Report prepared for Brå by
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Effects of Early Family/Parent Training Programs on Antisocial Behavior & Delinquency

A Systematic Review

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Swedish National Council for Crime Prevention

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Report prepared for
The Swedish National Council for
Crime Prevention

Brå – a centre of knowledge on crime and measures to combat crime

The Swedish National Council for Crime Prevention (Brottsförebyggande rådet – Brå) works to reduce crime and improve levels of safety in society by producing data and disseminating knowledge on crime and crime prevention work and the justice system´s responses to crime.

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Foreword

Early family/parent training (EFPT) programmes constitute a set of methods for reducing children's behavioural problems and later delinquency that for some time have been the focus of considerable attention. But how well do they work? What does the research tell us?

There are never sufficient resources to conduct rigorous scientific evaluations of all the crime prevention measures employed in individual countries. Nor has a high quality evaluation been conducted in Sweden of efforts employing EFPT-programmes to prevent behavioural problems and later delinquency. For this reason, the Swedish National Council for Crime Prevention (Brå) has commissioned distinguished researchers to carry out an international review of the research published in this field.

This report presents a systematic review, including a statistical meta-analysis, of the effects of EFPT-programmes on behaviour problems and later delinquency, which has been conducted by Professor Alex R. Piquero of the University of Maryland College Park (United States), Professor David P. Farrington of Cambridge University (United Kingdom), Associate Professor Brandon C. Welsh of the University of Massachusetts Lowell (United States), Professor Richard Tremblay of the University of Montreal (Canada) and Assistant Professor Wesley G. Jennings of the University of Louisville (United States). The study follows a rigorous method for the conduct of a systematic review. The analysis combines the results from a number of evaluations that are considered to satisfy a list of empirical criteria for measuring effects as reliably as possible. The meta-analysis then uses the results from these previous evaluations to calculate and produce an overview of the effects that EFPT-programmes do and do not produce. Thus the objective is to systematically evaluate the results from a number of studies in order to produce a more reliable picture of the opportunities and limitations associated with EFPT-programmes in relation to crime prevention efforts.

The systematic review, and the statistical meta-analysis, in this case builds upon a large number of high quality evaluations from different part of the world, producing robust findings on effects. Even though important questions remain unanswered, the study provides the most accessible and far-reaching overview to date of EFPT-programmes and their effects on problem behaviour and later delinquency.

Stockholm, June 2008

Jan Andersson
Director-General

Abstract

Based on evidence that early antisocial behavior is a key risk factor for continued delinquency and crime throughout the life course, early family/parent training, among its many functions, has been advanced as an important intervention/prevention effort. The prevention of behavior problems is one of the many objectives of early family/parent training, and it comprises the main focus of this review. There are several theories concerning why early family/parent training may cause a reduction in child behavior problems including antisocial behavior and delinquency (and have other ancillary benefits in non-crime domains over the life course). For example, early family/parent training programs are based, in part, on the notion that quality of parent-child relations will facilitate learning of control over impulsive, oppositional, and aggressive behavior, thus reducing disruptive behavior and its long-term negative impact on social integration. Additionally, these programs attempt to change the social contingencies in the family context and/or provide advice/guidance to parents on raising their children or general parent education.

Results of this review indicate that early family/parent training is an effective intervention for reducing behavior problems among young children and the effect size is in the 0.23 to 0.45 range depending on the weighting procedure employed, approximately corresponding to 50% recidivism for the control group compared with 39% and 28% recidivism in the experimental group, respectively. The results from a series of analog to the ANOVA and weighted least squares regression models (with random effects) demonstrated that there were significant differences in the effect sizes of studies conducted in the US versus those conducted in other countries and that studies that were based on samples smaller than 100 children had larger effect sizes. Sample size was also the strongest predictor of the variation in the effect sizes. Additional descriptive evidence indicated that early family/parent training was also effective in reducing delinquency and crime in later adolescence and adulthood. Overall, the findings lend support for the continued use of early family/parent training to prevent behavior problems such as antisocial behavior and delinquency. Future research should be designed to test the main theories of the effects of early family/parent training, more explicitly including a better articulation of the causal mechanisms by which early family/parent training reduces delinquency and crime, and future early family/parent training program evaluations should employ high quality evaluation designs with long-term follow-ups, including repeated measures of antisocial behavior, delinquency, and crime over the life course.

Background

Early family/parent training programs are intended to serve many purposes, one of them being the prevention of behavior problems including antisocial behavior and delinquency. While early family/parent training may not often be implemented with the expressed aim of preventing antisocial behavior, delinquency, and crime – sometimes these programs are aimed at more general, non-crime outcomes – its relevance to the prevention of crime has been suggested in developmentally-based criminological and psychological literatures.

Objectives

The main objective of this review is to assess the available research evidence on the effects of early family/parent training on child behavior problems including antisocial behavior and delinquency. In addition to assessing the overall impact of early family/parent training, this review will also investigate, to the extent possible, in which settings and under what conditions it is most effective.

Search Strategy

Seven search strategies were employed to identify studies meeting the criteria for inclusion in this review: (1) A key word search was performed on an array of online abstract databases; (2) We reviewed the bibliographies of previous reviews of early family/parent training programs; (3) We performed forward searches for works that have cited seminal studies in this area; (4) We performed hand searches of leading journals in the field; (5) We searched the publications of several research and professional agencies; (6) After completing the above searches and reviewing previous reviews, we contacted scholars in various disciplines who are knowledgeable in the specific area of early family/parent training; and (7) We consulted with an information specialist at the outset of our review and at points along the way in order to ensure that we have used appropriate search strategies. Both published and unpublished reports were considered in the searches. Searches were international in scope.

