in recalling age of onset by parents, and the absence of empirical and prognostic support for use of age in girls (Essau, 2003). An alternative strategy, for which there is strong support, is based on overt (e.g., non-compliance, fighting) versus covert (e.g., stealing, lying, fire-setting) problem behaviours.

Overt Conduct Problems

Non-compliance, the hallmark symptom of ODD, plays a central role in the development of CP. In their research on the social behaviour of typically developing children across six cultures, Whiting and Edwards (1988) observed naturally occurring parent request delivery and child compliance to these requests. Compliance levels were 72% for 2-3 year olds, 79% for 4-5 year olds, and 82% for 6-8 year olds, with girls being more compliant than boys. Brumfield and Roberts (1998) also reported that normative rates of compliance in preschoolers increased with age. However, when they held the instruction-giving style of parents constant (e.g., one step motor tasks with no repetitions of requests), they found compliance levels of 32% for 2-3 year olds and 78% for 4-5 year olds, with no differences between girls and boys (Brumfield & Roberts, 1998). During their second year, children are only in the beginning stages of developing self-regulation, which in part involves the ability to understand and the physical ability to carry out parental requests (Kuczynski, Kochanska, Radke-Yarrow, & Ginius-Brown, 1987). Therefore, two and three year old children will necessarily have fewer skills in this regard and parents may naturally compensate by providing scaffolding (e.g., delivering repeated requests, requesting in different ways, providing physical assistance to carry out the request) that can artificially elevate true compliance levels.

The child's ability to achieve about 70% compliance to parental requests constitutes a major developmental milestone in the socialization process (Patterson & Fisher, 2002). By the time they enter elementary school, children have typically developed the self-regulation and acquiescence skills necessary to handle the social demands that will be placed upon them (e.g., 'getting along' with teachers and peers). When development of these skills does not occur, the high levels of non-compliance might be considered a form of arrested socialization. Non-compliance appears early in the development of CP, plays a critical role in the development of overt and covert CP and continues to be manifested in later developmental periods (Chamberlain

& Paterson, 1995; Edelbrock, 1985). Moreover, compliance is considered a keystone behaviour because of its central role in child behavior and findings indicating that improved compliance following treatment is typically associated with improvements in other forms of CP (Russo, Cataldo, & Cushing, 1981; Wells, Forehand, & Griest, 1980).

Physical aggression is another important factor influencing the development of ODD and CD (Essau, 2003). In a prospective study examining possible symptoms of CD, only early aggression, together with a diagnosis of ODD, predicted the eventual onset of CD and suggested a more severe course for the disorder (Loeber, Green, Keenan, & Lahey, 1995). Although physical fighting is common in preschool-aged boys, some boys stand out in terms of the persistence of such behavior; they may go on to display chronic physical aggression in childhood and beyond (Tremblay et al., 2004). It is notable that a relationship between childhood physical aggression and the development of ODD or CD has not been consistently demonstrated in girls (Broidy et al., 2003; Essau, 2003). The inconsistency might be explained by methodological differences between studies. While there are generally few gender differences with respect to aggression in toddlerhood, aggression in girls tends to decrease after the age of four (Prior, Smart, Sanson, & Oberklaid, 1993). However, when extreme samples of aggressive boys and girls are compared, there are no differences in the frequency or severity of hostile exchanges regardless of age (Cairns & Cairns, 1994). It has been suggested that particular concern be shown for girls beyond the age of four who continue to engage in physical aggression because it is non-normative and puts them at risk for a range of adjustment difficulties in adolescence and adulthood (Pulkkinen, 1992).

Different types of physical aggression may also differentially influence the course of CP. Proactive aggression is self-serving and used to coerce or influence others (Poulin & Boivin, 2000) and has been shown to predict severe CD symptoms as well as delinquency in boys (Hubbard et al., 2002; Vitaro, Brendgen, & Tremblay, 2002). In contrast, reactive aggression

occurs in response to perceived provocation, is associated with information processing deficits in children such as hostile attribution biases and poor problem solving skills, and is not as clearly predictive of severe CP and delinquency (Crick & Dodge, 1996).

Covert Conduct Problems

Much less study has focused on covert CP. Youth who steal show levels of CP that are comparable to non-referred youth; however, stealing combined with social aggression may exacerbate the CP of those displaying social aggression alone (Loeber & Schmalting, 1985). Lying is strongly correlated with stealing and somewhat less strongly with fighting (Stouthamer-Loeber & Loeber, 1986) but it does predict later recidivism (Loeber & Dishion, 1983). Fire involvement is consistently associated with other CP as well as more severe CP. Children with CP who also set fires are arrested and become embroiled in the justice system at a younger age compared to children with CP but no fire involvement (Becker, Stuewig, Herrera, & McCloskey, 2004; Stickle & Blechman, 2002).

Another type of aggression that warrants mention here is relational aggression, which involves the manipulation of interpersonal relationships with such strategies as spreading rumours, social isolation and exclusion. It may be overt or covert, reactive or proactive.

Relational Aggression

Relational aggression is of particular interest because it appears to be more common in latency-aged girls than boys (Crick & Grotpeter, 1995) and it predicts poorer social outcomes in the ensuing year in these girls (Crick, 1996). This type of aggression is perhaps more advantageous for girls than boys because it may be more effective within the female social context of small, more intimate groups; boys tend to have more extensive and less defined peer groups (Lagerspetz, Bjorkqvist, & Peltonen, 1988). Note also that the verbal skills of girls generally develop earlier than those of boys and physical aggression is less socially acceptable for girls. These two factors may contribute to the emergence of relational aggression at an earlier

age in girls as compared to boys. When boys finally do catch up developmentally in adolescence, the gender gap disappears.

CP With and Without Callous and Unemotional Traits

Finally, Frick and Ellis (1999) proposed that two groups of early-onset CD children be further distinguished; those with callous and unemotional traits and those without. Youth diagnosed with CD who also have callous and unemotional traits engage in more serious and varied CP, have more stable CP, are more likely to have had police contacts, and engage in violence that is more severe, premeditated and instrumental (Frick, Cornell, Bodin, Dane, Barry, & Loney, 2003; Kruh, Frick, & Clements, 2005). They tend to prefer novel, exciting, and dangerous activities and are less reactive to emotionally distressing events (Frick et al., 2003). Moreover, CD children with callous and unemotional traits tend to be less sensitive to punishment (Frick et al., 2003), demonstrate poor perspective taking skills and expect more positive rewards from aggression (Pardini, Lochman, & Frick, 2003).

Co-morbidity

One of the most consistent findings in epidemiological studies is the high rate of co-occurrence of psychiatric disorders in children and adolescents, and in particular, the co-morbidity of CD with other disorders. Co-morbidity can have a dramatic impact on the course of CP. About 90 percent of children diagnosed with CD also meet criteria for ODD with ODD generally occurring before CD (Essau, 2003). In a comprehensive, pioneering meta-analysis of co-morbidity in child and adolescent psychiatric disorders (Angold, Costello, & Erkanli, 1999), ADHD most frequently co-occurred with CD with a median odds ratio of 10.7. The odds ratio is a way of comparing whether the probability of a certain event is the same for two groups. An odds ratio of 1 implies that the event is equally likely in both groups and an odds ratio greater than one implies that the event is more likely in the first group. Therefore, ADHD is more likely to occur in children who have been diagnosed with CD than in children without CD and vice

versa. In most cases, ADHD precedes the onset of CP with the hyperactivity symptoms of ADHD postulated as the “motor” driving the development of ODD (Burns & Walsh, 2002) and early-onset CD (Loeber et al., 1995; Moffitt, 1990), steering the children toward a pathway of persistent and overt CP. The association between ADHD and CD in girls is less well understood with some researchers showing higher co-morbidity in girls than boys (Bird, Gould, & Staghezza, 1993) and others showing very low rates of co-morbidity (Faraone, Biederman, Keenan, & Tsuang, 1991). Other factors, such as learning problems and symptoms of impulsivity, may mediate the emergence of CD in girls with ADHD (Keenan et al., 2005)

With respect to internalizing disorders, CD is commonly associated with mood disorders including major depression (odds ratio=6.6, Angold et al., 1999) as well as bipolar disorder and dysthymia (Arredondo & Butler, 1994). This association is particularly notable in girls considering that they are more than twice as likely to experience depression in adolescence than boys (Zoccolillo, 1992). The co-occurrence of ODD and depressive symptomatology also exists, albeit to a lesser extent (Arredondo & Butler, 1994). In most studies, CP precede the development of depressive symptoms (Essau, 2003). In an attempt to explain the association between CP and depression, Patterson and Capaldi (1990) postulated the dual failure model whereby CP interfere with social skills acquisition resulting in high levels of interpersonal conflict with parents, peers, and teachers. Resulting school failure and peer rejection then leads to depressed mood. Depressive symptoms (particularly irritability and emotional lability) act recursively to intensify CP resulting in defiance, aggression, and substance use. Anxiety disorders also co-occur with CD (odds ratio=3.1, Angold et al., 1999) but their association is complex. Epidemiological studies indicate that children with anxiety alone are at a reduced risk for developing adolescent CP while, paradoxically, youth with CP are at increased risk for co-morbid anxiety (Loeber et al., 2000).

Co-morbidities have a tremendous impact on the course, prognosis, and outcomes for children with CP. Children with co-occurring CD-ADHD display more physical aggression and more persistent CP (Fischer, Barkley, Smallish, & Fletcher, 2002) as well as academic underachievement (Loeber et al., 2000). Similarly, the joint presence of CD and depression increases the risk of substance use, criminality, and suicide (Essau, 2003; Loeber et al., 2000). The risk and impact of co-morbidity appears to be equally problematic for boys and girls (Olson & Hoza, 1993).

Risk Factors Contributing to the Emergence and Maintenance of CP

A wide range of risk factors exert influence on the development of CP and the maintenance of CP over time. Risk factors can be grouped into five domains including child characteristics (e.g., age), family characteristics (e.g., parenting practices), sociodemographics (e.g., SES), peer influences, and school factors (e.g., academic failure).

Child characteristics

Child characteristics including psychobiology, temperament, and social-cognitive deficits exert bidirectional influences on environmental risk factors (e.g., inconsistent parenting, low socioeconomic status) leading to the development of coercive interaction patterns between family members and with others and increasing the risk of CP (Patterson and Fisher, 2002).

Several lines of investigation have emerged from the psychobiological literature linking genetics and brain chemistry with CP. From a theoretical standpoint, deficits in inhibition and reward-controlled aggressive behaviour have been hypothesized to result from deficient neurotransmitter and biochemical activity like noradrenalin and serotonin (Lahey, Hart, Pliszka, Applegate, & McBurnett, 1993). These deficits are thought to underlie an overactive behavioural activation system (“gas pedal”) and an underactive behavioural inhibition system (“brake pedal”) which in turn leads to an atypical sensitivity to rewards and a failure to respond to punishment. According to this theory, children will continue to display behavioural responses even under

conditions of no reward (Quay, 1993). Empirical research is emerging in support of this theory. In a prospective longitudinal study, Kruesi, Hibbs, Zahn, and Keysor (1992) was able to show lower levels of a serotonin metabolite in children with CP compared to those without. In addition, children with early-onset CD demonstrated low cortical arousal and low autonomic reactivity relative to their typically developing peers leading to diminished avoidance learning in response to usual socialization practices (e.g., warnings and reprimands) and a poor response to punishment (Magnusson, 1988; Pennington & Ozonoff, 1996).

Two additional psychobiological research programs are underway. The first proposes a reward deficiency syndrome to explain CP. This syndrome involves a biochemical inability to derive pleasure from ordinary, everyday activities, which leads to persistent stimulus seeking behaviour. Researchers have described a deviation in a variant of the dopamine D2 receptor gene as the brain mechanism for this syndrome (Blum, Cull, Braverman, Chen, & Comings, 1997). The second implicates elevated levels of plasma testosterone that have been found to correlate with low frustration tolerance as well as aggression (van Goozen & Fairchild, 2006).

Regardless of the specific brain chemistry, Moffitt (1993, 2003) proposed that such subtle neuropsychological variations may be due to prenatal, perinatal, and/or postnatal environmental influences that impact the infant's nervous system, resulting in increased irritability, impulsivity, and overall difficult temperament. For example, Tremblay et al. (2004) found that smoking during pregnancy and postpartum depression significantly predicted a trajectory of high levels of physical aggression from 17 months to 42 months of age.

Research on temperament as a predisposing factor for CP has been inconsistent, with some arguing that a dysregulated temperament facilitates the progression from early disruptive problems to CD because of poor emotional control (Caspi, Henry, McGee, & Moffitt, 1995; Guerin, Gottfried, & Thomas, 1997), and others finding no relation between temperament and

CP in early and middle childhood (Aguilar et al., 2000). It may be that the temperament mediates or is mediated by the presence of other risk factors such as maternal depression or stress.

Children with CP also demonstrate social-cognitive deficits (Coie & Dodge, 1998). These deficits include poor attention to relevant social cues and errors in the interpretation of social cues (e.g., they attribute hostile intent in neutral or accidental social events). They have difficulty generating alternative solutions to problems and are more likely to choose aggression as a response. The development of social-cognitive skills is dependent, at least in part, on adequate parental supervision and monitoring during which opportunities for parental modelling of problem solving, conflict resolution, and social skills emerge.

Family Characteristics

Parenting practices have been found to play a critical role in the development of CP, in particular, inconsistent discipline and low supervision (Chamberlain & Patterson, 1995). Moreover, the relationship between physical abuse and CP is a clear and robust finding (Jaffee, Caspi, Moffitt, & Taylor, 2004). Coercion theory was developed by Patterson and his colleagues (Patterson, 1982) to explain the mechanism through which childhood aggression emerges and is maintained over time. The theory proposes that parents and children “train” each other to behave in ways that increase the probability of aggressive behaviours in children while decreasing the parents’ control over these same behaviours. Parent-child interactions are thus characterized by the parents’ demands for compliance and the child’s refusal to comply in conjunction with concomitant escalating complaints and behaviours (e.g., temper tantrums, aggression). When the child’s behaviour reaches a level of aversiveness that is no longer tolerable to the parent, the parent gives in. In the short term, this interaction is reinforcing for both the child and the parent.

Parental characteristics such as socio-cognitive deficits, stress, and psychopathology have also been shown to influence the development of CP, largely by disrupting parenting practices. In non-problem families, parents perceive prosocial child behaviour as internal and dispositional

whereas negative behaviours are viewed as being related to external and situational factors (Dix, Ruble, Grusec, & Nixon, 1986). However, for parents of children displaying high levels of oppositional behaviour, child misbehaviour is attributed to internal and dispositional factors and they are more likely to interpret child misbehaviour as intentional (Bickett, Milich, & Brown, 1996). When parents view child behaviour as intentional they show an increased tendency to hold their children responsible for their misbehaviour (Baden & Howe, 1992; Dix & Lochman, 1990; Gretarsson & Gelfand, 1988) and to use coercive and power-assertive parenting practices (Dix & Lochman, 1990). In the same vein, low parenting self-efficacy is associated with heightened parental sensitivity to child CP (Johnston & Mash, 1989) and parents with low self-efficacy tend to experience more negative emotions toward their children (Dix, 1991).

With regard to parental stress, Granic (2000) suggested that stressful events cause mother-child dyads to shift to a more negative style of interaction. Patterson (1983) demonstrated that on days in which mothers reported high levels of stress, they were observed to be more irritable. The combination of stress and irritability has been shown longitudinally to disrupt parenting practices (Patterson & Forgatch, 1990). Similarly, maternal depression disrupts parenting behaviour, perhaps by leaving the mother emotionally unavailable to her child or by negatively colouring her perceptions of her child's behaviour (McMahon & Kotler, 2006).

Parental antisocial behaviour has received more attention in the literature and likely exerts both direct (e.g., modeling) and indirect (e.g., parenting practices) influences on CP in children. Antisocial behaviour in parents has been shown to mediate the effect of social disadvantage and family conflict in predicting parenting practices (Frick & Loney, 2002). Marital conflict may also influence the development of CP through the modelling of coercive and aggressive behaviour, interference with appropriate parenting practices, and indirectly through the cumulative effects resulting from parental marital distress such as maternal depression (Rutter, 1994).

While these risk factors also hold for the development of girlhood CP, a discussion of risk factors for girls requires consideration of the impact of sexual abuse. Research has demonstrated that almost half of victims of childhood sexual abuse exhibit aggressive and antisocial behaviour (Kendall-Tackett, Williams, & Finkelhor, 1993). Moreover, early sexual abuse engenders the continuity of CP because these girls may be limited in their capacity to form mature, respectful, and trusting relationships and they have been provided with a wholly destructive model of parenting (Pepler & Craig, 2005). Gender differences in the posttraumatic responses to sexual abuse have received little attention in the literature perhaps because of the substantially lower prevalence rates in boys, the fact that girls are more likely to experience intrafamilial abuse (which has greater deleterious effects than other forms of sexual abuse), or because too few interesting differences have been found in the few studies that did examine gender differences (Kendall-Tackett et al., 1993)

Sociodemographic Factors.

Low socioeconomic status (SES) and neighbourhood risk have been associated with CP. While the effect of SES is largely mediated by parenting practices (Capaldi & Patterson, 1994), neighbourhood risk may act as an independent risk factor (Gorman-Smith, Tolan, & Henry, 2000). Neighbourhood risk is characterized by a lack of social support from neighbours, extended family, and religious groups and a high level of negative and coercive interchanges with community or helping agencies (Leventhal & Brooks-Gunn, 2000; Wahler & Dumas, 1984). Negative interactions and emotions from outside the home may be carried over into parent-child interchanges within the home.

Peers and School

Oppositional or aggressive children, considered developmentally behind their peers in the socialization process, enter school unable to cooperate, share, and regulate their emotions. Research has shown that when a new peer group begins to form, it takes only about two to three

hours of contact with an aggressive child for that child to be labeled as “disliked” (Coie & Kupersmidt, 1983; Erhardt & Hinshaw, 1994). Repeated experiences of peer rejection and neglect lead to negative self-evaluations and, in particular shame (Tangney, Miller, Flicker, & Barlow, 1996). The emergence of shame has been demonstrated to both amplify and maintain antisocial behaviour (Fabes & Eisenberg, 1992; Izard, 2002; Tangney et al., 1996). Children with CP may also seek out like-minded peers who share their aggressive tendencies and attitudes and are less likely to reject them. The relationship between deviant peer affiliations and CP is well-documented (Granic & Patterson, 2006). Based on direct observations of peer dyads, Dishion and his colleagues identified a process of deviancy training (Dishion, Spracklen, Andrews, & Patterson, 1996) whereby children with CP react positively to each other in response to deviant talk, thereby positively reinforcing antisocial behavior. Children without CP showed no such pattern of reinforcement (Dishion et al., 1996). Accordingly, deviant talk may be an attractor for children with CP that decreases opportunities to engage with prosocial peers (Granic & Patterson, 2006).

Academic failure is another likely outcome for children with CP (Hawkins & Lishner, 1987; Hinshaw, 1992). Classroom observations of aggressive children have revealed that they display significantly less on-task behaviour than their normal peers (Shinn, Ramsey, Walker, & Stieber, 1987) and are less likely to complete their homework (Dishion, Loeber, Stouthamer-Loeber, & Patterson, 1984). Problem behaviour and cognitive deficits may inhibit their ability to learn, strain relationships with teachers and peers, and lead to alienation and rejection (Patterson, DeBaryshe, & Ramsey, 1989). Repeated academic and social failures could contribute to feelings of shame and a perception of the world as hostile, which could in turn exacerbate problem behaviour. It is notable that clear requirements for homework completion, high academic expectations, clear and consistent discipline policies, and incentives for appropriate

school behaviour and achievement have been found to partially compensate for poor family circumstances (Gottfredson, Gottfredson, & Hybel, 1993).

Lifespan Developmental Model of CP

Given the current state of our knowledge in CP, researchers have proposed a model to explain the origins and course of chronic antisocial behaviour and personality (Loeber et al., 2000; Moffitt, 2003; Sroufe, 1997). The age of onset is a key component of the model because the causal influences on CD vary with age, with early starters more likely to persist with CP into adulthood. Risk factors influence which children will make the transition from ODD to CD and which children will desist in their antisocial behaviour. Finally, interactions between the developing person and the changing social environment result in the shifting phenotypes of CP across the lifespan. The schematic model (Loeber et al., 2000) is presented in Figure 1 to illustrate this transition.

As described in detail previously, various factors place children at risk for CP. These factors can be grouped into domains including child characteristics (e.g., psychobiology, social-cognitive deficits), family (e.g., poor parenting practices, parental psychopathology), peers (e.g., rejection, association with a deviant peer group), school (e.g., underachievement), and demographics (e.g., SES, neighbourhood). ADHD is posited to activate ODD, while non-compliance and aggression increase the likelihood that a child will go on to develop CD. Substance use and CD are thought to exert a reciprocal influence on each other. The factors influencing the transition from CD to antisocial personality disorder are less well delineated. In the context of existing ODD and CD, early psychopathic features (i.e., callous and unemotional traits) may modulate the transition to antisocial personality disorder. As with CD in teens, antisocial personality disorder and substance abuse/dependence are described as reciprocally related with anxiety and depression primarily related to substance use. Because most of the research to date has been conducted with samples of boys, it is yet to be determined whether this

model can be applied to girls as well. While the stability of CP from childhood to adulthood has been established in both boys and girls, as mentioned previously, Silverthorn and Frick (1999) proposed a delayed-onset trajectory for girls where putative factors that are present early interact with interpersonal risk processes that are present later, resulting in the manifestation of CP in adolescence.

Outcomes and Costs to Society

The prognosis for those on the early-starter pathway is bleak with far reaching negative sequelae for the individuals and those around them. In addition, these persons place financial burdens on the health, education, and justice systems. In terms of “personal” costs, Capaldi and Stoolmiller (1999) used prospective data to show that CD in boys strongly predicted dropping out of school, unemployment, driver’s license suspensions, problems with peers and parents, causing unwanted pregnancies, low self-esteem and substance abuse. Girls diagnosed with CD are similarly affected. Bardone, Moffitt, Caspi, and Dickson (1996) found that girls with CD displayed an increase in depressive disorders, anxiety disorders, substance use, dropping out of school, early pregnancy, and violent victimization. A follow back study of 12, 000 Swedish children showed that early indicators of CP were also associated with a three fold increase in mortality by age 30.

With respect to the financial burden relative to children with other psychiatric disorders, those with CD demonstrate more hospitalizations and use of extended outpatient services (Lambert, Wahler, Andrade, & Bickman, 2001). The estimated cost of treatment over 6 months was \$21, 046 for children with CD compared to \$7557 for children without (Lambert et al., 2001). The monetary costs of delinquency have also been extremely high with upwards of 60% of clinic-referred youth with CD having been convicted of a crime by age 30 (Harrington et al., 1991). In one study conducted in the early 1990’s, the cost of youth crime in the US was estimated to be \$1.5 billion per year with an annual cost of detaining youth estimated at \$70

million (Potas, Vining, & Wilson, 1990). Currently, it costs approximately \$100,000 per year to incarcerate a youth in Canada. In their examination of the economic impact of CD, Foster and his colleagues (Foster & Jones, 2005) found that the cost to society increased annually from approximately \$6000/yr for a 10-11 year old with CD to more than \$14,000/yr by the end of high school, a figure that was roughly 6 times that for youth without CD. Foster and Jones (2005) also provided a breakdown of these costs to different sectors of society. For an average 14-year old child with CD, \$9563 was spent on inpatient mental health services (including residential treatment and group home placements), \$1389 on juvenile justice (arrest costs, detention), and \$2943 on educational services (repeating a grade, special education) in one year. There are, of course, enormous individual differences in these rates and the distribution of monies spent across sectors varies across age groups. For example, costs to the education system would be expected to decrease as youth with CD drop out of school. In terms of who bears the financial burden, Knapp, Scott, and Davis (1999) found that the greatest expense fell on the families (just over one third) while the education system accrued one third of the burden.

Treatment Outcome Research for Children and Adolescents with CP

Given the significant negative impact of CP on children, their families, and society, it is not surprising that more than 550 treatments have been documented for the remediation of child and adolescent psychopathology (Kazdin, 2000). There has been increased interest in the last decade to evaluate these treatments empirically and identify which ones lead to significant change. Two approaches have been undertaken in an attempt to delineate treatments that work: consensus papers and meta-analyses.

With regard to consensus papers, different professional organizations and committees have set out to outline criteria that would establish a treatment as evidence-based, also variously referred to as empirically validated or empirically supported. Following from the Division 12 (Clinical Psychology) Task Force on Promotion and Dissemination of Psychological Procedures,

Chambless (1996) and Chambless and Hollon (1998) published seminal papers outlining strict methodological requirements for treatment outcome studies before an intervention should be considered empirically supported. A summary of their criteria is presented in Table 1.

Following the establishment of the aforementioned criteria, researchers set out to create listings of empirically supported treatments as well as probably efficacious treatments for various disorders. Brestan and Eyberg (1998) focused their efforts on treatments for children with behaviour problems. They searched through published studies in peer-reviewed journals to find treatments for CP (which they defined as any symptom or synonym listed in the DSM-IV under ODD or CD). Studies evaluating substance abuse or component analyses of treatments were excluded. They specified further methodological criteria in their search for well-established treatments; i.e., studies were required to have a comparison group with random assignment. They also specified a sample size of 12 participants per comparison group if comparing treatment to a no-treatment control group or 25 participants per group to test "equivalence" of two treatments. Moreover, outcome measures had to be reliable (as per Sattler, 1992 or by means of establishment of a reliability coefficient on the study sample itself). Brestan and Eyberg (1998) were able to identify 82 studies that met their inclusion criteria. Results are presented in Table 2.

Using a different form of consensus methodology, Kazdin (1997) engaged experts in the field to select exemplary treatments where palpable progress had been made in controlled studies. He offered no other criteria to demarcate which interventions should and should not be covered in his review but came up with a similar listing of well-established treatments. These included variations on Parent Management Training (Parent-Child Interaction Therapy for ODD, and Incredible Years Parents Training Series). His listing of probably efficacious treatments included a combination of child-directed treatments (e.g., Webster-Stratton's Incredible Years Teachers and Children Training Series, Kazdin's Problem-Solving Skills Training, and Lochman's Anger Control Training), parent- and family-focused treatments (Kazdin's Parent

Management Training and Henggeler's Multi-systemic Family Therapy) as well as the Oregon Multi-dimensional Treatment Foster Care Model.

There are disadvantages to using only narrative reviews to draw broad conclusions regarding a body of empirical literature (Pillemer & Light, 1980). The author must make subjective judgements regarding methodological and theoretical quality when deciding which studies to include in the review and which studies should receive the most emphasis. Such decisions become challenging when there are a large number of studies available for possible inclusion in the review (Lipsey & Wilson, 2001). Narrative reviews have also been criticized for their under-emphasis on the methodological features of studies as explanations for similarities and differences in results and for their general failure to look at moderating variables that might impact their findings (Pillemer & Light, 1980).

A quantitative review or meta-analysis addresses many of these weaknesses. There are generally four advantages to meta-analysis over narrative reviews (Lipsey & Wilson, 2001). First, meta-analysis makes the research summarizing process explicit and transparent. The reader has access to the author's assumptions, procedures, and evidence and can make a more informed decision regarding the merits of the conclusions. Second, encoding of the magnitude and direction of each statistical relationship can provide a summary that is sensitive to findings of different strength across studies and weights their contribution to the overall conclusions accordingly. Third, a meta-analysis is capable of finding effects and relationships that might be obscured by other methods. The systematic coding of study characteristics, such as the nature of the treatment, research design, and measurement procedures, permits an analytically precise means of scrutinizing methodological differences between studies. Fourth, a quantitative review is an organized and systematic way of handling a vast amount of information. Despite these advantages, meta-analyses are not without their weaknesses. The limitations of meta-analysis are

discussed in more detail later (see Summary and Objectives) together with an explanation of how the present study attempted to mitigate them.

In the treatment outcome literature, meta-analyses have been useful not only in helping to establish which treatments work but also how well the treatments work. Cohen (1988) established a convention for appraising the magnitude of effect sizes (ES) such that an $d \leq .2$ was considered small, an $d = .5$ medium and an $d \geq .8$ was large. Meta-analyses also contribute to our understanding of factors that moderate treatment efficacy. The pioneering meta-analysis on child and adolescent psychotherapy was conducted by Casey and Berman (1985). They analysed psychotherapy for a wide range of child and adolescent psychopathologies and reported an overall effect size (ES) of $d = .71$. Behavioural and cognitive-behavioural treatments had significantly larger ESs than client-centred and dynamic approaches to intervention. In terms of treatment characteristics, they found that the use of play techniques did not enhance ES, that there were no differences between group and individual therapy, that the ES was similar whether treatment was administered to parents or directly to children, and that ES was not differentially impacted by therapist education, experience or sex. Child characteristics such as age, intellectual functioning, and school grade did not impact ES but the percentage of male participants in the sample was significantly related to outcome (with more males resulting in smaller ESs). Measures obtained from observers, therapists, parents, and subject performance produced significantly larger effects than those obtained from teachers and children's self-reports.

Since 1985, three more broad based meta-analyses (Skiba and Casey, 1985; Weisz, Weiss, Alicke, & Klotz, 1987; Weisz, Weiss, Han, Granger, & Morton, 1995) have been conducted on the overall efficacy of psychotherapy for child and adolescent disorders, yielding findings similar to Casey and Berman (1985) while utilizing improved methodological techniques and controls. In their review of these meta-analyses, Weisz and Hawley (1998) concluded that empirically tested child treatments, on average, produce substantially positive

effects that are: (1) similar in magnitude to the effects of psychotherapy with adults, (2) relatively specific to the problem targeted in treatment, and (3) relatively lasting in their impact. They noted, however, a need to identify new empirically supported treatments.

A good deal of intervention research has focused specifically on children with CP. Many of these treatments have been well-informed with respect to the literature on the origins and development of CP as well as the risk factors that impact its course. More specifically, targets for intervention have included peer mediation and improved classroom management, purported social information processing deficits in children, social skills, and family relationships and interaction patterns. More than 25 meta-analyses have been conducted on the different types of treatment for children and adolescents with CP including: (1) school-based programs for reducing aggression (Prout & DeMartino, 1986; Stage & Quiroz, 1997; Wilson, Lipsey, & Derzon, 2003), (2) cognitive behavioural treatments for reducing aggression (Durlak, Fuhrman, & Lampman, 1991; Dush, Hirt, & Schroeder, 1989; Sukhodolsky, Kassinove, & Gorman, 2004), (3) behavioural interventions with single-case research designs (Scruggs, Mastropieri, Cook, & Escobar, 1986; Wellen, 1998), (4) play therapy (LeBlanc, 1998), (5) social skills interventions (Beelman, Pfingsten, & Losel, 1994; Denham & Almeida, 1987; Mathur, Kavale, Quinn, Forness, & Rutherford, 1998; Schneider & Byrne, 1985), and (6) family therapy (Hazelrigg, Cooper, & Borduin, 1987). Other meta-analyses have evaluated treatments that target delinquent behaviour in adolescents (Dowden & Andrews, 2003; Izzo & Ross, 1990; Latimer, 2001; Lipsey, 1992; Lipsey & Wilson, 1998; Mayer, Gensheimer, Davidson II, & Gottschalk, 1986; Wilson & Lipsey, 2000; Wilson, Lipsey & Soydan, 2003).

The conclusions of these meta-analyses vary considerably depending on the psychotherapeutic approach taken and the setting in which they were conducted. School-based programs generally resulted in low to medium ESs. However, one exception was behaviour therapy designed to remediate specific and discrete problem behaviours in the classroom using

techniques such as response cost and differential reinforcement, where the ES was found to be large. Cognitive-behavioural approaches to the treatment of CP hovered around the medium range and were found to be smaller than ESs in the corresponding adult treatment outcome literature, a finding that may be explained by the still-developing cognitive abilities of children. Play therapy resulted in medium effects. It is notable that many of the play interventions included in this analysis had a parent component that included teaching parents play techniques and other child management strategies. ESs were moderate for social skills interventions as well as family therapy, but the family therapy analysis was based on a very small number of studies. Programs designed to reduce rates of delinquency, such as group therapy to improve self-esteem and wilderness training programs, have mostly yielded low to negligible ESs.

Despite its status as a well-established treatment for childhood CP, only one meta-analysis has been conducted on PMT for this population. Serketich and Dumas (1996) examined parent training for which intervention procedures had to include instruction in differential reinforcement and/or time-out. They included 26 studies in their analysis that met the following 5 criteria: (1) at least one antisocial behaviour as a target for intervention, (2) preschool- or school-aged children, (3) a comparison group with a sample of children with CP, (4) experimental and comparison groups with at least 5 participants in each, and (5) at least one outcome measure that addressed the child's behaviour. The sample of studies was derived from the published literature and doctoral dissertations. The formula for ES calculation was the difference between the means of the treatment and control groups divided by the standard deviation of the control groups. Where multiple measures of the same outcome construct were used, ESs for each measure were averaged to produce only one ES.

Results indicated that the overall ES for child outcome was $d = .86$. ESs were similar regardless of whether the outcome information was obtained from parents, teachers, or the children themselves. In addition to child outcomes, the study revealed a moderate ES for parental

adjustment at $d = .44$. The age of the child was found to moderate outcome with parent training showing greater effects in older children (samples included preschool and school-aged children, the oldest sample had a mean age of 10.1 years). Methodological characteristics of the studies also impacted outcome such that larger sample sizes were associated with smaller ESs and when ESs were calculated from less accurate statistics (e.g., p values as opposed to means and standard deviations), they tended to be higher.

Although a wide range of interventions exist for the remediation of child and adolescent CP, both qualitative and quantitative reviews are consistent in their endorsement of PMT as one of the most effective treatments.

Parent Management Training

Parent Management Training (PMT) is arguably the best researched psychosocial intervention for children. PMT requires four distinguishing components (Kazdin, 2005): (1) an underlying conceptual framework about how to change social, emotional, and behavioural problems, (2) the application of principles and techniques that follow from the conceptual framework, (3) the development of specific skills in parents through performance-based training, and (4) the use of assessment and evaluation in treatment decision-making. Thus PMT does not include all treatments whereby parents are counselled about their children or taught to interact differently with their children. These four components are outlined in greater detail below.

PMT is based on social learning theory and a model originally outlined by Hanf (1969). It draws on the principles of applied operant conditioning and involves the provision of learning experiences in everyday life to promote behaviour change. Specific skills are taught to parents to build and strengthen parenting competencies including but not limited to child directed play skills, praising prosocial behaviour, monitoring problem behaviour, differential reinforcement of incompatible behaviours, and ignoring or punishing targeted problem behaviour. These skills are developed in parents through performance-based training strategies, including modeling, role

playing and performance feedback (therapists use many of the same techniques to “train” the parents in skills that they will then use with their children, for example, positive reinforcement of successful performance and shaping of desired skills). Given that the goal of treatment is to reduce aberrant child behaviour and increase adaptive functioning, treatment progress and outcome are defined in observable and measurable terms and monitored through systematic data collection.

According to Kazdin (2005), PMT was directly influenced by three historical streams of thought; the operant conditioning theories of B.F. Skinner, applied behaviour analysis (Baer, Wolf, & Risley, 1968), and the coercion theory of Gerald Patterson. Briefly, operant conditioning is a type of learning that accounts for and predicts the impact of environmental events on behaviour. Operant behaviours are those that exert influence on (or operate on) the environment. These behaviours increase or decrease as a function of the environmental events that precede (antecedents) or follow (consequences) them. Based on his laboratory work with animals, Skinner outlined four general principles that later formed the basis of PMT. These principles are: (1) reinforcement, which involves the presentation or removal of an event after a behaviour that increases the probability of that behaviour, (2) punishment, the presentation or removal of an event after a behaviour that decreases the probability of that behaviour, (3) extinction, the withdrawal of an established reinforcing event that decreases the probability of a previously reinforced behaviour, and (4) stimulus control, which involves reinforcement of a behaviour in the presence of one stimulus but not another. Early research showed that these principles of operant conditioning could be used to modify the problem behaviour of children with mental retardation and general psychiatric patients (Kazdin, 2005). Research eventually expanded to demonstrations that these principles could have a broad range of clinical, social, and educational applications, launching a new field of research and practice called applied behaviour analysis (ABA). Generally, ABA strategies focus on reducing specific target behaviours (e.g.,

number of aggressive responses, such as hitting) or increasing them (e.g., number of compliant responses) by rearranging proximal environmental events.

Following from his extensive research program that involved observation of interactions between parents and their aggressive children in the home, Gerald Patterson developed coercion theory to explain the emergence and maintenance of CP in children (as described earlier). He and his colleagues then “packaged” behavioural techniques into a parent training program called “Living with Children” that was designed to disrupt the emergence and maintenance of CP. Patterson and his colleagues evaluated the effects of the program empirically (Patterson, Reid, Jones, & Conger, 1975). Since that initial study, several other behavioural parent training programs have been developed using the same principles but employing variations in the mode of program delivery. Examples of such PMT programs include Parent-Child Interaction Therapy (Eyberg, & Robinson, 1982), Helping the Noncompliant Child (McMahon & Forehand, 2003), Triple P (Sanders, 2003), and COPE (Cunningham, Bremner, & Boyle, 1995). With the large number of studies attesting to its effectiveness, PMT is now considered “best practice” and one of the few empirically validated interventions for children with CP.

A side note regarding the efficacy of PMT concerns its use for ADHD. PMT has not been demonstrated consistently effective in reducing the disruptive behaviour of children presenting with ADHD or in reducing the ADHD symptoms of children with concomitant non-compliance or aggression. However, research demonstrates that children with ADHD who have co-morbid disruptive behaviour disorders and received combined PMT and stimulant medication require less medication and show greater declines in oppositional and aggressive behaviour relative to their peers who receive medication or PMT alone (MTA Cooperative Group, 1999).

PMT Outcome Research

The results of the Serketich and Dumas (1996) meta-analysis supported the overall efficacy of PMT but several limitations were highlighted. Although they reported generalization

of treatment gains to the school setting and improved parent adjustment, these results were considered tentative because the mean ES was based on 10 group comparisons (for school generalization) and 12 group comparisons (for parent adjustment). Moreover, although PMT was found to be superior to no intervention, only four studies in this analysis compared PMT to another treatment and thus any conclusions regarding its superiority as a treatment option were provisional. Further, the long-term durability of the treatment effects could not be established, given that the few studies reporting follow-up did not evaluate beyond one-year post-treatment.

Serketich and Dumas (1996) also suggested using caution in interpreting their findings regarding the moderators of treatment outcome. Their conclusion that older children benefited more from PMT was based on a sample with a limited age range (from preschool to 10 years). It is possible, for example, that age has a curvilinear association with treatment outcome in PMT. Although no associations between outcome and contextual variables (e.g., SES) were found, the range or sample size for some of the variables examined was so restrictive that their importance could not be negated. Serketich and Dumas further hypothesized that the reason why studies with smaller samples had bigger ESs may have been related to the failure of researchers to report attrition information.

Since the Serketich and Dumas (1996) meta-analysis, many more empirical studies on PMT have been published. Treatment effects have now been demonstrated across various cultural, socioeconomic, and age groups. Numerous variations of PMT have been developed with an eye toward increasing its cost effectiveness (e.g., group therapy) or enhancing its efficacy with particularly hard-to-serve families (e.g., provision of concurrent marital therapy). Studies have continued to examine child behaviour change at home and at school and have included observer, parent, teacher, and child reports of change. Some studies have included measures of parent and family functioning and therapeutic gains in these areas have been demonstrated. Clearly, with the plethora of new data available, an updated quantitative review of

the PMT literature is necessary. Such a study could potentially address many of the questions and limitations raised by Serketich and Dumas including investigation of the relative superiority of PMT to its variants, and the extent of generalization and maintenance of treatment effects over the long-term.

From Efficacy to Effectiveness

The great divide that exists between psychotherapy conducted in the research laboratory and psychotherapy conducted in clinical practice has presented a longstanding and enduring challenge to the field of psychology. While researchers have developed a list of well-established or empirically supported treatments that have been rigorously evaluated in clinical trials, clinicians maintain that this research is of little use to them in the “real world” (Hoagwood & Olin, 2002; Kazdin, 2001; Stirman, Crtis-Cristoph, & DeRubeis, 2004). Several authors have enumerated key features of psychotherapy conducted in the lab setting (referred to hereafter as “research therapy”) that might impede its acceptability and dissemination into clinical practice (Weisz, Donenberg, Han, & Weiss, 1995). These key features include: (1) patients who volunteer and are less severely affected by their condition, (2) homogeneous groups, (3) narrow problem foci, (4) treatment conducted in controlled lab settings, (5) therapists with smaller caseloads and special pre-therapy preparation and training, and (6) therapy duration that is fixed and highly structured with adherence to the treatment protocol closely monitored.

Weisz et al. (1995) sought to investigate whether child and adolescent research therapy maintained its effectiveness when carried out in clinical practice. They completed a meta-analysis on studies that defied the aforementioned key features of research therapy. The overall result was that outcomes of clinic therapy were far less positive than the outcomes of research therapy. ES values for clinic therapy ranged from -0.40 to 0.29 whereas *d* values for research therapy ranged from 0.71 to 0.84. Weisz et al. also suggested and tested eight potential hypotheses as to why research therapy may be more effective than clinic therapy. Five of their

hypothesized factors proved to have no association with the poorer outcomes obtained in clinic therapy. These factors included (1) the potential superiority of research therapists over professional clinicians (e.g., smaller case loads), (2) the specialized training of research therapists, (3) poor design and older publication dates of studies on clinic therapy, (4) the narrow focus of treated problems, and (5) the highly structured nature of research therapy. However, the remaining three hypotheses were supported. First, participant diagnostic characteristics were significantly different with research study samples yielding greater ES values because the problems were less severe and more homogeneous. Second, research therapy produced higher ES values because of their propensity to employ behavioural techniques. Finally, although the setting of research therapy, with more resources and more highly controlled environments, also contributed to higher effect sizes, this appeared to be an artifact of the confounding between diagnostic characteristics and the use of behavioural techniques.

Among the limitations of their investigation, Weisz et al. (1995) noted that their sample for clinic therapy was quite small, including only nine studies. Moreover, only studies involving child-directed therapies were included, thereby excluding PMT. The extent to which the findings of Weisz et al. are pertinent to the PMT literature is an as yet unanswered empirical question. It is important to note that many PMT studies have samples of patients who are clinic-referred with loosely and broadly defined behaviour problems and they focus on the reduction of a wide range of CP, which is commensurate with clinical practice. At the same time, much research in PMT involves highly and specifically trained therapists with smaller caseloads. As well, treatment is time limited and highly structured. The differential contribution of these variables to measured PMT outcomes has yet to be established.

Other variables that are specific to PMT may also impact effectiveness including innovations to reduce costs or to increase accessibility to rural populations through the use of telephone consultation and self-administered programs (Gordon & Stanar, 2003). Fortunately,

the current data base of treatment outcome studies is extensive, ranging from traditional highly controlled clinical trials to program evaluations of clinic therapy, providing greater opportunity to answer questions on treatment effectiveness. In addition, the current body of research should enable the identification of research therapy features that are likely to maximize the effectiveness of PMT in all settings.

From Effectiveness to Cost Effectiveness

A core challenge for intervention researchers involves ensuring that the therapies they develop and evaluate are palatable not only to clinicians and families, but also to administrators, insurance companies, and policy makers for whom decision making about acceptable treatments is often strongly influenced by the cost considerations of service delivery. Thus even therapies that have been demonstrated both efficacious in clinical trials and effective in program evaluations are unlikely to enjoy widespread implementation if they are not also economically feasible. While cost evaluation of treatment requires specific information that is not presently available in the treatment outcome literature on PMT (Kazdin, 2005), meta-analysis can still be used to obtain a preliminary estimate of the cost-effectiveness of PMT.

A comprehensive cost evaluation should consider two different cost variables. The first involves evaluation by the consumer of whether the treatment was worth their money, time, and effort (Nelson & Steele, 2006). Recent studies on PMT often incorporate a measure of consumer satisfaction following treatment completion. Most studies indicate that PMT is highly valued by participants and considered worth their time and effort (Kazdin, 2005). Whether PMT is worth the money they spend accessing it is another question and not easily addressed in the current research literature on PMT (participants usually received treatment free of charge or in some cases are charged a small, often reimbursable fee to enhance treatment or homework completion). The other level of evaluation reflects the monetary costs to the system (e.g., stakeholders, public funding sources, and therapists). Data are available on the number of

treatment hours per client in most PMT studies. In a comprehensive cost evaluation, a monetary value would then be assigned to each treatment hour. In this case such assignment is probably ill-advised given that the costs per hour of treatment can vary dramatically across settings and therapist characteristics (e.g., education, experience, profession) and from year to year. However, at a rudimentary level using treatment hour per client as the measure of cost can be informative. For example, does the magnitude of treatment effects change with more hours of treatment? This is important because PMT programs differ in the amount of time families spend in treatment.

Attempts have also been made to reduce the costs associated with PMT by teaching parents in groups or providing them with videotapes and a manual for self-administration at home. In the same vein, costly enhancements have been added to PMT to increase its efficacy in hard-to-serve populations. Meta-analysis will provide information on how such variations in PMT impact treatment outcome.

Moderating Variables that May Contribute to Treatment Outcome

There is a sizable minority of families for whom inadequate outcomes have been documented (Eyberg & Boggs, 1998; Forehand, Middlebrook, Rogers, & Steffe, 1983; Prinz & Miller, 1994; Serketich & Dumas, 1996; Webster-Stratton & Hammond, 1997). Given the tradition of journals to publish only statistically significant results (Stoiber & Kratochwill, 2000), it is likely that these studies represent an underestimate of the negative outcomes obtained in PMT. Treatment can vary in outcome or be differentially effective depending on characteristics of the child, parents or family, as well as the treatment itself. These characteristics are referred to as moderators and researchers have begun to report on them much more diligently in their studies. While many of the Serketich and Dumas (1996) findings related to moderator variables were tentative because of the few studies available for consideration, there may now be enough research available to draw firmer conclusions using meta-analytic approaches.

Various child, parent, family, and societal factors have consistently been shown to diminish responsiveness to treatment in children with CP (Kazdin, 2005). Severity and duration of CP, co-morbidity, reading achievement, and school dysfunction (either social or academic) can negatively impact treatment outcome. Moreover, the differential efficacy of PMT across age groups has yet to be fully clarified. Studies predating 1996 were generally focused on children under the age of 10 years but several studies since have examined the use of PMT in older children and adolescents. While PMT has been shown to reduce offence rates, school behavioural problems, and substance use among youth at risk for serious CP, some have suggested that adolescents respond less well than their younger counterparts and that another treatment modality might be better indicated (Kazdin, 2005; Newcomb & Bentler, 1988). PMT may be particularly challenging with adolescents because they may be out of the home more, less amenable to techniques (e.g., praise, tokens) or influence of parents, and more readily influenced by peers (Newcomb & Bentler, 1988). In terms of parent and family characteristics, parent psychopathology, parent stress, poor family relationships, and adverse parenting practices have been shown to impact a family's ability to take advantage or benefit from PMT (Kazdin, 2005).

Contextual factors such as low family income, socioeconomic status, and poor living accommodations are all associated with less therapeutic change (Kazdin, 2005). Advancing research suggests that these factors may play a role in the parent's ability to adhere to some or all aspects of the intervention. For example, socioeconomic disadvantage, parent psychopathology, and family stress (Kazdin, Mazurick, & Bass, 1993; Kendall, Ronan, & Epps, 1991; Webster-Stratton, 1992; Webster-Stratton & Hammond, 1990) are all correlates of premature termination. Kazdin and his colleagues (Kazdin, Holland, Crowley, 1997) have made considerable progress in elucidating the more proximal factors that could alone or in combination promote dropping out or reduce parental adherence. For example, a proximal factor that may prevent a low-income family from attending a parent group might be the affordability of public transportation.

A more problematic form of non-adherence involves a failure to engage parents and have parents truly participate throughout the treatment process. For example, parents with low SES have less education and may be less able to benefit from didactic portions of PMT (Kazdin, 2005). Similarly, parents with depression may have less energy or drive to apply their newly acquired skills at home. While research is now under way to elucidate the mechanisms through which the aforementioned factors affect treatment outcome, gaps remain in the research with regard to the extent to which the factors influence outcome.

It is perhaps not surprising that the factors that influence treatment outcome overlap to a large extent with those risk factors associated with the emergence, development, and maintenance of CP. While research has demonstrated the association of each individual risk factor with the diverse negative sequelae of CP, many of these risk factors co-occur and interact in complex ways to produce the same and different outcomes in children and adolescents (Gerard & Buehler, 2004). Similarly, with treatment efficacy research, risk factors that have been shown to exert independent influences on treatment outcome also co-occur and interactions between them might be expected to also differentially impact treatment outcome. Cumulative risk is one approach that has been proposed for examining how environmental risk factors work together to influence long-term psychological well-being. While this model has been applied with considerable success in the risk and resiliency literature, it has yet to emerge in the treatment outcome literature.

Cumulative Environmental Risk

The cumulative risk hypothesis states that an accumulation of risk factors can impact developmental outcomes, such that a greater number of risk factors is associated with a greater number or severity of clinical problems (Rutter, 1979; Sameroff, 2000). In order to quantify cumulative risk, researchers have developed indices variously labeled as adversity indices or life disadvantage indices. In the classic Isle of Wight epidemiological study, Rutter (1979) identified

six risk factors that were significantly correlated with childhood psychiatric disorders for inclusion in his index including: (1) severe marital discord, (2) low socioeconomic status, (3) large family size, (4) paternal criminality, (5) maternal mental disorder, and (6) foster placement. While no individual risk factor increased the likelihood of psychiatric disorder, the presence of two risk factors increased the likelihood of disorder by four and four risk factors resulted in a tenfold increase in the risk of disorder. Rutter's research suggests a threshold model of cumulative risk whereby beyond a certain number, the risk factors potentiate each other, resulting in substantially poorer outcomes. Similarly, other studies have found evidence for a *multiplicative* model of cumulative risk with three or four risk factors being the "trigger point" (Biederman, Milberger, Faraone, & Kiely, 1995; Greenberg, Speltz, DeKlyen, & Jones, 2001; Jones, Forehand, Brody, & Armistead, 2002).

In the Rochester Longitudinal Study (Sameroff, 2000), ten risk factors were combined in an index to evaluate their cumulative impact. These risk factors included: (1) history of maternal mental disorder, (2) high maternal anxiety, (3) rigid parental attitudes, beliefs, and values about child development and rearing, (4) observations of few positive parent-child interactions, (5) unskilled occupational stress, (6) low maternal educational status, (7) disadvantaged minority status, (8) being a single parent, (9) stressful life events, and (10) large family size. The findings of this longitudinal investigation revealed that the number of risk factors were associated with both concurrent CP in preschool age children and consecutive CP as well as mental health and academic problems in adolescence (Sameroff, Bartko, Baldwin, Baldwin, & Seifer, 1998). In contrast to the Isle of Wight study, investigations by Sameroff and his colleagues as well as others (Appleyard, Egeland, van Dulmen, & Sroufe, 2005) suggest an *additive* model wherein increasing risk factors result in a relatively steady increase in poor outcomes.

Regardless of whether the effects are additive or multiplicative, the impact of cumulative risk on the development of CP is robust (Appleyard, Egeland, van Dulmen, & Sroufe, 2005;

Gerard & Buehler, 2004). It seems a logical extension that an accumulation of risk factors would also impact on treatment outcome. As described previously, studies involving individual clinical trials of PMT have examined moderators of treatment outcome and found that many of the risk factors implicated in the development of CP also reduce the likelihood of treatment gains. The very nature of PMT means that some of the risk factors comprised in the indices used by Rutter (1979) and Sameroff (2000) are direct targets of treatment (e.g., rigid parental attitudes and child rearing, few positive parent-child interactions), whereas other factors are less amenable to change (e.g., SES, maternal education). Thus the examination of cumulative risk for PMT outcome requires the development of a new index that includes all risk factors associated with CP that are not targets in PMT treatment (and for which data is typically available in the current treatment outcome literature).

SUMMARY AND OBJECTIVES

In summary, narrative reviews have touted PMT as an empirically supported treatment for children with CP. The only meta-analysis in the field, conducted by Serketich and Dumas (1996) also provides support for the efficacy of PMT but is outdated and limited in scope. In the 10 years since the publication of the Serketich and Dumas (1996) meta-analysis, many more empirical studies on PMT have been published. Studies have continued to examine child behaviour change at home and at school and have included observer, parent, teacher, and child reports of change. Some studies have included measures of parent and family functioning. Therapeutic gains in these areas have been reported, enabling an examination of the generalization of treatment gains in CP to other domains of child functioning (e.g., school and peers) and to examine the collateral effects of PMT (i.e., improvement in areas not directly targeted by treatment such as family functioning). In addition, children and their families have been followed-up over a longer period of time. Therefore, the first goal of this study is to investigate the efficacy of PMT for children with CP.

PMT is differentially effective for each child and family and there are numerous factors that may play a role in increasing or diminishing the treatment gains. The factors that influence treatment outcome overlap to a large extent with those risk factors associated with the emergence, development, and maintenance of CP and include child characteristics, family characteristics, and contextual variables. Moreover, these risk factors may work in a cumulative manner such that a greater number of risk factors is associated with a greater number or severity of clinical problems and perhaps a reduced treatment response. Thus, a second goal of this study is to more clearly delineate the variables that moderate treatment outcome and how such variables might interact to influence behaviour change in children.

The focus of the Serketich and Dumas (1996) meta-analysis was on “research therapies”; therapy conducted in the context of a well-controlled randomized trial. Studies have begun to

emerge demonstrating that PMT can also have positive effects when the treatment is implemented more loosely with fewer resources. The present meta-analysis expands on the Serketich and Dumas (1996) by examining PMT effectiveness (as opposed to efficacy) as well as cost effectiveness. The present meta-analysis includes “clinic therapies” (therapy routinely carried out in real-life clinical practice) conducted in the course of a program evaluation (e.g., one-group pretest posttest design or single case designs). With regard to cost-effectiveness, attempts have also been made to reduce the costs associated with PMT by teaching parents in groups or providing them with videotapes and a manual for self-administration at home. In the same vein, costly enhancements have been added to PMT to increase its efficacy in hard-to-serve populations. The third goal of this meta-analysis is to examine the degree to which methodological rigor and variations in PMT impact treatment outcome.

While meta-analysis addresses many of the weaknesses of narrative reviews described previously, they are not without their disadvantages (Lipsey & Wilson, 2001). First, the “apples and oranges” criticism is often used to describe the potential in meta-analysis for use of overly broad categories when averaging across dependent or independent variables. An example involves aggregating all of the outcome data into a unitary measure of improvement or change rather than separating out conceptually different outcomes (e.g., child CP, compliance, prosocial behaviour) or sources providing the outcome data (e.g., parents, teachers, observers). In the present meta-analysis, this problem was circumvented by analyzing conceptually different outcomes separately. The outcomes that are relevant and will be examined in the present meta-analysis are: (1) child CP, (2) child non-compliance, (3) prosocial child behaviour, (4) child social skills, (5) negative parenting, (6) positive parenting, (7) family stress and dynamics, and (8) parent stress and adjustment.

A second criticism is that the representation of individual studies by multiple effect sizes creates non-independence in the data points. Because most treatment outcome studies use a

multi-method multi-informant approach to measuring each outcome construct, a similar technique to that used by Serketich and Dumas (1996) will be used here to minimize non-independence. Specifically, ESs for each measure used to assess the same outcome construct will be averaged so that there is only one ES per construct per study.

Meta-analyses have also been criticised for including studies of differing methodological quality on the premise of “garbage in and garbage out”, whereby the results and conclusions drawn from the analysis are only as good as the data that were analyzed. From a practical standpoint, however, identifying methodologically impeccable studies is not only subjective but might yield an unrepresentative sample of treatment quality, a significant problem when there is a strong need for examples and evaluation of psychotherapy effectiveness. From a statistical standpoint, this criticism is easily overcome by treating methodological variation across studies as an empirical matter (Lipsey & Wilson, 2001). If studies with questionable methodological practices show significantly different results compared to study designs that are more rigorous, they can be excluded or used only with statistical adjustments to correct for their bias. For this dissertation, the range of possible methodological variations that were routinely reported in studies were coded and analyzed (see appendix for a full list of codes).

Finally, studies reporting significant findings are more likely to be published than those that do not, potentially inflating results generated through meta-analysis. This problem was addressed by completing a “file drawer” analysis. First developed by Rosenthal (1984), the file drawer analysis involves the calculation of a Fail Safe N which estimates the number of additional new, filed, or unretrieved studies with non-significant results that would be required to reverse the conclusion drawn from a meta-analysis.

RESEARCH QUESTIONS

Goal 1: Investigate the efficacy and effectiveness of PMT for children with CP

The first goal of this study is to provide an effect size estimate for the efficacy of PMT for children with CP immediately post-treatment and at follow-up. The inclusion of studies employing a range of methodologies will also provide insight into the effectiveness of PMT. In achieving the first goal, several questions are posed:

1. Can a large ES for the efficacy of PMT be replicated in this study?
2. How many new, filed or unretrieved studies averaging null results would be needed to bring the overall combined effect of PMT to a negligible level?
3. Do all sources reporting on treatment outcome (i.e., parents, teachers, experimenters, the children themselves) agree on the extent to which PMT alleviates CP? In other words, is there convergent validity for the efficacy of PMT?
4. What are the long-term outcomes for children and families who participate in PMT?
5. Does methodological rigor impact treatment outcome? Do families participating in randomized trials (i.e., randomized between-group designs) have better outcomes than families in program evaluation studies (e.g., within-group designs)?
6. Does treatment quality impact outcome? Do treatments that provide ongoing training and supervision to their therapist yield the best outcomes for families?

Goal 2: Examination of Variables that Potentially Moderate Treatment Outcome

A second goal of this study is to more clearly delineate the variables that moderate treatment outcome and how such variables might interact to influence behaviour change in children. The literature points toward a number of variables that might influence treatment outcome. However, the ability to investigate some of these potential moderators is limited in some cases by the available data. For the second goal, the following questions are addressed:

1. What child characteristics influence treatment outcome? Specifically, how does age, specificity of the diagnosis, gender, and co-morbidity impact outcome?
2. What family characteristics impact on outcomes for PMT? Do single parents, young parents, and families from minority groups benefit less from PMT? Does father involvement in assessment and treatment improve outcome?
3. What contextual variables impede a child and family's ability to benefit from PMT? (Socioeconomic status was the only variable reported with enough consistency to be included in this meta-analysis.)
4. Do the same risk factors associated with CP act in a cumulative way to reduce the efficacy of PMT?

Goal 3: Evaluation of the cost-effectiveness of PMT

The third goal is to evaluate the cost-effectiveness of PMT. This was achieved by examining treatment characteristics that moderate outcome.

1. What is the time commitment required for PMT to be effective?
2. Do efforts aimed at reducing costs also reduce the magnitude of PMT's efficacy?
3. Are ESs impacted by efforts directed toward generalization and maintenance of treatment effects?
4. Do therapeutic enhancements to PMT yield larger effects?

METHOD

Search and Retrieval of Studies

The initial step in the research process involved comprehensive computerized literature searches of all studies in Psycinfo and Medline with publication dates up to September 2005. Keywords used in these searches included: treatment descriptors (e.g., parent training, family therapy), research descriptors (e.g., outcome, comparison, effect-, efficacy, evaluat-, influence, impact, result-, assess-), target population descriptors (e.g., adolesc-, child-, juvenile-, pre-adolescen-, pre-school-, toddler-, youth-) and target problem descriptors (e.g., acting out, aggress-, anti-social, behavior disorders, disruptive behavior, behavior problems, conduct disorder, criminal behave*r, emotionally disturbed, externali*, juvenile delinquen*, oppositional behaviour, oppositional defiant disorder). In addition, computerized searches of the above mentioned databases using the names of some of the major researchers in this field (e.g., Eyberg, Webster-Stratton, Forehand, Patterson) as search terms were also carried out. Finally, manual searches of the reference sections of relevant qualitative narrative reviews and meta-analyses, as well as all studies meeting eligibility criteria for inclusion in the present meta-analysis were conducted.

These searches yielded several thousand potential articles. The title and abstracts generated through these searches were examined prior to study selection to eliminate studies that clearly did not meet inclusion criteria (see below). As a result of these efforts, 499 studies were identified for possible inclusion in the meta-analysis. Identified studies were retrieved from the library (either online or from the stacks), obtained through interlibrary loan or requested directly from the author.

Eligibility Criteria

Studies were included based on the criteria outlined below:

1. The study was reported in English and involved the evaluation of parent management training (PMT) in the remediation of CP. The researchers either identified their treatment as based in PMT or described in their method an intervention that incorporated all of the components of PMT including: (1) a theoretical framework based on social learning and operant conditioning, (2) training of parents in the use of, at a minimum, positive reinforcement and ignoring or punishing (e.g., time-out) of targeted problem behaviour, (3) the development of specific skills in parents through performance-based training (modeling, role-playing). Studies using other therapeutic techniques in conjunction with PMT, such as child directed play skills, monitoring problem behaviour, or communication training were also eligible, as were studies in which social skills training or other treatments were provided separately and directly to children or training was provided to teachers.
2. The sample included parents of children and adolescents up to 18 years of age.
3. The target behaviour included a minimum of one externalizing behaviour labelled as aggression, noncompliance, temper tantrums, or disruptive behaviour. Studies of children with hyperactivity or ADHD were also included provided these children were also explicitly described as having at least one externalizing behaviour that was the primary target of intervention. Children with autism or mental retardation were excluded.
4. At least one outcome measure in the study addressed the child's behaviour. An exception to this criterion occurred when multiple publications used the same sample base. In these cases, provided at least one article addressed child behaviour change, the other articles were included to obtain evaluations of other outcomes such as parent behaviour change.
5. The study used either of the following research designs:

- a) an experimental or quasi-experimental research design that compared one or more interventions with one or more comparison conditions (i.e., between-group design) and reported both pretest and posttest scores for each group.
- b) a pre-posttest design (i.e., within subject design) in which data were reported before and after intervention on the same subjects including one-group designs and multiple group designs involving different interventions.
- c) a single case design for which pretest and posttest scores (i.e., means and SDs) were available on each participant. Only studies reporting data on three or more participants were included because that is the minimum sample size required for a treatment evaluated using a single case design to be considered possibly efficacious (Chambless & Hollon, 1998).

A total of 75 articles met criteria for inclusion. If studies met the above criteria but did not report sufficient data for statistical analysis, the authors were contacted for their raw data. Of the six authors contacted, two were able to provide the additional necessary data and were included in the meta-analysis and the other four sent their regrets (i.e., inadequate funding or time to gather requested information). The 75 articles in the present meta-analysis generated data on 153 intervention and comparison groups and a combined sample of 3761 children and adolescents.

In some cases, the same data were reported in more than one publication. To ensure that each participant contributed only one observation per outcome construct, the most comprehensive publication was used and any additional published or unpublished reports were used only if they presented unique data.

Coding of Study Reports

A comprehensive coding manual was devised for coding study descriptors (see Appendix). The coding scheme was based on examination of the data available for programs

described in the eligible studies and the coding categories used in other quantitative reviews. Paper-pencil coding was completed by the author and data were then entered into SPSS. Coded study descriptors included (1) bibliographic descriptors (publication type, publication year), (2) research descriptors (referral source, experimental design, assignment to conditions, sample size, attrition), (3) sample descriptors (age of youth, sex of participants, diagnosis, co-morbidity, cultural background, socioeconomic status, family constellation, age of parents), and (4) treatment descriptors (modality, format, setting, therapist education, therapist training, manualization, treatment duration, generalization techniques employed, maintenance techniques employed).

Effect Size Coding.

Most previous quantitative analyses in the treatment of children with CP have included only studies with between group designs, for which effect sizes are calculated using posttest comparisons between groups, because they are considered methodologically stronger than within group designs. However, there is a compelling rationale for including pre-posttest designs in such analyses. Treatment evaluations that are conducted in natural settings often make use of within group designs, while the well-funded randomized controlled studies are conducted in less externally valid settings, such as universities. Incorporation of pre-posttest designs means that routine practice programs are more likely to be included in the meta-analysis, thus ensuring consideration of treatment effects as they occur in everyday clinical practice.

Study findings were coded to represent either the mean reduction in negative outcomes or the mean increase in positive outcomes from pretest to posttest on each outcome variable for each distinct group of participants. This approach allowed for the inclusion of control group designs and pre-posttest designs in the same meta-analysis. Studies with only one group contributed one pretest-posttest mean change effect size for each dependent variable examined, whereas studies with multiple groups contributed an effect size for each group on each outcome

variable. The outcome variables were made conceptually distinct based on the type of behaviour measured as well as the source of data. There were five outcome indicators for child behaviour including child problem behaviour, compliance, school generalization, prosocial behaviour, and social skills. Within each outcome indicator, available information was gathered from mother reports, father reports, observation of children during mother-child interaction, observation of children during father-child interaction, teacher reports, and classroom observation. There were three outcomes indicators of parent behaviour including negative parenting, positive parenting, and parent stress and adjustment. As with the child behaviour indicators, efforts were made to obtain data from mother self-reports, father self-reports and independent observations of each parent while engaged in interaction with their child. As a final outcome indicator, data were collected on family stress and dynamics. Sources of information on this variable included mother report, father report, and observation of family and marital interaction.

The standardized mean gain effect size statistic was used in the present meta-analysis, defined as the difference between the posttest mean and the pretest mean for each subject group divided by the pooled standard deviation (of pretest and posttest values; Lipsey & Wilson, 2001). This effect size is statistically represented as,

$$d_{ij} = \frac{\bar{Y}_{ij} - \bar{X}_{ij}}{S_{ij}}$$

Where X_{ij} is the group pretest mean, Y_{ij} is the group posttest mean, and S is the pooled standard deviation for Group j in Study i .

The pooled standard deviation is calculated as follows:

$$S_{ij} = \frac{S_i^2 (n_i - 1) + S_j^2 (n_j - 1)}{n_i + n_j - 2}$$

Each standardized mean gain effect size was weighted by the inverse of its sampling error variance in all statistical analyses in order to mitigate the impact of sample size; specifically, the inverse of the following:

$$\text{var}(d_{ij}) = \frac{2(1-r_{ij})}{n_{ij}} + \frac{(d_{ij})^2}{2n_{ij}}$$

Computation of these weights required the correlation between the pretest and posttest scores represented in each effect size (r_{ij}), in other words, the test-retest reliability of the outcome measure used. These correlations were obtained from the primary studies when possible, from the manuals of the measures, or from studies on the psychometric properties of the measures. When a correlation could not be found, it was estimated from the mean of the test-retest reliabilities of measures used in other studies for the outcome construct in question. This mean was calculated by applying a Fisher's Z transformation on the available correlation coefficients, averaging across z scores, and then converting the average back to a correlation coefficient. For example, although the Eatontown Problem List was often used as a measure of parent-reported child CP, the test-retest reliability of the measure could not be located. Therefore, it was estimated by taking the mean of the test-retest reliabilities for the Child Behaviour Checklist, the Eyberg Child Behaviour Inventory, the Quay-Peterson Problem Behavior Checklist, as well as all the other measures available from the studies included in this meta-analysis. The mean

available test-retest reliability for the measures comprising each outcome construct is reported in Table 3.

The impact of estimating the test-retest reliability on the Mean ES was examined for each of five key outcome variables chosen (i.e., those to be used in the analysis of independent variables). For each outcome variable, a Mean ES was computed for groups in which the test-retest reliability was largely estimated (from the table above) and compared to groups for which accurate test-retest reliability data were available. There were no significant differences between the Mean ESs on three of the key outcomes which included mother reports of child problem behaviour, independent observations of child problem behaviour, and observed compliance. In contrast, estimating the test-retest reliability did have a significant impact on the Mean ESs for maternal self-reports of negative parenting ($z=-2.87$, $P<.01$) and independent observations of negative parenting in mothers ($z=2.09$, $p<.05$). In both instances, groups for which the test-retest reliability was estimated had significantly lower Mean ESs than groups for which accurate test-retest reliability was available. Thus rather than inflating scores, estimating the test-retest reliability either had no impact or contributed to a more conservative estimate of the Mean ES.

Effect Size Composites

Studies often used multiple measures to evaluate the same outcome construct, for example, the Achenbach Child Behavior Checklist and the Eyberg Child Behavior Inventory, both of which could provide a measure of mother-reported child problem behaviour. In order to ensure independence among the ESs, composites were created so that studies using multiple measures to evaluate the same outcome did not contribute more than one ES for each outcome construct. This controlled for the possible undue influence of successful studies contributing more than one ES. The composites were created by averaging the weighted d -values of the all the measures within a given outcome construct.

Missing Effect Sizes and Outliers

When standard deviations were not available, which occurred in only a small number of cases, an attempt was made to estimate the effect size by procedures outlined in Lipsey and Wilson (2001). For example, with means and the paired t-test value, the pre-post test correlation was estimated (as above) and the SDs were derived from the t-test formula.

When results were reported as non-significant without the relevant scores given in the study report, then the ES was coded as zero as per Rosenthal (1984). While it has been recommended that the mean ES of non-significant results reported within the dataset be used as a substitute for missing values (Schneider, Atkinson, & Tardif, 2001), non-significant findings were relatively rare in this literature as were missing values. Therefore it was felt that Rosenthal's method provided a more conservative method, rather than substituting a mean value obtained from a very small number of studies. Results reported as significant in the study report (e.g., a significant F-test) were replaced with the Mean ES for that outcome construct.

A thorough examination of outliers (i.e., composite ES (or d) values exceeding three standard deviations above or below the mean) was conducted to ascertain the reason for their deviancy. Following this examination, some scores were eliminated (e.g., incorrectly reported) or re-entered (e.g., transcription errors). When no apparent reason could be found for the outlier, the value was recoded to a less extreme score (i.e., within three standard deviations of the mean). This procedure enabled outliers to become more representative of the population while at the same time preventing the loss of any data.

Mean Effect Size and Homogeneity Analysis

After the individual ESs and/or composites were calculated, a mean ES for the effect of PMT for each outcome construct was generated using a macro for SPSS created by Lipsey and Wilson (2001). In addition, a mean ES was also calculated for the comparison groups. Waiting

list, no treatment, and attention placebo conditions were considered equivalent. It has been established in previous meta-analyses (Casey & Berman, 1985; Serketich & Dumas, 1996) that these three types of comparisons groups yield similar ES values. Although some studies used an alternative treatment comparison, they were few in number and a comparison of PMT with other treatments was considered beyond the scope of this meta-analysis. The interested reader is referred to the numerous meta-analyses on the various alternative treatments for child CP (e.g., Denham & Almeida, 1987; Scruggs, Mastropieri, Cook, & Escobar, 1986; Sukhodolsky, Kassinove, & Gorman, 2004; Wilson, Lipsey, & Derzon, 2003).

In addition to evaluating the gains made from pre to post treatment, the d statistic was also used for calculating maintenance of treatment gains at six months, at one year, and beyond one year. Studies reporting multiple follow-up points were included in each follow-up analysis. The mean ES was calculated using pretest and follow-up data to determine the degree to which children and adolescents were improved at follow-up. In addition, the mean ES was calculated using posttest and follow-up data to evaluate whether children and adolescents stabilized or continued to improve after intervention was terminated.

The macro used to calculate the mean ES also provided the confidence interval for the mean ES. The confidence interval is the range within which the population mean is likely to fall given the observed data. This range or distribution of ES values enables the meta-analyst to estimate the population mean with a significance test. If the 95% confidence interval does not include zero, it may be concluded that there is a significant effect across studies.

After computing the mean ES and its confidence interval, the homogeneity of the ds was examined to determine whether the collection of studies could be adequately described with a single ES. A homogeneity statistic, Q , was calculated using the same SPSS macro. When the Q is significant, the ds are not homogeneous (i.e., the null hypothesis is rejected) indicating differences between studies over and above subject level sampling error alone. These differences

might be accounted for by variations in procedures or methodological factors, as examples (i.e., study-level sampling error or moderators). When the ESs are not homogeneous, Lipsey and Wilson (2001) recommend that a random effects model or mixed model (that assumes both random and systematic error variance at the study level) be used in conducting the meta-analysis. An alternative is a fixed-effects model, but this approach assumes homogeneity of variance (i.e., a non-significant Q statistic), and this assumption rarely holds true (Lipsey & Wilson, 2001). For the present study, the maximum likelihood procedure for calculating a mixed effects model was used because it is considered to be most accurate (Lipsey & Wilson, 2001).

Independent Variable Analysis

Data were analyzed using SPSS and macros developed by Lipsey and Wilson (2001). A weighted regression analysis was used to evaluate the moderator effects of continuous and discrete variables. In some instances, an analogue to the ANOVA for weighted effects was used to examine the moderator effects of categorical variables. As described above, a mixed effects model (maximum likelihood estimate) was applied to both statistical paradigms.

"File Drawer" Analysis

A well-documented bias exists in the literature such that studies are more likely to be published if they report significant findings (Rosenthal, 1984). This bias could artificially inflate the mean ES. The first guard against this bias is to perform a thorough search for studies. Another means of ensuring confidence in meta-analytic findings is to perform a "file drawer" analysis that involves calculating the number of new, filed or unretrieved studies, averaging null results that would have to exist to bring the mean ES to some negligible level (Orwin, 1983). Statistically, the idea to determine how many "lost" studies (N) must exist to bring mean d_k down

to mean d_c (the critical value for mean d) such that:

$$\text{mean } d_k = \sum d_k / k \text{ where } k \text{ is the number of studies}$$

$$\text{mean } d_c = \sum d_k / k + N$$

$$N = k \text{ mean } d_k / \text{mean } d_c - k$$

$$N = k(\text{mean } d_k / \text{mean } d_c - 1)$$

Reliability Analysis

In order to assess coder reliability, 20% of studies were randomly selected and recoded independently by a second coder. The primary coder was the author, who designed the coding system and was extensively trained in the use of such systems. In contrast, the second coder was relatively inexperienced with the use of coding systems. A comprehensive and detailed coding manual was developed. The second coder was provided with extensive training that involved coding upwards of 20 studies (not included in the reliability analysis) with discussion and feedback provided throughout. Inter-coder agreement was calculated separately for each variable in the coding system. The reliability for all of the coding descriptors was adequate (Sattler, 1992) with kappas for categorical items ranging from .80 (homework, miscellaneous generalization techniques) to 1.00 (experimental design, specificity of diagnosis, and phone consultation). Inter-coder correlations using Pearson coefficients for continuous variables were all above .98, with the exception of ratings for percent father involvement ($r=.82$).

Adequate inter-coder agreement was not achieved for therapist education and this variable was excluded from the moderator analysis. Given that the vast majority of programs utilized a manual or a published book to guide treatment, manualization was also excluded from the analysis as a potential moderator.

Effect size data involved transcribing statistical data from study reports into the database.

All data entry was completed by the author. Six months after initial data entry, each data point was double checked by the author and errors were corrected accordingly.

RESULTS

The literature search procedure yielded data from 80 studies; however, many studies compared two or more groups. Therefore, this meta-analysis aggregated data from 119 intervention groups comprising 3325 individual youth and 42 control groups or 1645 individual youth. There were 461 standardized mean gain effect sizes representing pretest to posttest change on measures of child CP. Hundreds of additional effect sizes were calculated for the remaining outcome variables including child prosocial behaviour, child social skills, child compliance, positive and negative parenting practices, parent stress and adjustment, and family stress and dynamics. Follow-up data were available from 35 studies including 51 intervention groups, but only two untreated control groups (most comparison groups were waitlist controls and thus participants entered into treatment immediately after providing data at post-measurements).

Attrition rates were reported in 94 of the 119 treatment groups and averaged 16% while dropout rates were 13.3% for the 31 control groups providing data on this variable. Further attrition occurred between post-treatment and various follow-up points. An additional 9.4% of families dropped out at one to five month follow-up, 13% from post-treatment to 6 months, 7.8% at one year, and 31.4% at follow-up extending beyond one year.

Results will be presented in four sections: (1) a description of the sample characteristics of the included studies, (2) an overall effect size analysis of weighted outcomes for each of the outcome variables, (3) an analysis of the potential moderating variables, and (4) an examination of cost-effectiveness.

Demographic Composition of the Samples in the Meta-Analysis

The demographic composition of the samples included in this meta-analysis is summarized in Table 4. The frequencies shown in the table are based on the number of samples generating pre-posttest effect sizes, not on the number of studies (e.g., some studies had more

than one group per category). Characteristics of the treatment samples and comparison samples are shown separately.

The overall mean age of youth included in this study across both intervention and control groups was 6.3 years. While most studies examined the effects of PMT on preschool aged or school aged children, ages ranged from a mean of 2.4 years to a mean of 14.2 years. Most samples had a mix of boys and girls, although most were also disproportionate boys to girls. Of the children treated with PMT, 73.7% were boys. Similarly, 75.8% of children participating in the control samples were boys. The higher proportion of male participants in PMT is consistent with epidemiological data on the high prevalence rates of CP in boys.

While PMT has been established as an efficacious treatment for children with ODD, more than two thirds of the samples examined involved children without a formal DSM-IV diagnosis and very little data were available on co-morbidity, in particular ADHD. Investigators reported co-morbid ADHD as a proportion of the sample for only 16 of the 119 treatment groups. In these 16 groups, approximately half of the sample was dually diagnosed with CP and ADHD. Similarly, researchers reported co-morbid ADHD for only 4 of 42 control groups, with about 89% of the sample dually diagnosed.

Also presented in Table 4 are the family and contextual characteristics of the samples included in this meta-analysis. In general the reporting of these data was sparse across studies. In terms of ethnic diversity, investigators reported the racial makeup of their samples for only 40.3% and 59.6% of treatment and control groups, respectively. Given the limited data and the need to create a variable that could be coded in a consistent manner, it was necessary to collapse the available data into a new variable, called minority status, that represented the proportion of individuals in each sample that would be considered part of the racial minority for the country in which the study was conducted. PMT was conducted largely on participants from the United States and Australia. The two studies conducted in Hong Kong included only Chinese

participants. The treatment and control group samples consisted of, on average, 36.9% and 40.4% single parent households, respectively. Finally, the only contextual variable that was reported with any consistency was socioeconomic status (SES). However, the way in which data on SES was reported varied greatly across studies with some using indices (e.g., Hollingshead Four Factor Index) and some using annual income, as examples. Therefore, a criterion was set to establish the proportion of each sample in which participants would be considered impoverished. The criterion was based on 2004 American standards in which a family of four with a yearly income of \$19,307 or less was considered poor (U.S. Census Bureau News, August 30, 2005) and prorated based on the year of the study using the Consumer Price Index Conversion Factors. The data revealed that about 15% of treatment groups and 21% of control groups had samples in which over 50% of the families would be considered impoverished.

Characteristics of PMT Programs in the Meta-Analysis

The characteristics of the treatment groups included in this meta-analysis are summarized in Table 5. As with the sample characteristics described above, the frequencies shown in the table are based on the number of samples generating pre-posttest effect sizes. The vast majority of studies examined a basic form of PMT, while add-on components (e.g., marital therapy, child therapy, and teacher training) were only occasionally evaluated for their potential to enhance the effects of PMT. Another recent trend to reduce costs and extend PMT to rural communities involves the use of self-administered PMT. For these programs, parents watch videos and complete workbooks at home over a period of several weeks, without guidance from a therapist. The control groups consisted of waitlist comparisons (n=29) as well as samples that received nothing (n=8), minimal contact (n=3), or an attention placebo (n=2). A comparison of PMT to other treatments was beyond the scope of this meta-analysis; however, for descriptive purposes, six studies in this meta-analysis did use an alternative treatment comparison group while two others used a “treatment as usual” comparison.

Treatment setting and therapist education were not included in any of the statistical analyses because it was not possible to obtain reliability on these codes; the information provided in the studies was too vague. The amount of training and supervision received by therapists was coded and is presented in Table 5 (the nine samples coded as “not applicable” for this variable completed self-administered PMT). Training and supervision were coded hierarchically such that each study was placed in the highest possible category with previous generic training being the poorest form of training and supervision and the reporting of integrity scores from observational supervision being of highest quality.

Data were available for numerous strategies designed to enhance generalization of treatment effects. The degree to which PMT programs assigned homework, provided outreach (i.e., home visits) or phone consultation, and included fathers or children directly in treatment is indicated in Table 5. In terms of maintenance strategies, outreach, phone consultation, and booster sessions occurring after the post treatment assessment were examined. Only booster sessions emerged as a strategy that was reported with any frequency.

Methodological Characteristics of the Studies in the Meta-Analysis

The methodological characteristics of the studies are presented in Table 6. The N and Percent categories represent the number of samples derived from studies with a given methodological characteristic.

Goal 1: Investigate the efficacy and effectiveness of PMT for children with CP

1. Can a large ES for the efficacy of PMT be replicated in this study?

In the present meta-analysis, a Mean ES was calculated for each source providing data on each outcome construct. Thus, for the construct of child CP, five Mean ESs were calculated, one for each source, including mother-reported, father-reported, observation of mother-child interaction, observation of father-child interaction, and observed compliance. Although it is generally preferable to have an omnibus test of all the data available for each outcome construct

to help reduce Type 1 error, with a significance level set at .05 for subsequent comparisons, this was not done for the present meta-analysis. The primary reason for deviating from typical statistical methodology was that merging data to create a single overall ES would require averaging across non-independent observations. For example, mother-reported child CP and father-reported child CP are not independent, given that both parents are living in the same home and providing information using the same measure on the same child. Without an omnibus test and in order to mitigate the impact of performing a large number of statistical analyses (which usually results in increased Type I error), findings were only considered significant if they reached a p value of .01 or less. Findings will be presented in terms of trends if the p value reached .05.

The weighted Mean ES value and respective confidence interval are presented for each outcome variable in Table 7. A Mean ES could not be calculated for some outcomes because there was only one group (or in some instances no groups) comprising the sample. For the comparison groups, these outcomes included father-reported positive parenting, observation of family stress and dynamics, father-reported social skills, and observation of child behaviour in the classroom, and for the treatment groups, father-reported positive parenting. Given that the assumptions required for parametric statistical analyses were usually not satisfied, in particular, normality of the sample distribution, non-parametric Mann-Whitney U tests were used to evaluate whether the intervention groups and comparison groups differed significantly from one another. When the data for an outcome variable was based on only two groups, no further analysis was undertaken because two observations for a given construct were not considered sufficient to produce reliable findings.

Child Problem Behaviour and Negative Parenting Practices

A primary aim of PMT is to reduce child CP, in particular aggressive, disruptive, and oppositional behaviour. On three of the four outcome variables examining child CP (see Table

7), the intervention groups had significantly larger ESs and thus significantly improved child CP, relative to the comparison groups. Similarly, a trend in the same direction was obtained for observation of father-child interaction, ($z=-2.11$, $p=.035$). Observed compliance was not analyzed because there were only two groups in the comparison group dataset.

A second primary target of PMT is to reduce negative and coercive parenting practices. This was consistently accomplished regardless of the source of the information; negative parenting practices as rated by mother self-reports ($z=-4.23$, $p<.01$) or independent observations during mother-child interactions ($z=-3.51$, $p<.01$) showed significantly greater reductions in the PMT groups as compared to the comparison groups. Similarly, fathers whose families participated in PMT reported significantly greater decreases in their own negative parenting ($z=-2.37$, $p=.018$) relative to those fathers in the comparison groups as did independent observers of father-child interactions ($z=-2.64$, $p<.01$).

Prosocial Child Behaviour and Positive Parenting Practices

In addition to effecting change on negative behaviours directly targeted in treatment, many positive collateral effects of treatment might also be expected as the parent-child relationship begins to improve. PMT provides instruction around promoting positive parent and child behaviour; however, this did not appear to translate into treatment effects with one exception, observed mother behaviour (see Table 7). Child prosocial behaviour, as rated by mother or as observed by independent coders of mother-child interactions, was not significantly improved with PMT. Again, it was not possible to compare groups on observed father-child interactions as there was only one group in the comparison group sample and thus not enough data to calculate a Mean ES. On self-report measures of positive parenting practices, mothers who received PMT did not identify themselves as having adopted a more positive parenting style relative to those in the comparison groups. In contrast, independent observers who coded positive parenting in mothers before and after PMT did notice significant improvements ($Z=-$

3.203, $p < .01$) compared with mothers who did not receive PMT. There were no significant differences in self-reported or observed positive parenting behaviour of fathers in the PMT groups compared to fathers in the comparison groups.

Generalization to Other Domains of Child Functioning

Given that PMT directly targets child problem behaviour, one might anticipate that gains in child CP might generalize to other domains of functioning; however, this was often not the case. The gains made in PMT did not impress as generalizing to the school setting or peer interactions (see Table 7). For teacher reported child CP, the ES was only small to medium with a trend toward higher ESs for treatment groups relative to comparison groups ($z = -1.98$, $p = .048$). It was not possible to compare groups on classroom observation as there was only one group in the comparison group sample and thus not enough data to calculate a Mean ES. For social skills, there was a trend for mother-reported changes in child social skills to be higher for the treatment groups (-2.45 , $p = .014$). Independent observation of the children with peers and teacher reports of social skills were not compared due to the small sample size.

Collateral Effects of PMT on Parent and Family Functioning

Given that parents benefit from improved child behaviour and a new and effective parenting style after PMT, one might expect that they would experience less stress and adjustment and improved family dynamics. This finding was supported for mothers; PMT had a significant and positive impact on their stress and adjustment ($z = -4.31$, $p < .01$). In contrast, fathers did not report any changes in their mental health as a result of their family having participated in PMT. There were not enough data to evaluate whether independent observers noted changes in family stress and dynamics with PMT. There was a trend for mothers to report improvements with treatment ($z = -2.04$, $p = .041$), although data were insufficient to perform the same comparison with fathers.

2. *How many new, filed or unretrieved studies averaging null results would be needed to bring the overall combined effect of PMT to a negligible level?*

Although many outcome variables were generated in the present meta-analysis to evaluate the efficacy of PMT, two were of primary concern. The first involved changes in child behaviour, including child CP and child compliance. Difficulties in these areas were typically the impetus for the initial referral. The second outcome variable of primary concern was change in negative parenting, because in the PMT model coercive parenting is thought to underlie (in part) and maintain child CP and is directly targeted in treatment. Given that many measures of child CP, compliance, and negative parenting from several sources were reported in the studies included in this meta-analysis, several Fail Safe Ns were calculated on the crucial datasets. For mother-reported child CP, the Fail Safe N was 93. Thus, 93 PMT groups averaging negligible improvement would be needed to bring the overall ES from large ($d=.92$) to small ($d = .20$). For observational data, the Fail Safe N was estimated at 37 for child CP and 29 for child compliance. With respect to mother self-reports of negative parenting, 27 PMT groups averaging negligible improvement would be required to bring the overall ES from medium-large ($d=.70$) to small ($d=.2$), while the Fail Safe N for observation of negative maternal parenting practices is 23.

3. *Do all sources reporting on treatment outcome (i.e., parents, teachers, experimenters, the children themselves) agree on the extent to which PMT alleviates CP? In other words, is there convergent validity for the efficacy of PMT?*

The non-parametric Kruskal Wallace test was used to examine this question because of the unequal sample sizes. The test yielded a significant result ($X^2 = 30.04$, $p < .01$) indicating that mothers, fathers, teachers, and independent observers had significantly different ratings of child CP change. A series of Mann-Whitney U tests were undertaken to evaluate conceptually important differences between pairs of raters. Both mothers' and fathers' ratings of change in child CP were significantly higher than those obtained from independent observers ($z = -3.57$,

$p < .01$ and $z = -2.94$, $p < .01$, respectively). While mother and father ratings did not differ from one another, they were significantly higher than teacher ratings of changes in child CP ($z = -3.59$, $p < .01$ and $z = -3.74$, $p < .01$, respectively).

4. *What are the long-term outcomes for children and families who participate in PMT?*

The follow-up data were divided into three time points: 1 to 6 months, 1 year, and more than 1 year, with data from each time point presented separately in Tables 8 through 10. In some cases, the same sample of participants were represented at more than one time point, for example, if a study provided follow-up data at 6 months and 1 year. In light of the fact that such data were not independent, the Mean ESs across the three follow-up points were not compared statistically.

As with the Mean ES analysis described previously, an omnibus test of the follow-up data was not performed. While a repeated measures regression analysis that co-varied pretest scores, posttest scores and time to follow-up was considered, this was not deemed possible given that ESs were composites and involved an aggregation of data from various measures, each of which had a difference pretest and/or posttest score.

Given these statistical limitations, follow-up data were examined descriptively to evaluate whether there was maintenance of treatment effects (i.e., a d statistic composed of pretest scores and follow-up scores) and to explore whether children and their parents continued to show gains following treatment termination (i.e., a d statistic composed of posttest scores and follow-up scores).

Child CP and Negative Parenting Practices

For mother-reported and father-reported child CP, ESs based on pretest to follow-up indicate that treatment gains were maintained at 6 months (see Table 8) and one year (see Table 9) at a level commensurate with the ESs reported at post-treatment. Parent-reported follow-up data beyond one year showed some declines but were still significant and within the medium

range (see Table 10). According to independent observers, children continued to improve and may have made additional medium sized gains after treatment termination at one year follow-up (as measured by a *d* statistic composed of post treatment and follow-up scores; see Table 9).

For negative parenting, similar to the pattern obtained at post-treatment, gains from pre to follow-up were of medium to large size for mother self-reported negative parenting practices at 6 months (see Table 8) and one year (see Table 9). Independent observers reported more modest gains yet still within the medium range. While father-reported negative parenting indicated maintenance of gains at six months (see Table 8), the Mean ES at 1 year (see Table 9) was only in the small-medium range. In contrast to the post treatment data, independent observations of father behaviour showed no maintenance of gains at either 6 months (see Table 8) or one year (see Table 9).

Prosocial Child Behaviour and Positive Parenting Practices

An examination of whether the positive collateral effects of treatment were maintained was also undertaken. For those findings that are interpretable ($N \geq 3$), ESs were maintained and stable at follow-up for prosocial child behaviour. The exception is the large ES for mother-reported gains at 1 year follow-up on this construct (see Table 9). However, it is notable that two of the treatment groups comprising this sample demonstrated very large ESs (over 1.0) and had a greater impact on the Mean ES in the follow-up dataset compared to the post-treatment dataset because of the small sample size in the former. Again results for positive parenting were similar to those obtained at treatment termination with independent observations of mothers showing medium to large Mean ESs at 6 months (see Table 8) and 1 year follow-up (see Table 9) but no continued improvement. In the treatment groups reporting follow-up data at 6 months for fathers, gains did not appear to be maintained (see Table 8). At one year, the data are consistent with expectations based on post-treatment data with a small to medium ES indicated. There seemed to be a small decrease in gains in positive parenting from post-treatment to follow-up when fathers

were observed with their children at 6 months (see Table 8) and with their mothers at 1 year (see Table 9).

Generalization to Other Domains of Child Functioning

With regard to continued generalization of treatment effects to other domains of functioning, teachers reported relatively small gains from pretreatment to one year follow-up and this is consistent with the outcome data obtained at treatment termination (see Table 9). Analyses of social skills data revealed a surprising finding; although treatment gains were maintained at one year (see Table 9) and beyond (see Table 10) with Mean ESs similar to those obtained at treatment termination, data reported at 6 months (see Table 8) did not show a significant treatment effect. Continued improvement in social skills after treatment did not occur, as evidenced by the negligible Mean ES obtained from post to follow-up.

Collateral Effects of PMT on Parent and Family Functioning

In terms of parent stress and adjustment, gains in mother self-reported stress and adjustment revealed maintenance of gains obtained in PMT with medium sized Mean ESs reported at each follow-up point. Mean ESs for father self-reported stress and adjustment were similar to those obtained at treatment termination (see Tables 8 and 9). Continued improvement post-treatment was not observed for either mothers or fathers.

Finally, for mother-reported family stress and adjustment, results were consistent with those at treatment terminations with ESs in the small to medium range. Of particular interest is the father-reported data for which a delayed effect of treatment was observed. Fathers did not report any change at post-treatment but small to medium gains were indicated at 6 months (see Table 8) and 1 year (see Table 9). While gains were maintained, continued improvement was not evidenced in the data (see Table 10).

5. *Does methodological rigor impact treatment outcome? Do families participating in randomized trials (i.e., randomized between-group designs) have better outcomes than families in program evaluation studies (e.g., within-group designs)?*

With respect to the rigor of the research designs from which the treatment groups were derived, the analogue ANOVA revealed that assignment to conditions moderated outcome but only for observations of child CP ($Q=9.08$, $p=.01$). The significant within-group Q statistic suggests that moderators other than the rigor of the research design may account for some of the unexplained variability in the model. Groups with participants assigned by convenience demonstrated larger ESs than groups with participants assigned at random, the latter being considered the stronger research design. Given that only a few studies assigned participants based on need or choice, it was not possible to evaluate whether this type of assignment impacted the magnitude of ESs.

6. *Does treatment quality impact outcome? Do treatments that provide ongoing training and supervision to their therapist yield the best outcomes for families?*

An analogue ANOVA was used to evaluate whether treatment quality (as measured by the training and supervision received by therapists) was associated with treatment outcome. For observations of child CP, treatment groups in which therapists received ongoing supervision (either observational or didactic) had larger ESs than groups in which only initial training was provided ($Q=9.05$, $p<.05$). However, the within-group Q statistic was significant suggesting that additional variance might be accounted for by other moderators. No other significant findings emerged.

Goal 2: Examination of Variables that Potentially Moderate Treatment Outcome

The homogeneity of ESs was examined for each outcome variable. Table 11 provides the extensive list of outcome variables yielding a significant Q statistic ($p<.01$). A significant Q statistic implies that characteristics varied across studies and had a significant impact on the

magnitude of the ESs reported for the treatment or comparison groups. The ESs were found to be homogeneous for many of the outcome variables. Typically, Q statistics representing outcomes for comparison groups or outcomes with a low number of ESs comprising the Mean ES were not significant.

An examination of potential moderators of treatment efficacy was undertaken on only three outcome constructs. Child CP and compliance were chosen as two of the outcome variables of interest because the main purpose of PMT is to reduce CP (i.e., problem behaviours such as non-compliance and disruptiveness are directly targeted). Similarly, the other outcome examined with respect to moderators was change in negative parent behaviour, as coercive parenting forms the basis of the theory for why PMT is effective and negative parenting behaviours are directly addressed in treatment. Other changes in child behaviour (e.g., increases in prosocial behaviour) were considered to be collateral effects of treatment. While data on each outcome construct were available from multiple sources, only Mean ESs with a significant Q statistic were analyzed because ES values within those samples would be expected to vary as a function of methodological, sample, or treatment characteristics. Given the relatively little data obtained from fathers, the fact that father parenting practices were rarely targeted directly in treatment, and the earlier finding that mother data and father data were not significantly different, only mother data and data obtained from independent observations of mother-child interactions were included as outcomes in the moderator analysis.

1. What child characteristics influence treatment outcome? Specifically, how does age, specificity of the diagnosis, gender, and co-morbidity impact outcome?

An analogue regression model (Lipsey & Wilson, 2001) that included mean age, diagnostic specificity, and the percentage of males comprising the sample as independent variables was able to explain significant variability in the effect sizes for mother-reported child CP change ($Q = 11.81, p < .01$). A non-significant sum-of squares residual shows that the

unexplained variability is no greater than would be expected from sampling error alone. Age ($z = -2.74, p < .05$) and the proportion of male children in the sample ($z = 2.21, p < .05$) contributed significantly to the model, whereas diagnostic specificity did not. More specifically, younger children and samples with a greater proportion of male participants had larger effect sizes. In terms of observational data, the same model yielded the same pattern of findings for compliance ($Q = 17.69, p < .01$), while results were not significant for observations of child CP.

With respect to negative parenting, the regression model was significant for mother self-reports ($Q = 7.82, p < .05$) with mothers of younger children showing a trend toward larger ESs. A non-significant sum-of squares residual shows that the unexplained variability is no greater than would be expected from sampling error alone. The model using observations of mother behaviour during mother-child interaction as the outcome was not significant.

ADHD co-morbidity was analyzed separately using an analogue regression on only the small number of studies reporting this information ($N=16$). Co-morbid ADHD significantly moderated the magnitude of ESs for compliance data ($Q=13.60, P<.01$) and mother-reported child CP ($Q= 5.53, p<.05$) in that samples having a greater proportion of children with ADHD also had larger ESs. For both of these analyses, a non-significant sum-of squares residual was obtained. No significant findings were obtained for observed child CP and there was not sufficient outcome data for negative parenting practices to be similarly analyzed.

2. *What family characteristics impact on outcomes for PMT? Do single parents and families from minority groups benefit less from PMT? Does father involvement in assessment and treatment improve outcome?*

Although the analogue regression was significant for observer ratings of child CP and compliance ($Q=12.07, p<.01$ and $Q=10.14, p<.01$, respectively), only minority status significantly predicted outcome at $p<.05$ and only for observed child CP, with higher ESs in samples with a larger proportion of families from minority groups. The sum-of squares residual

was not significant in either case. The regression model with mother-reported child CP as the outcome was not significant.

When changes in self-reported coercive parenting practices were examined as the outcome, the regression model was significant ($Q=68.22$, $p<.01$). The percentage of single parents in the sample explained significant variability in the model ($z=-2.26$, $p<.05$). Samples with a higher proportion of single mothers showed smaller effect sizes than those with partners or spouses sharing the task of caregiving. The sum-of squares residual was not significant. Negative parenting as rated by independent observers was not significantly moderated by the percentage of minority families or single parents comprising the samples.

The impact of father involvement was analyzed using the analogue ANOVA. Treatment samples were grouped depending on the percentage of father involvement. No significant findings were indicated for father involvement with regard to child behaviour outcomes. However, father involvement did significantly impact negative parenting ESs for both mother self-report ($Q=23.67$, $p<.01$) and independent observations of mother behaviour ($Q=9.49$, $p<.01$), although the direction of the effect was different for each outcome. While observations of mother behaviour showed greater improvements in the absence of father involvement, self-reported improvement in parenting practices showed improvement at the extremes, with samples of women having negligible support from a spouse and samples having upwards of 75% father involvement showing the most dramatic changes in ES. For the analogue ANOVA, a non-significant within-group Q statistic shows that the unexplained variability is no greater than would be expected from sampling error alone, as was the case for the above analyses.

3. What contextual variables impede a child and family's ability to benefit from PMT?

Socioeconomic status was the only variable reported with enough consistency to be included in this meta-analysis. For observations of child behaviour during mother-child interaction, the analogue regression model was significant ($Q=3.09$, $p<.01$) such that samples with a greater

proportion of impoverished families had higher ESs. An opposite and significant pattern was observed for self-reported negative parenting practices ($Q=6.77$, $p<.01$) in that samples that were not impoverished showed greater improvements. Again sum-of squares residuals were not significant. No significant findings were indicated for mother-reported child CP, observed compliance, or observations of negative parenting.

To rule out the possibility that children from impoverished families had lower pre-treatment test scores and thus more room to improve with PMT, SES and pre-treatment scores were analysed. Only studies reporting Eyberg Child Behaviour Inventory (ECBI) scores or Child Behaviour Checklist (CBCL) scores were included in this analysis. The pre-treatment scores obtained on either of these measures were then correlated with the ratings each sample received for the proportion of impoverished families represented within them. These two variables were not significantly correlated.

4. Do the same risk factors associated with CP act in a cumulative way to reduce the efficacy of PMT?

No significant findings emerged.

Goal 3: Evaluation of the cost-effectiveness of PMT

To evaluate questions of cost effectiveness, only groups receiving PMT alone were included in the analysis except for the question examining whether PMT enhancements improved outcomes.

1. What is the time commitment required for PMT to be effective?

Time commitment was as low as 3 hours per family and as high as 46 hours per family. While no significant differences were found, it is important to note that “treatment hours” is not a clean measure of treatment intensity. For example, some families received a total of 3 hours of face-to-face contact over several weeks but the contact involved performance-based bug-in-the-ear procedures and intense observation through one way mirror. Some treatment lasting 40 hours

may have involved many hours of discussion and many fewer hours of performance-based training. Attendance was not examined given the paucity of reported data and the restricted variability in the data that were available.

PMT interventions were then analyzed by research team. For example, all groups undergoing Webster-Stratton's Incredible Years Parenting Program were compared to those receiving Sanders' Triple P Parenting Program. There were no significant differences between groups for mother-reported child CP or observed compliance; however, observations of child CP did yield significant findings ($Q=11.36$, $p<.05$). Participants completing Patterson's Living with Children or Forehand's The Noncompliant Child had the highest Mean ES. Self-reported and observed negative parenting also varied significant by research team ($Q=48.50$, $p<.01$ and $Q=25.13$, $p<.01$). For self-reported negative parenting, Triple P was associated with the highest Mean ES. While Eyberg's Parent Child Interaction Therapy (PCIT) also yielded a high Mean ES, this finding should be considered with caution as there were only two groups representing each negative parenting outcome for PCIT. All significant findings were associated with non-significant within-group Q statistics.

2. Do efforts aimed at reducing costs also reduce the magnitude of PMTs efficacy?

The analogue ANOVA examining the impact of different delivery formats for PMT on mother reports of child CP was significant ($Q=13.30$, $p<.01$) with self-administration yielding ESs similar to individually administered PMT and group delivered PMT associated with relatively lower ESs. A somewhat different result emerged for independent observations of child CP ($Q=8.56$, $p<.0358$) and child compliance ($Q=9.46$, $p=.0238$) with self-administered PMT yielding smaller or negligible ESs, respectively, relative to individual or group PMT. No significant results emerged for negative parenting practices.

3. *Are ESs impacted by efforts directed toward generalization and maintenance of treatment effects?*

Several generalization techniques were evaluated using the analogue ANOVA.

Homework did not have a significant impact on the magnitude of the ESs for the outcome variables examined, while outreach did, at least for mother-reported child CP ($Q=19.49$ $p<.01$). Treatment groups receiving home visits for assessment purposes had higher ESs compared to groups for which no home visits were conducted. However, it is notable that when home visits were conducted for both assessment and therapy, ESs were also low. Maternal self-reports and independent observations of negative parenting were also significant ($Q=6.66$ $p<.05$ and $Q=28.83$, $p<.01$, respectively) such that those with no outreach had higher ESs and those groups for which home visits were conducted for therapeutic purposes had lower ESs.

Phone consultation was also evaluated as a generalization technique using the analogue ANOVA. ESs for mother-reported child CP were impacted by phone consultation ($Q=6.09$, $p<.05$). As with outreach, treatment groups receiving phone consultation for assessment had higher ESs than those who received phone consultation for therapy or no phone consultation at all. In contrast, when compliance was analyzed as an outcome, the findings were significant ($Q=10.40$, $p<.01$); with treatment groups receiving no phone consultation having higher ESs.

Finally, child involvement was evaluated and determined to be an important generalization technique. When children were involved in treatment, higher ESs were reported by mothers for child CP ($Q=6.75$, $p<.01$) and observed compliance ($Q=5.52$, $p<.05$).

The cumulative effect of generalization was examined by adding the number of techniques used in each study. For mother-reported child CP, the cumulative effect of generalization was significant ($Q=62.92$, $p<.01$) with two, three, or four techniques yielding the highest ESs. Similarly, for observed compliance the results were significant ($Q=11.96$, $p<.05$) with three techniques associated with the highest ESs. In terms of changes in negative parenting,

independent observations of mother negative behaviour also yielded significant results ($Q=15.79$, $p<.01$), again with two and three generalization techniques seemingly having the greatest impact and associated with higher ESs.

Very few studies programmed for maintenance after study completion and only booster sessions emerged as a maintenance technique that was reported with any frequency. However, no significant findings emerged.

4. Do therapeutic enhancements to PMT yield larger effects?

Significantly higher ESs were obtained in samples receiving only PMT or PMT and an enhancement directed specifically at parents (e.g., CBT for depression, marital therapy) but only for mother self-reported negative parenting practices ($Q=6.26$, $p<.05$). Data were insufficient to examine this question using observed changes in compliance as the outcome variable.

DISCUSSION

A unique aspect of this meta-analysis was the calculation of several “overall” ESs to investigate the impact of PMT on child, parent, and family functioning. Although quantitative analyses usually blend the available outcome data into a single Mean ES, the method chosen for the present study enabled the elucidation of patterns of treatment effects that may have been obscured otherwise. This method provided the opportunity to preserve the richness of the data available through multi-method and multi-source assessment protocols used within and across studies. Overall, the major finding of this meta-analysis is that PMT is an efficacious intervention to reduce CP in children and improve negative parenting practices. This is consistent with the previous meta-analysis on PMT conducted by Serketich and Dumas (1996) and narrative reviews (Brestan & Eyberg, 1998; Kazdin, 2003). Moreover, this finding supports the underlying conceptual framework of PMT, based on coercion theory, whereby the remediation of negative parenting practices is associated with improvements in child behaviour (Patterson, 1982). However, the magnitude of the effect of PMT is tempered by significant discrepancies in outcome associated with the source of the outcome measure. For example, parent-reports yielded significantly larger ESs than independent observations. The impact of PMT on other areas of child and parent functioning was less apparent. With regard to the long-term effects of PMT, although follow-up data were encouraging, they were also sparse, and thus, interpreted with caution.

Another unique aspect of the present meta-analysis was the use of a mean gain ES. The mean gain *d* statistic permitted the incorporation of study reports with one-group pre-posttest designs (i.e., within-group design), a design that is often used for evaluating community-based intervention programs. The integration of such programs was useful for increasing the generalizability of the present meta-analytic findings to PMT implemented in a wide variety of

contexts and provided a preliminary indication of effectiveness (as opposed to efficacy). Overall, this meta-analysis suggests that PMT has many qualities characteristic of interventions as they are actually carried out in clinical practice. Moreover, PMT may be disseminated into community-based settings with similar levels of improvement observed in university-based settings.

The second major finding of this meta-analysis was that several variables were found to moderate PMT outcome. Samples comprised of younger children and a greater proportion of male children tended to have higher effects sizes than samples of older children and samples with a more even gender mix. Samples with a greater number of single parents and minorities had relatively poorer responses to treatment, while impoverished families seemed to benefit more compared to samples with an overall income above the poverty line.

Finally, with regard to cost effectiveness, PMT programs that may be considered less resource intensive (e.g., self-administered training) appeared to be less effective than group or individual treatment. Therapeutic enhancements directed toward parents are likely to be of additional benefit. In terms of building in strategies to promote generalization, Involving children in PMT so that parents can have opportunities to practice their skills and receive feedback seemed an especially important strategy for maximizing treatment effects.

Changes in Child Behaviour

The post-treatment ESs derived from mother and father reports of child CP were $d = .92$ and $.87$, respectively. Parents of children in PMT groups reported significantly greater improvements in their children than did parents of children in comparison groups. To put these Mean ESs into perspective, consider the widely used convention for interpreting ESs developed by Cohen (Cohen, 1988). He reported that ESs generally fall into three ranges; small ($d \leq .20$), medium ($d = .50$), and large ($d \geq .80$). Therefore, parent-reported improvements in child CP would be considered “large” in the present meta-analysis. Independent observations of child CP

revealed more modest effects, although they were still within the medium range in the context of both mother-child and father-child interactions and significantly greater relative to comparison groups. Independent observations of child compliance also demonstrated the large impact of PMT, although insufficient data were available to make a comparison between treatment and control groups.

Although there are important benefits associated with PMT, the magnitude of the effects vary depending on the source providing the outcome information. Researchers have long been wary of self-report data (Drotar, Stein, & Perrin, 1995; Sabourin, Laferriere, Sicuro, Coallier, Cournoyer, et al., 1989). When participants report on their own change following intervention, they tend to convey more favourable results relative to objective raters. It has been suggested that the investment in time and energy to complete treatment creates a bias wherein participants are more likely to perceive improvements. Atkeson and Forehand (1978) reviewed parent training studies that used multiple outcomes ($N = 24$ studies) and found that when outcome data were based on independent observations, a significant treatment effect occurred in 79% of studies. When outcome data were based on parent reports, a significant treatment effect was found in 95% of the study reports. This bias may play a role in the significantly larger effect sizes for parent reports over independent observations in the present analyses.

Unfortunately, improvements did not appear to generalize as readily to peer relationships, based on mother and teacher report ($d = .45$ and $.18$, respectively), or to the classroom, based on teacher reports ($d = .39$), given that no differences emerged between treatment and comparison groups. Teachers reported significantly less improvement in children compared to mothers. There are a number of possible explanations for the divergence between mother and teacher reports. First, the discrepancy may result from the expectancy bias on the part of the mothers, given the differences between mother reports and independent observations of child behaviour change described above. However, mothers as primary caregivers might also be more sensitive

to change than teachers. Second, behavioural improvements may not generalize to the classroom. There is evidence for poor generalization as an explanation given that independent observations of changes in classroom behaviour were negligible in the present meta-analysis. Other researchers have also found that reducing deviant child behaviours in the home did not affect classroom performance (Forehand, Breiner, McMahon, & Davis, 1981; Horn, Ialongo, Popovich, & Paradotto, 1987) or in some cases made it worse (Forehand, 1979). In their seminal paper on the generalization and maintenance of treatment effects, Stokes and Baer (1977) explained that for gains to be generalized, specific efforts must be directed toward that aim. PMT programs typically do not directly program for generalization to the classroom (only 5 of 119 treatment groups in the current study attempted to train teachers or engage schools). The addition of PMT content addressing parent-teacher consultation may prove beneficial for children experiencing behaviour problems at school as well as at home. New programs such as conjoint behavioural consultation are emerging and bringing to light the value of helping parents engage the school to reduce child CP in the school setting (Guli, 2005; Sheridan, Clarke, Knoch, & Edwards, 2006). Conjoint behavioural consultation may be a manageable and useful enhancement to standard PMT.

An unambiguous finding of this meta-analysis is that PMT decreases child CP; however, good behaviour therapy practice suggests that these behaviours need to be replaced with adaptive behaviour that will enable children and parents to achieve the same ends (e.g., attention, compliance) for gains to be maintained and generalized. Hosp, Howell, and Hosp (2003) suggested that researchers must begin to focus not only on reducing negative behaviour but also on replacing them with prosocial behaviour. Given that improvements in prosocial child behaviour were not realized at post-treatment in the present study, perhaps a stronger focus on building such replacement behaviours during treatment sessions would contribute to the

alleviation of some the deficiencies of PMT noted in this meta-analysis (e.g., weaker school results).

Changes in Parenting Practices

The pattern of results for negative parenting practices is similar to those for child CP. The post-treatment ES for mothers' self-reported change in negative parenting was $d = .70$, closer to a large ES and significantly improved relative to the comparison group mothers. More modest gains were reported by independent observers ($d = .47$), albeit still within the medium range and still significantly greater relative to the comparison group. Independent observers also reported significant decreases in the negative parenting of fathers ($d = .57$) relative to the control group. Therefore, PMT appears to achieve its goal to reduce negative parenting and therefore disrupt the coercive pattern of interaction that develops between children with CP and their parents (Patterson, 1982). The generalization of effects to fathers is also promising. Studies reporting data from fathers often made direct attempts to include them in treatment. Even if fathers did not attend the treatment groups, it is likely that they endorsed or at least supported their family's participation in the program because they allowed observers into their homes to rate their parenting skills, a fairly intrusive assessment procedure.

In terms of positive parenting, mothers reported no improvements in their display of positive parenting practices (e.g., praise, contingent attention) but data from independent observers demonstrated large improvements ($d = .75$) and ESs that were significantly greater than comparison groups. Given that PMT programs also focus on developing positive parenting behaviour and that objective measures of behaviour change support the achievement of such skills, it is puzzling that mothers do not appear aware of changes in their own positive parenting behaviour. It may be that parent attention during treatment is focused on the reduction of problem behaviour in their children and such behavior change can be seen to occur most readily as a direct consequence of effective discipline. The feedback to parents after use of such

disciplinary strategies is immediate and salient (i.e., the problem behaviour stops), perhaps convincing them that such decelerative approaches are solely responsible for child behaviour change. Research has shown that the discipline components of PMT are strongly associated with mother reports of decreased child CP and consumer satisfaction (Eisenstadt, Eyberg, McNeil, Newcomb, & Funderburk, 1993). More specifically, mothers who receive the parent-directed components of PMT first (e.g., time-out) reported their children as more improved at post-treatment relative to parents who receive the child-directed components first (Eisenstadt et al., 1993). These mothers were also more satisfied with treatment (Eisenstadt et al., 1993). In contrast, the benefits of positive parenting (e.g., play, praise) may not be as salient or immediate.

These findings suggest that from a clinical standpoint, it is important to place stronger emphasis on the positive parenting skills taught in PMT, to increase parent awareness of changes in their positive parenting practices, and to make explicit how positive parenting may impact their child and treatment outcome.

Parent Adjustment and Family Functioning

With the reduction in child CP and coercive parenting after PMT, we anticipated possible improvements in adjustment and reductions in stress for parents and family. In fact, mothers indicated medium range improvements in self-reported parenting stress and adjustment at post-treatment ($d = .49$) that were also a significant improvement over comparison group findings. Fathers did not report any gains in self-reported stress at post-treatment and PMT did not appear to have a significant effect on family stress and dynamics at post-treatment.

Comparison to Previous Meta-Analyses

Another means of placing the findings of the present meta-analysis into a broader context is by comparing it to other meta-analyses on PMT and interventions for child CP. The only meta-analysis in the published literature to specifically examine the efficacy of PMT was completed by Serketich and Dumas (1996). They included 26 studies and reported an overall Mean ES of

.86 for overall child outcome. Moreover, they indicated that “if each study had only been allowed to contribute one comparison between an experimental and a control condition, the ES for overall child outcome would have been .91” (p. 178). They also reported an overall Mean ES of .44 for parent adjustment. In comparison, the present results, although consistent with Serketich and Dumas for parent-reported child outcomes, yielded smaller ESs for independent observations and teacher reports of child outcome. This is surprising, in light of the method used in the present analysis to compute the Mean ES. In contrast to the *mean difference d* statistic used by Serketich and Dumas, the *mean gain d* statistic used in this meta-analysis tends to inflate the Mean ES. In an examination of several meta-analyses, Lipsey and Wilson (1993) found that Mean ESs calculated from studies including within-group designs (necessitating the use of a mean gain *d* statistic) were 61% larger than Mean ESs calculated from studies including exclusively between-group designs (mean difference *d* statistic).

However, another variation on ES calculation may have contributed to the large Mean ESs obtained by Serketich and Dumas (1996). Specifically, they computed an unweighted Mean ES such that the sample size associated with each contributing ES was not taken into account. It is notable that in their moderator analyses they found PMT significantly more effective in smaller samples. In the present meta-analysis, each ES that contributed to the Mean ES was weighted by its inverse variance, thus enabling the researcher to mitigate the impact of sample size. The practice of weighting ESs tends to bring down the value of the Mean ES (Lipsey and Wilson, 2001).

Although the use of unweighted ESs might partially explain why Serketich and Dumas (1996) obtained substantially higher Mean ESs for child outcomes based on behavioural observation and teacher report relative to the present study, an alternative explanation is the possibility that more recent research (not covered in the meta-analysis by Serketich and Dumas)

presents a slightly less effective picture of PMT. Two post hoc findings point toward a statistical artifact as the more likely explanation.

First, a re-analysis of 18 of the 26 studies included in Serketich and Dumas (1996) was conducted using a weighted mean gain ES. There was not a complete overlap of studies in the Serketich and Dumas meta-analysis and the present meta-analysis because they included dissertations ($n=4$), a study on sibling aggression, and one study for which insufficient data were available to compute a mean gain ES. The mean ES for studies included in the Serketich and Dumas was slightly larger for observations of child CP but smaller for observations of child compliance compared to the present meta-analysis. Serketich and Dumas did not separate child CP and child compliance in their analysis and if these data were combined, the difference between the results of their meta-analysis and the current one would be negligible.

Second, no significant difference in child outcomes based on observation (CP or compliance) emerged for studies conducted prior to 1996 (the time at which Serketich and Dumas published their meta-analysis) compared to those conducted after 1996. Similarly for school generalization, the studies included in Serketich and Dumas (1996) yielded a much smaller Mean ES when re-analyzed using a weighted mean gain ES ($d = .48$ compared to $d = .73$). Moreover, the Mean ES was commensurate with studies not included in their meta-analysis.

Relative to other meta-analyses examining outcome for a variety of treatments targeting a range of child and adolescent problem, PMT appears to be a potent intervention for its target population, namely children with CP. Table 12 provides a summary of the findings from numerous other meta-analyses on child and adolescent psychotherapy. Note, however, that only rough comparisons should be drawn between the present meta-analysis and those found in Table 12 because most used the mean difference d statistic, a more conservative measure of change. The only meta-analysis using the mean gain d statistic was Wilson, Lipsey, and Derzon (2003).

They examined school-based interventions for children exhibiting aggressive behaviour and reported an overall ES of $d = .41$. In comparison, PMT impresses as a more effective intervention for child CP. In the present meta-analysis, only four studies compared PMT to another treatment, providing little direct evidence on its relative effectiveness to other treatments for child CP.

The Effectiveness of PMT

The focus of the Serketich and Dumas (1996) meta-analysis was on “research therapies”; therapy conducted in the context of a well-controlled randomized trial. Although they did not examine PMT specifically, Weisz et al. (1995) found that clinic therapies for children and adolescents produced far less positive outcomes than research therapies. In other words, although a treatment may show efficacy in a research context, the same treatment may not be as effective in actual clinical practice. This meta-analysis furthers the treatment outcome research on PMT by demonstrating that PMT is not only efficacious but also effective, in contrast to the Weisz et al. findings regarding psychosocial interventions for children and adolescents.

Weisz et al. (1995) indicated that research therapies can be distinguished from clinic therapies by several key features. These key features include: (1) patients who volunteer and are less severely affected by their condition, (2) homogeneous groups, (3) narrow problem foci, (4) treatment conducted in controlled lab settings, (5) therapists with smaller caseloads and special pre-therapy preparation and training, and (6) therapy duration that is fixed and highly structured with adherence to the treatment protocol closely monitored. However, research on PMT, whether conducted as a university-based clinical trial or as a community-based program evaluation is characterized by many of the clinic therapy features as outlined by these researchers (i.e., Weisz et al.). PMT studies have samples of patients who are clinic-referred with loosely and broadly defined behaviour problems and they focus on the reduction of a wide range of CP, which is commensurate with clinical practice. The present meta-analysis also included PMT programs of varying duration (i.e., 4 to 24 sessions) conducted in community clinics, hospitals, and in

schools. Therefore, the fact that PMT is more closely aligned with the features of clinic therapy and yet still demonstrates positive outcomes suggests that it is effective as well as efficacious.

Two features of PMT that might be considered more in line with research therapies as described by Weisz et al. (1995) are that therapists receive special pre-therapy preparation and training, and that adherence to the treatment protocol is closely monitored. The present meta-analysis examined the relationship of these two features to treatment outcome for PMT. ESs were similar regardless of the type of pre-therapy preparation received by therapists, whether generic or specialized training for a specific PMT program. However, given that protocols for the various PMT programs are widely available, it is difficult to determine whether therapists receiving only generic supervision would have also had some previous exposure to PMT.

The degree to which therapists were supervised throughout treatment was related to outcome such that didactic supervision or observational supervision was associated with larger ESs compared to treatment for which therapists only received initial training and were then left on their own to carry out PMT without consultation or feedback. This finding has significant clinical implications and should not be taken to further widen the gap between research and practice (Hoagwood & Olin, 2002; Kazdin, 2001; Stirman, Crits-Christoph, & DeRubeis, 2004). Although ongoing observational supervision is ideal, it is difficult to implement in community-based settings where time and funds are limited. However, the findings of this meta-analysis suggest that even weekly didactic case discussions are worth the clinical time and effort.

Due to the overlap in the characteristics of PMT and features of clinic therapy outlined by Weisz et al. (1995), it was not possible to identify and then compare PMT programs that might be considered “research therapy” versus “clinic therapy” to directly evaluate effectiveness. However, the use of the mean gain ES allowed for the inclusion of research studies with a less rigorous research design that is more typical of clinic therapies (e.g., one-group pre-posttest). An examination of the moderating effect of assignment to conditions on PMT outcome revealed that

between-group design studies involving random assignment yielded ESs that were similar in magnitude to within-group design studies. These findings further contribute to our confidence in the effectiveness of PMT.

Moderator Variables

Child Characteristics

Child characteristics had a significant impact on the magnitude of ESs for two of the three child behaviour outcomes (i.e., mother-reports of child CP, observed child compliance). Younger children and males seemed to benefit the most from PMT. It is widely accepted in both the psychosocial and medical literature that early intervention is an important predictor of treatment outcome and this may be particularly true for parent-directed interventions. In Serketich and Dumas (1996) older children seemed to benefit most from PMT, however, in their sample, “older” comprised a sample of children with a mean age of 10. In the present meta-analysis, the sample comprised a far broader age range and the opposite was found; younger children demonstrated larger treatment gains. Unlike Serketich and Dumas, the present meta-analysis separated compliance and more general CP as outcomes. ESs for compliance data typically showed strong effects in preschoolers, whereas ESs for child CP showed strong effects for school-aged children and poorer outcomes for adolescents. PMT may be particularly challenging with older children and adolescents because they may be out of the home more, less amenable to behaviour modification techniques (e.g., praise, tokens) or influence of parents, and more readily influenced by peers (Newcomb & Bentler, 1988). Kazdin (2005) has suggested that adolescents respond less well to PMT than their younger counterparts and that another treatment modality might be better indicated such as family therapy or individual psychotherapy with the youth.

In terms of the gender difference in treatment response, researchers have suggested that particular concern should be paid to girls with CP. Excessive and severe overt physical

aggression is considered non-normative in girls and is associated with a very poor prognosis (Crick, 1996; Pulkkinen, 1992). Thus, excessive and severe disruptive behaviour may be more entrenched in girls and as a result they may be somewhat less amenable to change than boys. On the other hand, young girls are also more likely to display covert and relational aggression such as lying, inducing others to break rules, and pitting parents against one another (Essau, 2003). These forms of CP are more subtle and difficult to quantify. PMT typically aims to remediate overt and measurable types of CP (e.g., non-compliance, hitting, breaking household rules) that are more common in boys.

Child characteristics evaluated in the present meta-analysis did not differentially influence changes in negative parenting practices. Parents' ability to learn and apply the skills taught in PMT is likely influenced to a larger extent by their own cognitive functioning, coping skills, and stress management. However, severity of child CP might be expected to influence parenting behaviour. Children with more severe CP may quickly exhaust the coping resources of their parents leading to increased stress and a more reactive or coercive parenting style (Granic, 2000; Kazdin, 2005; Patterson, 1983). Unfortunately, the information on CP severity in individual studies was insufficient to include as a variable in the present meta-analysis.

One child characteristic that did not moderate outcome was the specificity of diagnosis. ESs were similar whether the sample comprised mainly children diagnosed with ODD or CD (or both) or whether the children in the sample had more broadly and loosely defined CP. However, co-morbidity did play a role in PMT responsiveness. The literature reports that approximately 60% of children diagnosed with CD or ODD are dually diagnosed with ADHD (APA, 2001) with the hyperactivity symptoms of ADHD purported to be the "motor" driving the development of ODD (Burns & Walsh, 2002) and early-onset CD (Loeber et al., 1995; Moffitt, 1993). ADHD co-morbidity moderated treatment outcome for two of the three child problem behaviour indicators in the small number of studies for which information was available. The direction of

the effect was surprising, however, given that samples with a greater proportion of children with co-morbid ADHD demonstrated larger improvements in compliance and mother-reported child CP. This finding is not in keeping with some of the research examining the effects of psychosocial and pharmacological treatments on ADHD symptomatology and co-morbidity, in particular, the Multimodal Treatment Study of Children with ADHD (MTA; MTA Cooperative Group, 1999). The MTA did not support the efficacy of a behavioural treatment that included PMT over stimulant medication for reducing ADHD symptoms or non-ADHD symptoms (e.g., oppositional behaviour, increases in positive functioning). However, when PMT was used in combination with stimulant medication, children required less medication (MTA Cooperative Group, 1999). The combined treatment also produced better outcomes with respect to non-ADHD symptoms than PMT alone. Studies included in the present analysis did not contain the data necessary to examine the effects of medication levels of participant children. It is possible that a combination of medication and PMT treatment contributed to the larger ESs for children presenting with co-morbid CP and ADHD. Alternatively, this finding may suggest that PMT provides more benefit than was reported in the MTA study. Parents can differentiate between CP and ADHD symptoms (Maniadaki, Sonuga-Barke, Kakouros, & Karaba, 2006). Relative to ADHD symptoms, parents are harsher in disciplining CP, perceive CP behaviours in their children as more intentional, and feel they have less control over CP (Maniadaki et al., 2006). With a treatment that decreases CP, there are overall fewer symptoms for parents of children with co-morbid ADHD and CP. Moreover, parents may be better equipped emotionally and in terms of skill to manage the ADHD symptoms that remain.

Family and Contextual Characteristics

Single motherhood and poverty moderated parent behaviour outcomes. With regard to negative parenting practices, samples with a higher proportion of single mothers were associated with smaller effect sizes. This finding may relate to the fact that single motherhood is often

entwined with a host of stressors including socioeconomic disadvantage (Appleyard et al., 2005; Gerard & Buehler, 2004). In the present meta-analysis, samples with a higher proportion of impoverished families also demonstrated poorer outcomes in terms of negative parenting practices. This is consistent with research showing that the effect of SES is largely mediated by parenting practices (Capaldi & Patterson, 1991). Single motherhood and poverty are two risk factors that may act as a barrier to parenting skill acquisition and performance.

Although single motherhood did not moderate child behaviour outcomes, poverty was associated with one. Samples with a greater proportion of impoverished families displayed greater improvements in observations of child CP. Pretest scores on measures of child CP were not differentially associated with poverty, thus ruling out the explanation that there was more room for improvement in families with higher levels of poverty. Given that the superiority of PMT for impoverished families was only reflected in one child behaviour outcome, it is unlikely that this is a robust finding. However, overall these results do support the efficacy of PMT for families living in poverty; a finding that has also been observed in empirical research that has specifically examined the usefulness of PMT in this population (Webster-Stratton, 1998).

As with SES, minority status was significant for one only child outcome (observed child CP); higher ESs were found in samples with a higher proportion of families from minority groups. Other studies have reported a positive impact of PMT on minority families, most notably, Reid, Webster-Stratton, and Beauchaine (2001) found that PMT was efficacious in African American, Hispanic, and Asian families living in the United States. Minority families also reported greater parent satisfaction than Caucasian mothers, who tended to be more critical (Reid et al., 2001). One might think that cultural differences in parenting practices and values across minority groups (Forehand & Kotchick, 1996) as well as the fact that minority status is often accompanied by a multitude of risk factors for CP (e.g., low SES, isolation, neighbourhood risk, REF), may act as a barrier to treatment. However, group PMT may be culturally sensitive as

a treatment because although the content is generic, applications and discussion vary depending on the make-up of the parent group. PMT is considered an interactive and collaborative process. Individual PMT has the potential to be at least as flexible because the content can be geared toward to the needs of each individual family, but it is also more vulnerable to the biases and flexibility of the therapist.

Cumulative Risk

Cumulative risk has been a robust finding in the literature examining the development of CP (Appleyard, Egeland, van Dulmen, & Sroufe, 2005; Gerard & Buehler, 2004). However, an accumulation of risk factors did not moderate treatment outcome in the present meta-analysis. This finding may have been an artifact associated with the way in which cumulative risk was coded and defined. First, an evaluation of the impact of cumulative risk was limited by the data available in included studies. When data were unavailable for a particular risk variable (e.g., single parent status, SES), the risk level was set at zero for that risk variable in the study being coded. Given that very few studies reported on all of the variables comprising the cumulative risk index used in the present meta-analysis, the coding system may have underestimated the actual cumulative risk in some samples.

Second, given the nature and objectives of PMT, some of the risk factors comprised in the cumulative risk indices used by Rutter, Sameroff, and others are direct targets of treatment (e.g., rigid parental attitudes and child rearing, few positive parent-child interactions). Thus the examination of the impact of cumulative risk on PMT outcome may require the identification and development of an index that is specifically adapted to intervention research. Research that may be of particular relevance to this issue is already underway by Kazdin and his colleagues at the Yale Child Conduct Clinic. This group of researchers is attempting to elucidate the important barriers to treatment participation and to examine the cumulative impact of these barriers on

outcome (Kazdin & Wassel, 1999; Kazdin, Holland, Crowley, 1997; Kazdin, Holland, Crowley, & Breton, 1997; MacNaughton & Rodrigue, 2001).

Cost Effectiveness

An important first step in evaluating cost effectiveness is to ascertain the level of treatment intensity required for PMT to be effective. In this meta-analysis, treatment intensity was operationalized as hours of treatment. The number of hours families spent in treatment ranged from as low as 3 hours to as high as 46 hours. Notwithstanding the tremendous variability in the time commitment required of families across study reports, no significant findings emerged with this variable. It should be noted that hours spent in PMT may not be the most valid measure of treatment intensity. For example, some families received a total of 3 hours of face-to-face contact over several weeks but the contact involved performance-based bug-in-the ear procedures and intense observation through a one-way mirror. Other forms of PMT lasting 40 hours involved many hours of discussion and much less performance-based training.

As indicated above, the specific and unique aspects of the various PMT programs likely provide a more valid measure of treatment intensity. There are important differences in the way each of these research teams implement their PMT program. Fortunately, many research teams have created a PMT “brand” with treatment components as well as expectations for implementation made explicit. An exploratory analysis of the impact of the research team/PMT approach served as a significant moderator of treatment outcome. Study reports using Patterson’s ‘Living with Children’ or Forehand’s ‘Helping the Noncompliant Child’ demonstrated larger treatment effects than those using Webster-Stratton’s ‘Incredible Years Parenting Program’, Eyberg’s ‘Parent-Child Interaction Therapy’ or Sanders’ ‘Triple P’. It is important to note that using ES alone as a measure of treatment effectiveness is problematic; the practical utility of an intervention depends on its relative costs as well as its benefits (Glass, McGaw, & Smith, 1981). Patterson’s and Forehand’s studies relied heavily on individual treatment using performance-

based training and often a bug-in-the ear to prompt parents during training. Webster-Stratton's program usually incorporated group training using videotape modeling and follow-up discussion with therapists (a procedure that is likely less costly than more performance-based approaches). Sanders' program was even less intense with fewer sessions or implementation of the program in a self-administered format using telephone consultation rather than regular face-to-face contact with a therapist.

Efforts aimed at making PMT more practical and cost effective were also examined in the present meta-analysis. Self-administered PMT resulted in less improvement in child CP and compliance based on independent observations compared to individual or group administered programs. In contrast, mothers reported large improvements in child CP for both self-administered and individually administered PMT and smaller ESs for group PMT. Unfortunately, in the case of self-administered programs, program completion was not monitored except by parent report. Parent understanding or application of the techniques was also not evaluated. In the absence of treatment integrity data, it is difficult to ascertain whether the unexpectedly high ESs associated with self-administered programs reflect a social desirability bias. These findings underscore the importance of multi-method, multi-source assessment procedures in evaluating treatment outcome.

As with all treatments, PMT is not effective for all families. There is a sizable minority of families for whom inadequate outcomes have been documented (Eyberg & Boggs, 1998; Forehand, Middlebrook, Rogers, & Steffe, 1983; Prinz & Miller, 1994; Serketich & Dumas, 1996; Webster-Stratton & Hammond, 1997). Given these treatment failures, some researchers have added enhancements to PMT to increase the number of families (especially hard-to-serve families) likely to benefit, even though the added components may add to treatment costs as well. The only PMT enhancements that appeared to yield additional benefits were those directed

specifically at the mental health and adjustment of the parents (e.g., CBT for maternal depression, marital therapy).

Enhancements such as teacher training and child behaviour therapy were not associated with greater treatment effects in the present meta-analysis. However, the sample size was small ($n=5$) and three of the studies involved large school-based PMT programs (August, Realmuto, Hektner, & Bloom, 2001; Conduct Problems Research Group, 1999, Weiss, Harris, Catron, & Han, 2003) for which poor or inconsistent attendance may have contributed to tempering the effects of PMT. Webster-Stratton, Reid, and Hammond (2004) investigated the potential additive effects of PMT, child behaviour therapy, and teacher training in a randomized trial. They also concluded that teacher training had fewer additive effects over and above the improvement in child behaviour obtained with PMT and CT alone or in combination. However, improvements in school behaviour were greater with the addition of teacher-directed intervention.

In summary, the findings of the present meta-analysis were able to shed some light on the cost-effectiveness of PMT programs. More intense treatments (and thus more expensive and resource intensive PMT programs) seem to be associated with better outcomes for children and parents. It was not possible to obtain a measure of dose-response because the number of PMT hours per family was confounded with variations in implementation procedures. Therapeutic enhancements directed specifically at parents stress and adjustment added to the effectiveness of PMT, while child-directed and/or teacher-directed enhancements did not.

Generalization and Maintenance

In their seminal paper on generalization and maintenance of treatment effects, Stokes and Baer (1977) emphasized that neither was likely to be achieved without specific programming by treatment providers. In the PMT research considered in this analysis, strategies used to enhance generalization included child involvement, father involvement, the assignment of homework, outreach (i.e., home visits), and phone consultation.

Child involvement in PMT was of great value, as reflected in mother reported changes in child CP. PMT programs that incorporated the children did so either through bug-in-the-ear training with parents, by scheduling individual parent-child sessions in clinic during which parents practiced skills on their own children, or by having children join portions of PMT group sessions. Performance-based training is consistent with good behaviour therapy practice and an important, if not necessary, component of PMT programs (Kazdin, 2005). Thus, PMT programs that do not make use of performance-based training are likely to be less effective.

When father involvement was analyzed, higher ESs were observed at the extremes, in samples of women having negligible support from a spouse (including single parents) and in samples for which upwards of 75% of the families had fathers involved in treatment (i.e., completing assessment measures and/or actually attending PMT). The former result may be a spurious finding related to a lack of specificity in the coding system used for this meta-analysis. Fathers were considered “involved” only if they contributed assessment data or if their involvement was explicitly mentioned in the study report; otherwise they were considered “uninvolved”. This means that a large group of samples actually consisted of families in which father involvement was for the most part unknown. A better understanding of the sample characteristics, in particular family constellation and dynamics as they relate to participation in PMT would help to further explain these findings. One study specifically examining father involvement may provide some further insight into these findings. Webster-Stratton (1985) found that families with involved fathers (i.e., fathers who participated in treatment) had greater outcomes and were better able to maintain the gains made in PMT compared to families for whom fathers were absent.

Outreach and phone consultation were associated with significant differences in ESs across treatment groups, but the results were not straightforward. To interpret the pattern of results, a brief explanation of what constituted outreach and phone consultation is in order. In the

coding system employed in this meta-analysis, each variable had three levels (1) no home visits/phone consultation, (2) home visits/phone consultation conducted for assessment purposes only or (3) home visits/phone consultation conducted for therapeutic purposes for which in-home consultation or telephone contact were provided between PMT sessions to reinforce or teach skills. Outreach conducted for therapeutic purposes yielded the smallest ESs (i.e., the benefits of PMT were achieved, but to a lesser extent relative to families receiving no outreach or outreach conducted only for assessment purposes). It is possible that parents might find ongoing home-based observation an intrusion on their privacy or too demanding in the context of all the other demands of therapy (e.g., homework and weekly group sessions). On the other hand, this significant effect was only obtained for one outcome measure (i.e., mother-reported child CP) and may be an artifact. Certainly, this counterintuitive finding is in need of further investigation and replication.

The pattern of results for phone consultation and outreach were similar in it did not prove to be of additional benefit. Although this finding may seem counter-intuitive, PMT programs using phone consultation often did so as a replacement for face-to-face therapist time to reduce costs or to reach out to rural populations. Instruction and training may be more difficult to relay or grasp over the phone.

Assignment of weekly homework did not moderate treatment outcome, however, this is likely an artifact of the coding procedure. Study reports varied in the extent to which they explicitly described PMT components, including the assignment of homework. Given that homework is a common component of well-established and commercial PMT programs (e.g., Webster-Stratton, Triple P), it is likely that it was included in many studies without specific mention. Similarly, counterintuitive findings with regard to the cumulative effect of generalization techniques may also be an artifact of the coding system. An inverted U shaped trend was indicated such that the use of about three generalization techniques was associated

with maximal changes in mother reported child CP and observed negative parenting practices. The incorporation of more generalization techniques was associated with lower ESs as was the use of only one or no techniques. Much like homework, the cumulative effect of generalization techniques was limited by the data available in included studies. When data were unreported for a particular generalization technique (e.g., homework, father involvement), zero was coded. It is unlikely that the cumulative generalization index used in the present study accurately reflects the amount of generalization that was actually programmed into the various PMT programs.

With regard to maintenance, very little information was available in study reports on strategies implemented after treatment termination to promote the preservation of treatment gains. Only booster sessions were reported with any frequency and were not found to moderate outcome.

The Long-term Effects of PMT

A preliminary attempt was made in the present meta-analysis to provide some indication of whether the effects of PMT are maintained over the long-term. This proved to be a challenge given the paucity of follow-up data available. It is not surprising then that there have been few efforts to derive ESs from follow-up data in previous meta-analyses on child and adolescent treatment outcome. In addition to small sample sizes, interpretation of follow-up data is complicated by attrition. Of those families who entered treatment, 29% had dropped out in studies reporting 6 month follow-up, 24% in studies reported 1 year follow-up, and 47% at follow-up extending beyond one year.

The follow-up data in the present meta-analysis are presented for 3 follow-up points; 6 months, one year, and beyond one year. Although this permits some discussion of long-term trends for PMT outcome, such a discussion must be undertaken with two caveats in mind. First, the data cannot be compared statistically because data was often provided for the same children repeatedly across the three time points. Thus, the data are not independent nor are they

completely dependent. Second, the samples of studies contributing data at 6 months, one year, and beyond one year, do not completely overlap. One cannot rule out that the methodological characteristics of the non-overlapping studies contributed to differences in the ESs observed across the three follow-up points. In other words, the higher quality studies in terms of methodology may also have had the longest follow-up. Unfortunately, there was also an insufficient number of non-overlapping studies to have enough statistical power to examine the methodological variations across studies that may moderate the maintenance of treatment outcome across time.

With these qualifications in mind, some general trends in the follow-up data are presented. At six month and one year follow-up, gains in child CP and negative parenting were maintained, regardless of the source of the information. Moreover, independent observations of child CP suggest that children may continue to improve after treatment termination. Data beyond one year follow-up were sparse but encouraging. Improvements in negative parenting practices were also maintained up to one year as were observed improvements in maternal positive parenting practices. The encouraging follow-up data suggest that PMT may alter the developmental pathway for children with conduct difficulties toward a more healthy and adaptive adolescence. The remaining follow-up data were either insufficient or too inconsistent to be reported with any confidence. For example, the follow-up data on prosocial child behaviour either demonstrated Mean ESs that were not significantly different from zero or were based on a very small number of studies ($n=3$) and insufficient to draw reliable conclusions about the long-term effects of PMT.

Strengths and Limitations

A major strength and unique feature of the present meta-analysis is the use of the mean gain ES. The mean gain ES statistic permitted the incorporation of study reports with one-group pre-posttest designs (i.e., within-group design), a design that is often used in community-based

intervention programs. The integration of these programs was useful for increasing the generalizability of the meta-analytic findings to PMT programs implemented in a wide variety of contexts. Moreover, a mean gain ES was also computed for untreated comparison groups providing a description of the change in child CP that occurred during the period of treatment, which spanned up to two years. Overall, little change in CP was demonstrated by youth in untreated comparison groups as demonstrated by the small ESs. This finding is consistent with longitudinal research demonstrating the stability of childhood CP (Huesman, Eron, Lefkowitz, & Walder, 1984; Olweus, 1979). The use of the mean gain ES also suggested a small placebo effect. Although small in magnitude, the ESs for parent-reported child CP and maternal self-reports of negative parenting practices were significantly different from zero in the direction of improvement. This is in contrast to independent observations of child and parent behaviour in the control groups, which were negligible and not significantly different from zero.

These strengths must be considered in light of the major limitations associated with using the mean gain ES. The mean gain ES is essentially the meta-analytic analogue to the one-group pre-posttest design. One disadvantage of this type of design is that an alternative explanation for the change observed in participants at post-treatment, besides the intervention itself, cannot be ruled out. For example, improvements in child CP may be due to development and maturity rather than treatment. It was possible to improve our confidence in the findings of the present meta-analysis because pre-post data were also available on comparison groups. A mean gain ES was computed for intervention and control groups separately enabling a direct comparison of the change in CP for the two groups, much like in a between-group design. Wilson, Lipsey, and Derzon (2003) noted in their meta-analysis on school-based intervention for aggressive youth that it was only from the perspective of the relative stability of aggressive behaviour among untreated youths in comparison groups that “the role of intervention in reducing such behaviour from those stable base rates could be discerned” (p. 148).

However, the between-group comparison described above would still be considered quasi-experimental because of the lack of random assignment. A large proportion of treatment groups in the present meta-analysis did not use random assignment. For one-group pre-post designs, assignment to conditions is not relevant and for between-group studies, participants were often assigned by convenience and in some cases based on need. This leads to the second disadvantage of the mean gain ES; that it tends to overestimate treatment effects. For between-group design studies, samples consisting of families assigned to PMT by convenience had larger ESs than those assigned at random. Assignment by convenience (due to availability of therapists, proximity to clinic) opens the door to a selection bias wherein a sample is obtained that may be a better match for PMT. One-group pre-post designs also overestimate treatment effects. Even though the difference in ESs for between-group and within-group was not found to be statistically significant in this meta-analysis, inflation of effects may still have occurred and might be expected to reach significance as the number of studies on PMT using a one-group pre-post design increase. Wilson and Lipsey (2001) completed a synthesis of a very large number of meta-analyses ($n=319$) of psychological, behavioural, and educational interventions to examine the role of method in treatment effectiveness. ESs derived from one-group pre-post designs (using the mean gain ES) were larger than ESs from between-group designs, and in some cases, the difference was quite large.

The present database was limited to published studies, which has both advantages and disadvantages. The inclusion of only published research is common practice in meta-analytic research because the peer review process during publication presumably serves as a screen, filtering out low quality research. However, the inclusion of only published studies also increases the risk of obtaining inflated ESs because of the bias inherent in the publication process, wherein studies are more likely to be published if they report significant findings. To minimize the impact of the publication bias, conservative practices were used in calculating ESs

(e.g., setting the ES at zero when non-significant findings were reported in the absence of necessary statistical information).

In addition, the Fail Safe N was calculated for the five outcomes that served as dependent variables in most of the analyses. The Fail Safe N for mother reported changes in child CP was 93, indicating that 93 studies reporting null results for PMT would be needed to bring the Mean ES to within the small range ($d=.2$). Hunter and Schmidt (2004) indicated that in most areas of research, it is highly unlikely that there would be 90 “lost” studies. Over 20 studies with null results would be required to bring effects obtained through independent observation of child CP, as well as effects reported and observed for negative parenting, to within the small range. Lipsey and Wilson (2001) suggested that an effect is unlikely to be spurious with a Fail Safe N of 20 provided a thorough search of the published and unpublished literature was undertaken. To fulfill this criterion, a supplementary search was undertaken to identify dissertations evaluating PMT. Nine dissertations were found that met inclusion criteria; four of these were later published and are included in the present meta-analysis. Five were unpublished. Of these five, two could not be retrieved and the remaining three found PMT effective in the remediation of child CP. These findings further support that the impact of PMT is valid and reliable.

Another limitation of this meta-analysis is that the interpretation of some findings was complicated by three factors; difficulties in operationally defining certain variables in the coding system, attrition, and analyses based on sparse data sets. With regard to operational definitions, it was often not possible to distinguish between a study with zero values for a particular variable and a study for which the data were unreported. In the present meta-analysis, father involvement serves a good example of interpreting imprecise operational definitions. For studies that made no mention of father involvement, it was not possible to distinguish between those with uninvolved fathers and those with unreported father involvement. Thus, in order to evaluate the impact of father involvement, these two levels of the father involvement variable were, by necessity,

combined. The analysis of this variable proved fruitful because father involvement significantly moderated outcome. However, a deeper understanding of how father involvement impacted PMT outcome was limited because one group of studies consisted of families in which father involvement was for the most part unknown. This difficulty also affected ratings of homework, cumulative risk, and cumulative generalization strategies.

Attrition can also skew findings and distort subsequent interpretation of those findings. In treatment outcome research, attrition refers to premature termination. Attrition may occur for a host of reasons. Random attrition (e.g., moving away, financial difficulties, serious illness) is unlikely to impact the researcher's interpretation of their results. In contrast, attrition that is systematically associated with the treatment or sample characteristics (e.g., cultural inaccessibility, severity of referral problem) is problematic because it may limit confidence in and ability to generalize the findings. Attrition presents as a substantial problem in the psychosocial intervention literature with rates of premature drop-out typically ranging from 40 to 60 percent (Kazdin, 1996; Prinz & Miller, 1994; Wierzbicki & Pekarik, 1993). Interestingly, the attrition rates in this meta-analysis were much smaller (approximately 16%). PMT implementation has likely benefited from research identifying barriers to intervention, leading treatment providers to build in strategies for targeting premature termination proactively (e.g., providing child care, transportation). On the other hand, it is notable that in the present meta-analysis, only a minority of studies even reported attrition and it is likely that attrition rates were much higher.

Finally, interpretation of findings must be done with caution for some outcome variables and for much of the follow-up data. In the present meta-analysis, statistical analyses were not performed when sample sizes were less than three; however, even a Mean ES based on only three observations may not be reliable. For example, the Mean ES for mother-reported gains in child prosocial behaviour at 1 year follow-up had highly variable ESs (*ds* of 1.9, 2.1, and .6).

Implications for Future Research

The primary objective of meta-analysis is the quantitative review of the state of the empirical literature in a particular area of research. However, when previous meta-analyses are available, evaluation of progress over time in methodological quality of the research and quantity of information included in study reports is also possible. In the ten year gap between the present meta-analysis and the one conducted by Serketich and Dumas (1996), progress had been made on several fronts. Serketich and Dumas lamented the paucity of data contained in study reports and highlighted two studies (Webster-Stratton, 1992; Webster-Stratton, Kolpacoff, and Hollinsworth, 1988) that provided exemplary reporting on sample attrition and study characteristics and results (e.g., means and standard deviations for all variables at pre and post treatment). Several of the evaluations in the present meta-analysis would not have been possible without substantive improvements in research reporting similar to those used in the earlier Webster-Stratton studies, in particular the reporting of means and standard deviations that are necessary for the computation of the mean gain ES. F values, p values and t values (in the absence of reported means) are not readily converted into a mean gain d statistic and are therefore lost to the meta-analyst. This limitation was minimized in the present analysis in large part because of the improvement in the reporting of statistical results but also because composite ESs were used. Even if an ES for a particular measure could not be derived, adequate data from other measures used to evaluate that same outcome were usually available.

Serketich and Dumas (1996) also called for increased methodological rigor in future research including the use of multi-method multi-source assessment of outcome and an expansion on the range of outcomes examined. In the present meta-analysis it was possible to compute effect sizes on parent reports, teacher reports, as well as independent observation of child CP because of improvements in this area. Moreover, the data for eight other outcome variables were evaluated.

The present meta-analysis points to several areas in need of further investigation. Longer term follow-up continues to be relatively sparse in PMT treatment research, although the available evidence is encouraging. Hood and Eyberg (2003) reported gains in child CP that were maintained at three to six years after the family received PMT. Moreover, they found that mother reports of child CP decreased as time since treatment termination increased. A similar effect of continued or delayed improvement was reported by Webster-Stratton and Hammond (1997). Forehand and his colleagues (Long, Forehand, Wierson, & Morgan, 1994) conducted a 14-year follow-up. Non-compliant children treated using PMT when they were 5 to 7 years old were reassessed at about age 17 and results were compared to a non-clinical sample of same-aged peers. No differences were found, suggesting that the treatment group adolescents were functioning as well as other adolescents on a range of behavioral and adjustment measures. Although the present meta-analysis suggests that child CP continue to improve up to one year after treatment termination and that improvement may even be maintained beyond one year, interpretation of results should be made with caution due to the very small number of studies contributing to the Mean ES. In addition, long-term follow-up were limited to mother reports of child CP and were not available from other sources or across the remaining eight outcome constructs.

In light of the findings of this meta-analysis that samples comprising a higher proportion of girls demonstrated less improvement in child CP, further empirical research on girlhood aggression and its treatment is needed. As described previously very little is known about the development, course, prognosis, and treatment of CP in girls. Factors such as co-morbid anxiety and depression, particularly in adolescent girls, might be expected to play a role in the way CP emerge and are expressed. In fact, more research is needed on how adolescents in general respond to PMT regardless of gender.

The impact of father involvement on PMT outcome is also in need of more study.

Research has shown that when fathers are actively involved, better outcomes are achieved (Webster-Stratton, 1985) but questions remain regarding outcomes when fathers are present but not involved or present and unsupportive. For example, it is possible that an unsupportive spouse might act as a barrier to treatment participation, by not parenting in a manner that is consistent with the skills taught in PMT. Other factors contributing to treatment resistance as well as premature termination are in need of further investigation.

While it may be possible to use meta-analysis to help answer some of these questions in the future, this will depend largely on empirical studies directed at investigating the questions outlined above as well as continued extensive reporting of methodological and sample characteristics in the research literature.

Tremendous progress has been made in child and adolescent intervention research, as evidenced by the scores of outcome studies and the identification of empirically supported treatments for a wide variety of disorders. PMT for child CP has become a well-investigated intervention and has now achieved the status of being “empirically validated” (Kazdin, 2003). PMT may also be poised to become the treatment of choice for youth with CP. In comparing the results of this meta-analysis with the more than 25 meta-analyses of treatments for child CP, PMT did as well or better in remediating youth CP than other interventions. Wilson, Lipsey, and Derzon (2003), who examined samples of children exhibiting aggressive behaviour, found an overall ES of .41 for school-based intervention. The ESs of individual cognitive-behavioural therapy hovered around the medium range, as did play therapy, social skills interventions, and family therapy. Programs designed to reduce rates of delinquency, such as group therapy to improve self-esteem and wilderness training programs, have mostly yielded low to negligible ESs. Although such studies are no substitute for head-to-head comparisons (and comparison

studies incorporating PMT are so far uncommon), these findings strongly suggest that PMT is among the best strategies currently available for managing CP.

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Table 1

Criteria for empirically supported treatments

Methodological Characteristic	Requirements for Both Well Established and Possibly Efficacious Treatments	
Research Design	Randomized controlled trials with at least one comparison condition Carefully controlled single case experiments or group analogue	
Sample Characteristics	Described in terms of DSM-IV (ideally with a standardized diagnostic procedure) Cut-off scores on reliable and valid questionnaires	
Outcome Assessment	Valid and reliable Consider general measures of functioning and quality of life	
Follow-up	Not necessary for EST determination	
Clinical significance	Not a criteria for EST determination but should be considered in the future	
Treatment implementation	Either session-by-session outlines or description of broad principles and phases of treatment with examples Evidence of therapist supervision and training	
Data analysis		
Between-Group Experiments	Must show improvement on critical outcome measure Must rely on between-group differences Intention-to-treat analysis when there is differential attrition	
Single-Case Experiments	Establishing a stable baseline or deterioration of at least three assessment points to establish a linear trend Acceptable designs are ABAB or multiple (at least 3) baseline Multiple replications (at least three each) by two or more independent research groups required for EST Visual analysis is fine for EST	
Absence of Conflicting Results	If the conflicting results are from sound methodological studies then treatment cannot be considered even possibly efficacious or EST	
Additional Criterion	Well Established Only	Possibly Efficacious Only
Replication Between-Group Experiments	At least two replications by independent research teams demonstrating the treatment to be either: a. superior to pill placebo or alternative treatment OR b. equivalent to an already established treatment	Two or more studies by same research team but meeting all other criteria for well-established treatments OR Two studies showing the treatment better than a no-treatment control group
Single-Case Experiments	Series of single case studies (n>9) that use: a. good experimental design and b. compare the intervention to another treatment	Series of well-designed single case studies (n>3)

Note. EST refers to empirically supported treatment

Table 2

Empirically Supported Psychological Treatments for CP

Level of Empirical Support	Name of Treatment Program	Primary Research Team
Well Established	Parent Training Based on Living with Children	Patterson and Gullion (1968)
	Videotape Modeling Parent Training	Webster-Stratton (1984)
Probably Efficacious	Anger control training with stress inoculation	Schlichter and Horan (1981)
	Anger Coping Therapy	Lochman, Burch, Curry, and Lampron (1984)
	Assertiveness Training	Huey and Rank (1984)
	Delinquency Prevention Program	Vitaro and Tremblay (1994)
	Multisystemic Therapy	Henggeler, Rodick, Bourdin, Hanson, Watson, and Urey (1986)
	Parent-Child Interaction Therapy	Zangwill (1983)
	Parent Training Program	Peed, Roberts, and Forehand (1977)
	Problem Solving Skills Training	Kazdin, Esveldt-Dawson, French, & Unis (1987)
	Rational-Emotive Therapy	Block (1978)
	Time-out Plus Signal Seat Training	Hamilton and MacQuiddy (1984)

Table 3

Test-Retest Reliability for Outcome Constructs used in the Meta-Analysis

Outcome Construct	k	Mean Test-Retest Reliability	Standard Deviation
Child Problem Behaviour – Parent Report	25	.85	.34
School Generalization – Teacher Report	14	.86	.24
Social Skills	24	.77	.30
Parenting Practices	12	.74	.39
Parent Stress and Adjustment	15	.78	.25
Family Stress and Dynamics	5	.83	.42
Observational Measures	6	.80	.49

Note. Several outcome constructs were collapsed into a single category in order to have enough data to generate reliable mean test-retest reliability value

Table 4

Demographic Composition of the Samples in the Meta-Analysis

Variable	Intervention Groups		Control Groups	
	N (groups)	Percent	N (groups)	Percent
Youth Characteristics				
Predominant Age Group				
Mostly preschool	40	33.6	15	35.7
Preschool to school age	8	6.7	3	7.1
Mostly school age	67	56.3	24	57.1
School age to adolescence	0	0	0	0
Mostly adolescence	3	2.5	0	0
Not reported	1	0.8	0	0
Gender Mix				
Less than 50% male	6	5	0	0
50% to 75% male	49	41.2	23	54.8
More than 75% male	45	37.8	14	33.3
All male (>95%)	11	9.2	4	9.5
Missing data	8	6.7	1	2.4
Diagnostic Specificity				
Undefined CP	89	74.8	32	76.2
ODD and/or CD	30	25.2	10	23.8
Not reported	0	0	0	0
Family and Contextual Characteristics				
Minority Status				
Less than 50% minority	42	35.3	18	42.9
50% to 75% minority	5	4.2	6	14.3
More than 75% minority	1	0.8	1	2.4
Not reported	71	59.7	17	40.5
Family Constellation				
Less than 50% single parent	75	63	22	52.4
50% to 75% single parent	17	14.3	5	11.9
More than 75% single parent	0	0	1	2.4
All single parent (>95%)	5	4.2	2	4.8
Not reported	22	18.5	12	28.6
Socioeconomic Status				
Less than 50% impoverished	34	28.6	14	33.3
50% to 75% impoverished	13	10.9	5	11.9
More than 75% impoverished	0	0	1	2.4
All impoverished (>95%)	5	4.2	3	7.1
Not reported	67	56.3	19	45.2

Table 5

Characteristics of PMT Programs in the Meta-Analysis

Variable	N (groups)	Percent
Modality		
PMT	94	79
PMT plus	11	9.2
PMT and Child Behaviour Therapy	7	5.9
PMT plus and Child Behaviour Therapy	1	0.8
PMT and Teacher Training	1	0.8
PMT and Child Behaviour Therapy and Teacher Training	3	2.5
PMT plus and Child Behaviour Therapy and Teacher Training	1	0.8
PMT and other Child Therapy	1	0.8
Delivery Format		
Individual parent	56	47.1
Parents in groups	47	39.5
Self-administered	11	9.2
Not reported	5	4.2
Therapist Training and Supervision		
Previous generic training	3	2.5
Previous PMT program specific training	30	25.2
Didactic supervision throughout	7	5.9
Completion of session checklists	7	5.9
Reporting of checklist scores in study report	7	5.9
Observational supervision throughout	23	19.3
Reporting of treatment integrity scores from supervision	9	7.6
Not applicable	9	7.6
Not reported	24	20.2
Homework		
No	33	27.7
Yes	86	72.3
Outreach		
No	59	49.6
Home visits conducted as part of outcome assessment	47	39.5
Home visits for the therapeutic purposes	13	10.9
Phone Consultation		
No	76	63.9
Phone call to home as part of outcome assessment	18	15.1
Phone calls to home for therapeutic purposes	25	21
Father Involvement		
Less than 25% involved	76	63.9
25% to 50% involved	9	7.6
50% to 75% involved	15	12.6
More than 75% involved	8	6.7
Not reported	11	9.2
Child Involvement		
No	73	61.3
Yes	46	38.7
Other generalization strategies		
No	95	79.8
Yes	24	20.2

Note. PMT plus refers to standard PMT and an additional treatment component aimed at parents (e.g., CBT for depression, marital therapy)

Table 6

Methodological Characteristics of the Samples in the Meta-Analysis

Variable	N (groups)	Percent
Publication Year		
70s	10	12.5
80s	20	25
90s	27	33.8
2000 to September 2005	23	28.8
Assignment to Conditions		
Random, after matching	16	13.4
Random, simple	65	54.6
Convenience	11	9.2
Participant Choice	1	.8
Based on Need	3	2.5
Not applicable or not reported	23	19.3
Design of Study		
Between groups	97	81.5
Within groups	20	16.8
Single case with pre-post data	2	1.7
Referral Source		
Solicited by investigator	32	26.9
Self-referred	3	2.5
Community professionals	7	5.9
Clinic	9	7.6
Court	1	.8
Multiple	39	32.8
Not reported	28	23.5

Table 7
Standardized Mean Gain Effect Sizes (Mean d) for Each Outcome Variable at Post Treatment

Outcome Variable	N	Intervention Groups			N	Comparison Groups		
		Mean <i>d</i>	95% CI			Mean <i>d</i>	95% CI	
			Lower	Upper			Lower	Upper
Child CP								
Mother-reported†	81	.9171**	.7961	1.0381	30	.2394**	.1434	.3354
Father-reported†	25	.8665**	.7627	.9703	9	.2508**	.0784	.4231
Observation of mother-child interaction†	55	.5370**	.4499	.6241	14	-.0694	.2506	.1118
Observation of father-child interaction	13	.5591**	.3656	.7525	6	.0838	-.1208	.2884
Observed Compliance	26	.8929**	.6931	1.0928	2	.4608	.1603	.7612
Negative Parenting								
Mother self-reported†	31	.7037**	.5340	.8733	15	.1070**	.0525	.1614
Father self-reported	10	.5995**	.4097	.7893	3	.0306	-.2107	.2718
Observation of mother†	40	.4671**	.3425	.5916	13	.0531	-.0512	.1575
Observation of father†	12	.5688**	.3541	.7835	5	-.1523	-.4117	.1070
Generalization to Other Domains of Functioning								
School Generalization								
Teacher Report	16	.3913**	.2327	.5499	9	.1253	-.0180	.2686
Classroom observation	5	.1456	-.5646	.8557		only one group		
Child Social Skills								
Mother report	15	.4490**	.3577	.5402	5	.1030	-.1141	.3201
Father report	2	.4411	-.0996	.9818		only one group		
Observation	3	.2797**	.0963	.4631	2	-.0436	-.4718	.3847
Teacher Report	2	.1756	-.2054	.5565	2	.2808	.0050	.5566
Child Prosocial Behaviour								
Mother reported	14	.2162*	-.0001	.4326	6	.0213	-.1284	.1710
Observation of mother-child interaction	6	.3526*	.0669	.6383	3	.0652	-.1536	.2840
Observation of father-child interaction	2	-.2632	-1.7955	-1.2692		only one group		
Positive Parenting								
Mother self-reported	12	.0380	-.1916	.2675	5	-.0482	-.1550	.0587
Father self-reported		no data available				no data available		
Observation of mother†	31	.7452**	.5486	.9419	13	.0969	-.0319	.2257
Observation of father	11	.3096*	.0661	.5531	5	.0233	-.1395	.1861
Collateral Effects								
Parent Stress/Adjustment								
Mother reported†	44	.4933**	.4043	.5823	21	.1157**	.0446	.1157
Father reported	17	.2488**	.1779	.3197	7	.1459*	.0339	.2580
Family Stress/Dynamics								
Mother reported	22	.3512**	.2196	.4828	7	.1221	-.0798	.3240
Father reported	9	.1439**	.0364	.2514	2	.0263	-.1066	.1592
Observation	4	.3658	-.3072	1.0388		only one group		

*p<.05, **P<.01; the mean is significantly different from zero, tested with a random effects model

† p<.01; the difference between the intervention group and the control group is significant at the p<.01 level

Table 8

Standardized Mean Gain Effect Sizes (Mean d) for Outcome Variables at 1 to 6 month Follow-up

Source of data	N	Pre to follow-up			N	Post to follow-up		
		Mean <i>d</i>	95% CI			Mean <i>d</i>	95% CI	
			Lower	Upper			Lower	Upper
Child CP								
Mother-reported	27	.8509**	.6947	1.0071	19	.0671	-.0073	.1415
Father-reported	7	.7130**	.3449	1.0811	7	.0155	-.1827	.2138
Observation of mother-child interaction	15	.4431**	.2478	.4431	14	.0293	-.1309	.1895
Observation of father-child interaction	2	.4686	-.6447	1.5820	2	.1188	-.0842	.3218
Observation of compliance	9	.9267**	.6832	1.1702	9	-.1056	-.3700	.1588
Negative Parenting								
Mother-reported	10	.8580**	.5772	1.1389	8	-.0637	-.2668	.1394
Father-reported	3	.7452*	.1354	1.3550	3	-.2162*	-.4114	.0210
Observation of mother-child interaction	8	.6661**	.3672	.9649	8	-.0672	-.1988	.0644
Observation of father-child interaction	3	.0399	-.7730	.8529	3	-.2525	-.6032	.0982
Generalization to Other Domains of Functioning								
Social Skills								
Mother-reported	4	.1380	-.0900	.3660	4	-.0461	-.2154	.1233
Child Prosocial Behaviour								
Observation of mother-child interaction	2	.2403	-1.2073	1.6878	only one group			
Positive Parenting								
Observation of mother-child interaction	7	.7810**	.4003	1.1616	7	-.1365	-.2931	.0201
Observation of father-child interaction	3	-.0228	-.9142	.8686	3	-.2787	-.6594	.1021
Collateral Effects of PMT								
Parent Stress and Adjustment								
Mother-reported	16	.5847**	.4159	.7534	12	.0715	-.0045	.1475
Father-reported	6	.3218**	.1188	.5248	6	.0882	-.0533	.2296
Family Stress and Dynamics								
Mother-reported	10	.3864**	.1699	.6030	10	.0680	-.0607	.1966
Father-reported	4	.4620**	.1476	.7765	4	.0948	-.0300	.2196

p*<.05; the mean is significantly different from zero, tested with a random effects model*P*<.01; the mean is significantly different from zero, tested with a random effects model

Table 9

Standardized Mean Gain Effect Sizes (Mean d) for Outcome Variables at 1 year Follow-up

Outcome Variable	N	Pre to follow-up			N	Post to follow-up		
		Mean <i>d</i>	95% CI			Mean <i>d</i>	95% CI	
			Lower	Upper			Lower	Upper
Child CP								
Mother-reported	23	1.131**	.9459	1.3160	14	-.0198	-.1213	.0818
Father-reported	14	.9445**	.7552	1.1339	7	.0527	-.1048	.2101
Observation of mother-child interaction	18	.8605**	.6840	1.0369	13	.5404**	.3521	.7288
Observation of father-child interaction	4	.7999**	.3088	1.2909	4	.4617**	.2917	.6317
Observation of compliance	8	1.817**	.9341	2.6990	4	.2948**	.1436	.4460
Negative Parenting								
Mother-reported	7	.7134**	.4910	.9357	4	-.1065	-.2772	.0642
Father-reported	3	.3850*	.0845	.6855	3	-.1476*	-.2816	-.0135
Observation of mother-child interaction	25	.7028**	.5598	.8458	21	-.0516	-.0936	.1968
Observation of father-child interaction	4	.0841	-.6876	.8557	4	-.0725	-.6130	.4679
Generalization to Other Domains of Functioning								
School Generalization								
Teacher Reported	9	.2804*	.0247	.5361	8	-.0457	-.2676	.1762
Social Skills								
Mother-reported	6	.5372**	.1599	.9146	3	.1037	-.0753	.2827
Father-reported	3	.5624**	.2819	.8429			-	
Child Prosocial Behaviour								
Mother-reported	3	1.484**	.4169	2.5516	2	-.1335	-.2944	.0273
Observation of mother-child interaction	4	.4989	-.1118	1.1095	3	.2995	-.1628	.7618
Observation of father-child interaction	2	.6891	.3617	1.0166	2	.1622	-.0578	.3822
Positive Parenting								
Observation of mother-child interaction	11	.8340**	.4785	1.1895	7	-.3526*	-.6473	-.0580
Observation of father-child interaction	3	.3748	.1023	.8518	3	-.1415	-.4389	.1560
Collateral Effects of PMT								
Parent Stress and Adjust								
Mother-reported	7	.6310**	.4777	.7843	6	.0060	-.0802	.0922
Father-reported	5	.2464**	.0904	.4025	4	.1425*	.0245	.2604
Family Stress and Dynamics								
Mother-reported	4	.3776**	.0861	.6692	4	-.0444	-.1229	.0342
Father-reported	7	.3383**	.1945	.4820	7	.0392	-.0770	.1553

Note. Dash indicates no data available

* $p < .05$; the mean is significantly different from zero, tested with a random effects model** $P < .01$; the mean is significantly different from zero, tested with a random effects model

Table 10

Standardized Mean Gain Effect Sizes (Mean d) for Outcome Variables Beyond 1 year Follow-up

Source of data	N	Pre to follow-up			N	Post to follow-up		
		Mean <i>d</i>	95% CI			Mean <i>d</i>	95% CI	
			Lower	Upper			Lower	Upper
Child CP								
Mother-reported	8	.4318**	.2265	.5338	2	-.3630	-.7157	-.0102
Father-reported	7	.7130**	.3449	1.0811			-	
Generalization to Other Domains of Functioning								
Social Skills								
Mother-reported	3	.5685**	.3592	.7778			-	
Father-reported	3	.5246**	.2773	.7718			-	
Collateral Effects								
Parent Stress and Adjust								
Mother-reported	5	.4766**	.1663	.7868	2	-.0605	-.2910	.1699

Note. Dash indicates no data available

* $p < .05$; the mean is significantly different from zero, tested with a random effects model

** $P < .01$; the mean is significantly different from zero, tested with a random effects model

Table 11

Homogeneity Analysis for Each Outcome Variable

<i>Outcome Construct</i>	<i>Intervention Group</i> Q	<i>Comparison Group</i> Q
Child CP		
Mother-reported	1195.7919**	181.8986**
Father-reported	49.7889**	26.6473**
Observation of mother-child interaction	171.9598**	52.5492**
Observation of father-child interaction	45.5262**	9.5336
Negative parenting		
Mother self-reported	367.3930**	16.2140
Father self-reported	34.6045**	6.0953*
Observation of mother	260.9735**	26.5232**
Observation of father	47.5046**	8.2241
Generalization to Other Domains of Functioning		
School Generalization		
Teacher report	178.3681**	50.4435**
Classroom observation	40.0984**	-
Child Social Skills		
Mother report	34.9019**	22.8493**
Father report	7.1431**	-
Observation	5.2722	9.1787**
Teacher Report	6.0242*	2.9214
Child Prosocial Behaviour		
Mother-reported	114.6935**	14.0571*
Observation of mother-child interaction	42.0345**	6.3574*
Observation of father-child interaction	27.3896**	-
Positive parenting		
Mother self-reported	67.2717**	3.3263
Father self-reported	-	-
Observation of mother	335.1559**	32.1246**
Observation of father	54.0213**	2.0102
Collateral Effects of PMT		
Parent stress and adjustment		
Mother-reported	177.1137**	31.5019*
Father-reported	14.3806	2.0891
Family adjustment and dynamics		
Mother-reported	150.8853**	51.8921**
Father-reported	16.4656*	.0178
Observation	57.5270**	-

Note. Dash indicates no data available

*p<.05

** p<.01

Table 12

Meta-analyses of Interventions for Child and Adolescent Problems

Reference	N	Intervention/ Problem Type	Age of Children	Effect Size
General Psychotherapy				
Casey and Berman (1985)	75	Psychotherapy/ range of child disorders	Under 13 yrs	$d = .71$
Weisz, Weiss, Alicke, and Klotz (1987)	108	Psychotherapy/ range of child disorders	0 to 18 yrs	$d = .79$
Weisz, Weiss, Han, Granger, and Morton (1995)	150	Psychotherapy/ range of child disorders	0 to 18 yrs	$d = .54$
Skiba and Casey (1985)	41	Range of interventions/ behaviour disorders	5 to 18 yrs	$d = .93$
School-based Intervention				
Prout and DeMartino (1986)	33	School-based psychotherapy/ school-related problems	School-age to high-school	$d = .58$
Stage and Quiroz (1997)	99	Classroom interventions/ disruptive behaviour	School-age to high school	ES = $-.78^*$
Wilson, Lipsey, and Derzon (2003)	221	School-based programs/ aggressive behaviour	Preschool to Gr.12	$d = .41^\dagger$
Cognitive Behaviour Therapy				
Dush, Hirt, and Schroeder (1989)	48	Self-statement modification/ behaviour problems	Youth under 18 yrs	$d = .51$
Sukhodolsky, Kassinove, and Gorman (2004)	40	Cognitive Behaviour Therapy/ anger	6 to 18 yrs	$d = .67$
Durlak, Fuhrman, and Lampman (1991)	64	Cognitive Behaviour Therapy/ behaviour or social problems	Under 13 yrs	$d = .56$
Behavioural Intervention				
Scruggs, Mastropieri, Cook, and Escobar (1986)	16	Behavioural interventions/ conduct problems	Under 5 yrs	PND = 79^{**}
Social Skills Intervention				
Mathur, Kavale, Quinn, Forness, and Rutherford (1998)	64	Social skills interventions/range of child disorders	0 to 18 yrs	PND = 63
Denham and Almeida (1987)	49	Social skills interventions/varied social problems	2 to 12 yrs	$d = .75$
Beelman, Pflingsten, and Losel (1994)	49	Social competence training/ varied social problems	3 to 15 yrs	$d = .47$
Family Therapy				
Hazellrigg, Cooper, and Borduin (1987)	20	Family therapy/range of parent or child problems	Children and adolescents	$d = .50$
Interventions for delinquency				
Dowden and Andrews (2003)	38	Family therapy/ young offenders	Adolescents	$d = .21$
Latimer (2001)	35	Family intervention/young offenders	Adolescents	$d = .15$
Wilson and Lipsey (2000)	28	Wilderness challenge programs/delinquency	10 to 21 yrs	$d = .24$
Wilson, Lipsey and Soydan (2003)	305	Mainstream delinquent programs	12 to 21 yrs	$d = .17$
Mayer, Gensheimer, Davidson II, and Gottschalk (1986)	34	Behavioural intervention/ delinquency	Adolescents	$d = .52^\dagger$
Lipsey (1992)	400	Range of treatments/delinquency	Adolescents	$d = .10$
Lipsey and Wilson (1998)	200	Range of treatments/serious juvenile offenders	14 to 17 yrs	$d = .12$

Note. Many studies reported more than one ES. The ES presented in the table is the most representative (e.g., overall ES) and the most conservative (e.g., a weighted ES was reported over an unweighted ES).

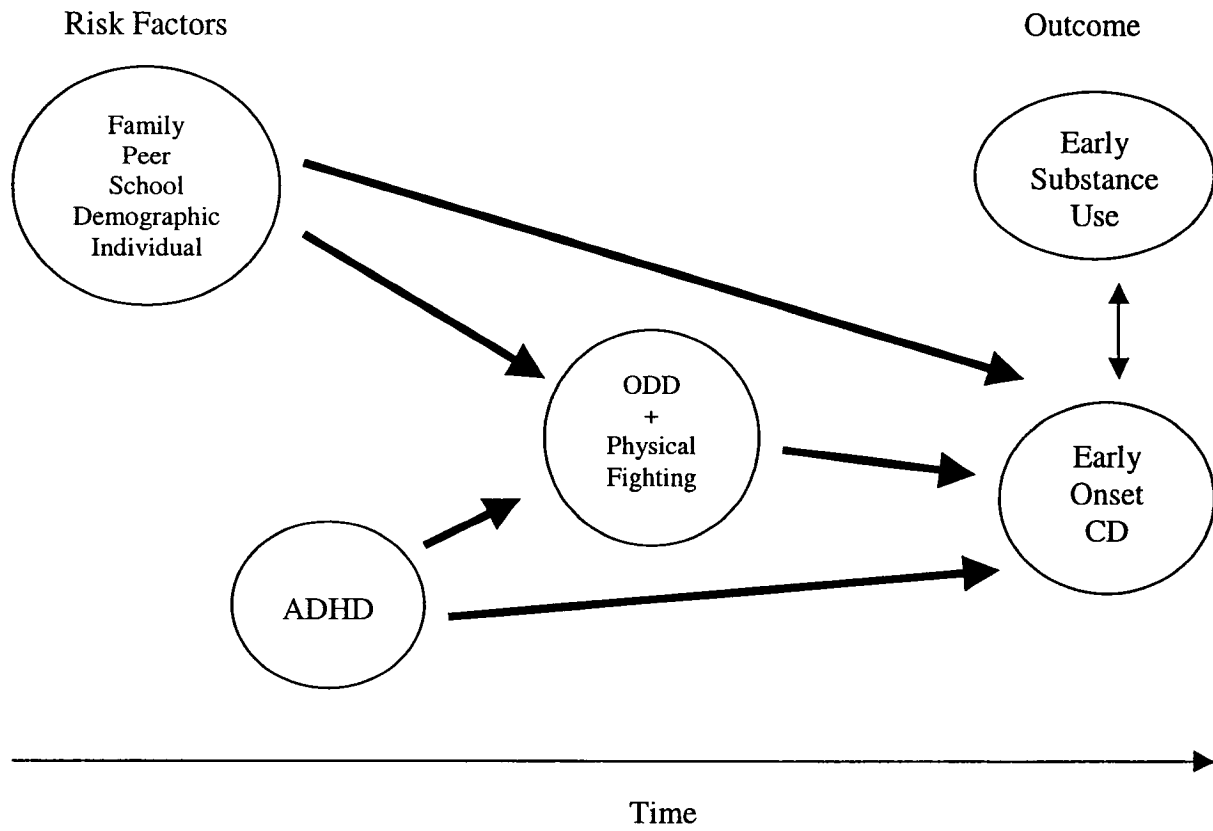
*This ES was generated from an interrupted time series autocorrelation program. Represents a 78% decrease in CP.

**PND refers to the percentage of non-overlapping data; an ES used for single subject methodologies with 70 representing a moderate intervention effect.

†Used pre-post ESs.

Figure Caption

Figure 1. Lifespan Developmental Model of Conduct Problems



APPENDIX A
CODING MANUAL

Coding Manual for Meta Analysis of Treatment Outcome for Externalizing Children

STUDY LEVEL CODING DESCRIPTORS

Bibliographic Descriptors

1. *Bibliographic Reference.*
2. *Study ID Number.*
3. *Type of publication.*
 - 1 book chapter
 - 2 journal article
 - 3 thesis or doctoral dissertation
 - 4 conference paper
 - 5 unpublished data direct from author
4. *Publication year.*

Research Design Descriptors

Record the abbreviation used in the study report to identify the treatment group (e.g., PMT for parent management training) and comparison group (e.g., WL for waitlist). If no abbreviation was used, leave space blank.

5. *Type of assignment to conditions.* Select code that best describes the how participants were assigned to treatment and control groups. Enter 999 for single case research.
 - 1 random after matching, stratification, blocking, etc.
 - 2 random, simple
 - 3 non random, convenience (e.g., first 6 clients to present to clinic are assigned to experimental group, second 6 clients are assigned to control group)
 - 4 participant choice
 - 5 based on need (e.g., clients most in need of service are assigned to experimental group)
 - 6 not applicable (i.e., as in the case of one-group studies)
6. *Experimental design of study.*
 - 1 between groups
 - 2 pre-post
 - 3 single case design but with group pre-post data
7. *Initial Sample Size.* Enter the exact sample size at the start of the study for the study entire as well as for the treatment group and comparison group.
8. *Attrition.* Enter the exact number of participants dropping out of the study before completion. Sample size may need to be computed when percentages are given in the study report.

9. *Final Sample Size.* Enter the number of participants completing the study for the study entire as well as for the treatment group and comparison group. Each number should be equal to the *n* reported in the data analysis section. If this information is not available within the study then subtract number 8 from number 7.

Sample Descriptors

10. *Referral source.*
- 1 solicited by investigator (e.g., through ads in newspaper)
 - 2 self-referred (article will say self-referred)
 - 3 community professionals (e.g., school, therapists, mental health professionals)
 - 4 clinic (e.g., from Yale Child Conduct Clinic, Oregon Social learning Centre)
 - 5 court
 - 6 multiple (referred by several sources)
 - 7 cannot tell (e.g., often studies will say “referred for” or “referred to...” but will not indicate who the referral source was)
11. *Age of sample.* Specify the mean age of the children at the beginning of intervention. Code the best information available; estimate mean age from grade levels if necessary. Also enter corresponding standard deviations and age range of sample.
- Age code.* Specify the age range of the sample by assigning one number. If an overall sample mean is not reported then average the mean age provided for each comparison group and use that as the overall mean. If an age range is provided, will usually need to code with 2 or 4.
- 0 mostly preschool (overall mean under 5)
 - 1 preschool to school age
 - 2 mostly school age (overall mean between 5 and under 12)
 - 3 school age to adolescence
 - 4 mostly adolescents (overall mean 12 and over)
- NB: used 5 as a cut-off because: (1) many samples reported a mean of around 5 had age ranges of 3 or 4 to 8 which encompasses a good number of school age children, (2) to provide more variability to this variable, if used 6 then a majority of studies would be treating preschoolers, and (3) 5 year old children are in Kindergarten which is school.
12. *Race of the sample.* Enter the exact number of participants in each cultural/ethnic group. The number of participants in each group may need to be computed when percentages are given in the study report.

Percent Minority. This is the percentage of the sample that is non-white or non-English speaking (if in English speaking country) or minority. If studies conducted in other countries, do not count those samples as minority (e.g., Chinese children in Hong Kong would not be considered a minority sample).

Race Risk code. Specify the risk level of the sample with respect to race by assigning one number based on the Percent Minority calculated above.

- 0 no risk (under 50% of sample from minority or non-white backgrounds)

- 1 high risk (sample includes 50% or more children from minority or non-white backgrounds)
- 2 cannot tell (e.g., race of sample not reported in study)

13. *Sex of the Sample.* Enter exact number of male and female children for entire sample and for treatment group and comparison group. Number of males and females may need to be computed when percentages are given in the study report.

Percent Male. This is the percentage of the sample that is male.

Sex Risk code. Specify the risk level of the sample with respect to sex by assigning one number based on the Percent Male calculated above.

- 0 no risk (under 75% of sample is male)
- 1 high risk (sample consists of 75% or more male children)
- 2 cannot tell (e.g., sex of sample not reported in study)

NB: cut point for risk is arbitrary but 75% creates nice variability in the sample.

14. *Diagnosis of sample.* Record number of participants with each diagnosis. When children were selected based on a clinical cut-off for behavioural rating scales, enter number under Not Clinically Defined. If children have dual diagnoses (but behavioural problems must be of primary concern) such as ADHD enter under "Co-morbid ADHD. If children have other dual diagnoses (but behavioural problems must be of primary concern) such as or learning disorders, enter under "Other co-morbidities" and specify diagnoses.

- 1 oppositional defiant disorder
- 2 conduct disorder
- 3 mixed ODD and CD
- 4 not clinically defined
- 4 comorbid ADHD
- 5 other co-morbidity (specify) _____

Comorbid ADHD Risk Code.

- 0 no risk (e.g., sample diagnostically defined and no ADHD comorbidity)
- 1 high risk (e.g., part of sample with comorbid ADHD)
- 2 cannot tell

15. *SES of Sample.* Enter Social Class Score for sample and each group. Indicate (by circling) whether information involved a sample mean or median. Also indicate the Index used to calculate Score [e.g., Hollingshead Four Factor Index (1975), Myers and Bean(1968)].

If SES is not explicitly available, enter mean or median (circle one) annual income.

- If in another currency, convert to USD.
- If monthly income provided, multiply by 12 and enter that amount.
- *CPI Conversion.* Convert income to present day using the CPI conversion tables.

If only education and occupational status provided, enter the information into their respective cells in the tables provided.

SES Best Estimates. Based on the information provided, choose the best estimate of SES for the entire sample and enter that value.

best	↓	Social Class or Position Score based on an Index
		Annual income estimates
		Years of Education
worst	▼	Occupational Status

Percent Impoverished. Indicate the number of participants from impoverished families (number of families with an income of <\$20 000/yr, number of families with a social class score of 4 or 5, number of families on welfare/social assistance, number of families below a certain income point predetermined by the authors, number not finishing high school). Then calculate the percentage of the sample that is considered impoverished. Use most accurate/complete information.

NB: In 2004, a family of four with a yearly income of \$19,307 or less was considered poor by American standards (U.S. Census Bureau News, August 30, 2005); 10.2 % of American families fell into this category.

SES Risk Code. Use information in the percent impoverished category to determine level of risk. If it was not possible to obtain percent impoverished value, then use the best estimate to make this judgement.

- 0 no risk (percent impoverished less than 50)
- 1 high risk
 - median income less than \$20 000
 - percent impoverished greater than 50
 - mean/median Hollingshead score of 4 or 5 or less than
 - mean/median Daniel score less than
 - mean/median Myers and Bean score less than
 - mean income less than \$20 000
 - mean/median years of education less than 12
- 2 cannot tell

16. *Family constellation.* Enter number exact number of single parents and married/partnered (two) parents.

Percent Single Parent. This is the percentage of the sample that is from a single parent household.

Family Constellation Risk Code. Specify the risk level of the sample with respect to single parenting by assigning one number based on the Percent Male calculated above.

- 0 no risk (under 50% of sample is from a single parent household)
- 1 high risk (sample consists of 50% or more single parents)
- 2 cannot tell (e.g., family constellation not reported in study)

17. *Age of parents.* Enter mean and standard deviation, or any other information available (e.g., age ranges) for mothers and fathers. If ages of mothers and fathers are mixed and not separable, then enter all information under "Primary Caregiver".

Nature of Treatment or Comparison Group Descriptors

Treatment must contain the following 4 factors. Please check each box to confirm that this information was verified in the study.

- (1) an underlying conceptual framework about how to change social, emotional, and behavioural problems based on social learning theory and the 2 stage model originally outlined by Hanf (1969) which includes, at the very minimum, learning to reward child positive behaviour consistently (e.g., praise, tokens) AND extinguish problem behavior (e.g., ignoring or time-out).
- (2) the application of principles and techniques that follow from the conceptual framework (e.g., child directed play skills, praising prosocial behaviour, monitoring problem behaviour, differential reinforcement of incompatible behaviours, punishing targeted problem behaviour)
- (3) the development of specific skills in parents through performance-based training (e.g., modeling and role-playing, feedback)
- (4) the use of assessment and evaluation in treatment decision-making

Treatment Description. List treatment reference provided in article (e.g., Forehand and McMahon, 1981; Patterson's Living with Children, Triple P, PCIT, Hanf).

1. Treatment Modality.

- 1 PMT
- 2 PMT+ (+ indicates an additional treatment aimed specifically at parents)
- 3 PMT and Child BT (parents and children were in behaviour treatment at same time)
- 4 PMT+ and Child BT
- 5 PMT and Teacher Training
- 6 PMT and Child BT and Teacher Training
- 7 PMT+ and child BT and Teacher Training
- 8 PMT and other Child Therapy
- 9 waitlist
- 10 receives nothing
- 11 minimal contact
- 12 attention placebo
- 13 treatment as usual
- 14 alternative treatment

2. Format of treatment delivery

- 1 individual parent
- 2 parents in groups
- 3 mixed (some individual work and some group work)
- 4 self-administered
- 5 cannot tell

3. Number of families units per group. A mother and father constitute one family unit. Do not code total number of people in group. If self-administered code 1. If not reported code NR.

4. Treatment setting.
 - 1 home
 - 2 clinic (e.g., OSLC, university)
 - 3 school
 - 4 community mental health (e.g., centre, hospital)
 - 5 cannot tell
 - 6 other
5. Therapist level of education
 - 1 university professional or psychologist with unspecified case load or Centre staff
 - 2 community professional (social worker, psychologist with clinical case load, physician)
 - 3 graduate student
 - 4 paraprofessional (e.g., teacher)
 - 5 undergraduate student
 - 6 cannot tell (e.g., study refers to “therapists”)
 - 7 not applicable
6. Therapist level of training. Amount of intervention-specific training received.
 - 1 none
 - 2 previous generic training
 - 3 previous program specific training
 - 4 didactic supervision throughout
 - 5 completion of session checklists
 - 6 reporting of checklist scores
 - 7 observational supervision
 - 8 reporting of treatment integrity scores
 - 9 cannot tell
 - 10 not applicable
7. Manualization of treatment procedures. Please record the *reference* information. Some studies will refer to another published study or provide the title and authors of a book that formed the basis of their treatment protocol.
8. Treatment duration in weeks. Exact duration of treatment in weeks from the first treatment event to the last treatment event, excluding follow-ups designated as such. If treatment duration is recorded in months, multiply number of months by 4.3 and enter that number. May need to be approximated using number of treatment sessions and other information.
9. Number of treatment sessions. Exact number of treatment sessions. May need to be approximated using treatment duration in weeks and other information. Then code actual mean number of sessions attended by parents in the study as well as the corresponding standard deviation.
10. Number of treatment hours. Exact number of hours spent by an individual participant in treatment. May need to be approximated using number of treatment sessions and reported duration of each session. Then code actual mean number of hours attended by parents in the study as well as the corresponding standard deviation.

11. Generalization. Indicate the number of generalization strategies used (from 0 to 5). Also please check all that apply.

Homework assigned. If study does not explicitly say then code cannot tell.

Outreach. Indicate whether treatment staff visited the homes of the participants, either for assessment (e.g., DPICS) or therapy (e.g., provision of support, teach and reinforce skills, etc).

Telephone Consultation. Indicate whether there was phone consultation, either for assessment (e.g., PDR) or therapy (e.g., consultation, reminders to do homework).

Father Involvement. Fathers are coded as involved if they participated in either assessment or therapy. If they are deemed to have been involved please record the percent of fathers involved. The best information is when the article explicitly states percent participation. More often, you have to calculate percent involvement yourself by looking at how many fathers completed questionnaires. For example, if there is questionnaire data for 50 fathers and 100 families participated in the treatment, then father involvement is 50%.

Child Involvement. Indicate if child was involved in treatment sessions. Often this occurs in the context of a “bug in the ear” or therapy home visits. This does not include studies in which children received their own treatment separate from parents (e.g., social skills training) unless the children and parents came together for part of the sessions.

12. Maintenance. Select code that best describes the degree to which research team attempted to program for maintenance. Please code whether families received outreach post (i.e., home visits), phone consultation post, or booster session in clinic. These maintenance strategies must have occurred after the end of treatment.

APPENDIX B
CODING FORMS

STUDY LEVEL CODING DESCRIPTORS

Bibliographic Descriptors

1. Bibliographic Reference.

2. Study ID Number. _____

3. Type of publication.
 - 1 book chapter
 - 2 journal article
 - 3 thesis or doctoral dissertation
 - 4 conference paper
 - 5 unpublished data direct from author

4. Publication year.

Research Design Descriptors

Treatment group abbr. used in source. _____

Comparison group abbr. used. _____

5. Type of assignment to conditions.
 - 1 random after matching, stratification, blocking, etc.
 - 2 random, simple
 - 3 non random, convenience
 - 4 participant choice
 - 5 based on need
 - 6 not applicable

6. Experimental design of study.
 - 1 between groups
 - 2 pre-post
 - 3 single case design but with group pre-post data

7. Sample size at start of study.

	Total	Treatment Group	Comparison Group
<i>N</i>			

8. Attrition. Total number of participants dropping out of study.

	Total	Treatment Group	Comparison Group
<i>N</i>			

9. Total number of participants completing study.

	Total	Treatment Group	Comparison Group
<i>N</i>			

Sample Descriptors

10. Referral source.

- 1 solicited by investigator
- 2 self-referred
- 3 community professionals
- 4 clinic
- 5 court
- 6 multiple
- 7 cannot tell

11. Age of sample.

	Total	Treatment Group	Comparison Group
Mean age			
Standard deviation			
Age range			

12. Race of the sample.

	Total <i>n</i>	Treatment Group <i>n</i>	Comparison Group <i>n</i>
White			
Black			
Hispanic			
Asian			
Mixed			
Other (specify)			

Percent of sample with minority status: _____ %

13. Sex of the Sample.

	Total <i>n</i>	Treatment Group <i>n</i>	Comparison Group <i>n</i>
Males			
Females			

Percent of sample that is male: _____ %

14. Diagnosis of sample.

	Total <i>n</i>	Treatment Group <i>n</i>	Comparison Group <i>n</i>
ODD			
CD			
Mixed ODD/CD			
Not clinically defined			
Co-morbid ADHD			
Other Co-morbidities			

15. SES of sample

Social Class	Sample Entire	Treatment Group	Comparison Group	Index Used
Mean or Median				

Annual Income	Total sample	Treatment Group	Comparison Group
Mean or Median			

Education Level	Total <i>n</i>	Treatment Group <i>n</i>	Comparison Group <i>n</i>
1. Graduate professional training			
2. College or university graduation			
3. Partial college			
4. High school graduation			
5. Partial high school			
6. Completed 7 th through 9 th grade			
7. Less than 7 years of school			
Median or Mean			

Occupation Level	Total <i>n</i>	Treatment Group <i>n</i>	Comparison Group <i>n</i>
1. Higher execs/major professionals			
2. Business mgrs/owners med. bus./lesser professionals			
3. Administrative/owners small bus./minor professionals			
4. Clerical and sales/technicians			
5. Skilled manual			
6. Machine operators and semiskilled			
7. Unskilled			
Median or Mean			

Percent of sample impoverished: _____ % _____ %
 _____ %

16. Family constellation.

	Total <i>n</i>	Treatment Group <i>n</i>	Comparison Group <i>n</i>
Single parents			
Two-parent			

Percent of sample from single parent household: _____ % _____ %
 _____ %

17. Age of parents

	Total Study	Treatment Group	Comparison Group
Mothers			
Fathers			
Primary Caregivers			

TREATMENT CHARACTERISTICS

Treatment description: _____

18. Treatment modality (describe)

- | | | |
|---|----|-----------------------|
| 1 PMT | 9 | waitlist |
| 2 PMT+ (marital therapy, stress management) | 10 | receives nothing |
| 3 PMT and Child BT | 11 | minimal contact |
| 4 PMT+ and Child BT | 12 | attention placebo |
| 5 PMT and teacher training | 13 | treatment as usual |
| 6 PMT and child BT and teacher training | 14 | alternative treatment |
| 7 PMT+ and child BT and teacher training | | |
| 8 PMT and other child therapy | | |

19. Format of treatment delivery

- 1 individual parent
- 2 parents in groups
- 3 mixed (some individual work and some group work)
- 4 self-administered
- 5 cannot tell

20. If group treatment, number of people/families in group _____

21. Treatment setting.

- 1 home
- 2 clinic
- 3 school
- 4 community mental health (e.g., centre, hospital)
- 5 cannot tell
- 6 other

22. Therapist level of education

- 1 university professional or psychologist with unspecified case load or Centre staff
- 2 community professional (social worker, psychologist with clinical case load, physician)
- 3 graduate student
- 4 paraprofessional (e.g., teacher)
- 5 undergraduate student
- 6 cannot tell (e.g., study refers to "therapists")
- 7 not applicable

23. Amount of training therapists received for specific intervention

- 1 none
- 2 previous generic training
- 3 previous program specific training
- 4 didactic supervision throughout
- 5 completion of session checklists
- 6 reporting of checklist scores
- 7 observational supervision
- 8 reporting of treatment integrity scores
- 9 cannot tell
- 10 not applicable

24. Manualization of treatment procedures

Reference information: _____

25. Treatment duration in weeks. _____

26. Number of treatment sessions. _____ Actual number of sessions attended (mean, SD). _____

27. Number of treatment hours. _____

Actual number of hours attended (mean, SD). _____

28. Generalization.

Homework (including parental data collection)

0 no

1 yes

3 cannot tell

Outreach (home visits)

0 none

1 for assessment only (e.g., DPICS)

2 for therapy purposes

Telephone Consultation

0 none

1 for assessment only (e.g., PDR)

2 for therapy purposes

Father Involvement.

0 no

1 yes _____%

2 cannot tell

Child Involvement

0 no

1 yes

2 cannot tell

Other (monetary incentive, reimbursement program, provision of published book to read)

0 no

1 yes _____

29. Maintenance

Outreach Post

0 no

1 yes

Phone consultation Post

0 no

1 yes

Booster session in clinic

0 no

1 yes

Other

0 no

1 yes _____

COMPARISON GROUP

Treatment description: _____

1. Treatment modality (describe)

1 PMT	9	waitlist
2 PMT+ (marital therapy, stress management)	10	receives nothing
3 PMT and Child BT	11	minimal contact
4 PMT+ and Child BT	12	attention placebo
5 PMT and teacher training	13	treatment as usual
6 PMT and child BT and teacher training	14	alternative treatment
7 PMT+ and child BT and teacher training		
8 PMT and other child therapy		
2. Format of treatment delivery
 - 1 individual parent
 - 2 parents in groups
 - 3 mixed (some individual work and some group work)
 - 4 self-administered
 - 5 cannot tell
3. If group treatment, number of people/families in group _____
4. Treatment setting.
 - 1 home
 - 2 clinic
 - 3 school
 - 4 community mental health (e.g., centre, hospital)
 - 5 cannot tell
 - 6 other
5. Therapist level of education
 - 1 University professional or psychologist with unspecified case load or Centre staff
 - 2 community professional (social worker, psychologist with clinical case load, physician)
 - 3 graduate student
 - 4 paraprofessional (e.g., teacher)
 - 5 undergraduate student
 - 6 cannot tell
 - 7 not applicable
6. Amount of training therapists received for specific intervention
 - 1 none
 - 2 previous generic training
 - 3 previous program specific training
 - 4 didactic supervision throughout
 - 5 completion of session checklists
 - 6 reporting of checklist scores
 - 7 observational supervision
 - 8 reporting of treatment integrity scores
 - 9 cannot tell
 - 10 not applicable
7. Manualization of treatment procedures _____
8. Treatment duration in weeks. _____
9. Number of treatment sessions. _____ Actual number of sessions attended (mean, SD). _____
10. Number of treatment hours. _____ Actual number of hours attended (mean, SD). _____

11. Generalization.

Homework (including parental data collection)

0 no

1 yes

Outreach (home visits)

0 none

1 for assessment only (e.g., DPICS)

2 for therapy purposes

Telephone Consultation

0 none

1 for assessment only (e.g., PDR)

2 for therapy purposes

Father Involvement.

0 no

1 yes _____%

2 cannot tell

Child Involvement

0 no

1 yes

2 cannot tell

Other (monetary incentive, reimbursement program, provision of published book to read)

0 no

1 yes _____

12. Maintenance

Outreach Post

0 no

1 yes

Phone consultation Post

0 no

1 yes

Booster session in clinic

0 no

1 yes

Other

0 no

1 yes _____