Selection Criteria

Studies that investigated the effects of early family/parent training on child behavior problems such as conduct problems, antisocial behavior and delinquency were included. Studies were only included if they had a randomized controlled evaluation design that provided before-and-after measures of child behavior problems among experimental and control subjects.

Data Collection & Analysis

Narrative findings are reported for the 55 studies included in this review. A meta-analysis of all 55 of these studies was carried out. The means and standard deviations were predominantly used to measure the effect size. Results are reported for unweighted and weighted effect sizes and, where possible, comparisons across outcome sources (parent reports, teacher reports, and direct observer reports). In the case of studies that measure the impact of early family/parent training on antisocial behavior and delinquency at multiple points in time, similar time periods before and after are compared (as far as possible).

Main Results

The studies included in this systematic review indicate that early family/parent training is an effective intervention for reducing behavior problems including antisocial behavior and delinquency, and that the effect of early family/parent training appears rather robust across various weighting procedures, and across context, time period, outcome source, and based on both published and unpublished data.

Reviewer's Conclusions

We conclude that early family/parent training should continue to be used to prevent child behavior problems such as conduct problems, antisocial behavior, and delinquency among young persons in the first five years of life. Such programs appear to have few negative effects and some clear benefits for its subjects. It is important going forward that more stringent, experimental evaluations of early family/parent training be carried out and its outcomes assessed over the long-term (i.e., include more follow-up periods, especially follow-ups into late adolescence and into adulthood) in order to cast a wide net with respect to the outcomes under investigation to include non-crime life domains as well, and to conduct comprehensive cost-benefit analyses of these programs.

1. Background

A key observation in longitudinal studies of antisocial behavior, delinquency, and crime indicates that chronic disruptive behavior that emerges early in the life course leads to frequent and oftentimes serious delinquency and crime during childhood, adolescence, and adulthood (McCord, Widom, & Crowell, 2001; Piquero, Farrington, & Blumstein, 2003) and also produces negative reverberations in other, non-crime life domains such as education, employment, and relationship quality (Moffitt, 1993). Because of this strong linkage or cumulative continuity over the life course and across life domains, it is not surprising to learn that early prevention has been suggested as an important policy proscription with respect to early childhood problem behavior (Farrington & Welsh, 2007). And, because children exhibiting early-life behavior problems become increasingly resistant to change over the life course (Frick & Loney, 1999; Tremblay, 2000), it becomes even more important to begin such services as early in the life course as possible, as these efforts may have a larger benefit when focused on high-risk families.[1]

One such vehicle includes early family/parent training programs. Such programs generally postulate that improving the quality of parent-child relations, which is a key feature of early family/parent training programs, will facilitate learning of control over impulsive, oppositional, and aggressive behavior, thus reducing disruptive behavior and its long-term negative impact on social integration (Bernazzani & Tremblay, 2006:22). In practice, such interventions attempt to change the social contingencies in the family context and/or provide advice/guidance to parents on raising their children or general parent education (Tremblay & Craig, 1995; Hawkins et al., 1999; Kazdin et al., 1992). Although a recent meta-analysis found that the two main types of family-based programs, general parent education (i.e., home visiting programs aimed at improving health and parenting skills and parent education plus daycare services) and parent management are effective in preventing delinquency or later criminal offending (Farrington & Welsh, 2003), and other reviews of the effectiveness of home visiting programs, including a systematic review (Bilukha et al., 2005) and a narrative review (Gomby et al., 1999) found that the evidence on child behavior outcomes was a bit more mixed, the totality of the evidence on early family/parent training programs is muddied (Farrington & Welsh, 2007:122), largely because of the lack of a significant number of experimentally-based early family/parent train-

[1] It is the case that despite this strong cumulative continuity, most children assessed as 'antisocial' when young do not grow up into antisocial adults (Robins, 1978; Scott, 2002).

ing programs that contain long-term information on delinquency and crime.

As background, we provide a brief overview of Farrington and Welsh's (2003) meta-analysis of the effectiveness of family-based crime prevention programs (carried out in several settings: home visiting programs, daycare/preschool programs, parent training programs, school-based programs, home/community programs with older adolescents, and multi-systemic therapy programs).[2] Specifically, these authors included in their review studies that met the following criteria: (a) the family was the focus of the intervention, (b) there was an outcome measure of delinquency or antisocial child behavior, (c) the evaluation used a randomized experiment, and (d) the original sample size included at least fifty persons. In general, while effect sizes were generally greater in smaller scale studies, the forty studies that met their criteria had a favorable effect on antisocial behavior and delinquency, with a decrease in offending from 50% in the control group to 39% in the experimental group. (The mean effect size for all delinquency outcomes in 19 studies was .321, corresponding to a significant 16% reduction in recidivism, e.g., from 50% in the control group to 34% in the experimental group.) Additionally, the effects persisted in long-term evaluation studies. Their review also indicated that the most effective interventions employed behavioral parent training, while the least effective were based in schools. Finally, home-visiting, day care/preschool, home/community, and multi-systemic therapy programs were generally effective.

The specific focus of the current review is on early parent training programs through age 5 (of the child) in preventing child behavior problems including antisocial behavior and delinquency. This focus permits us to compare our results to one previous review that we extend in important ways, to which we now turn our attention to.

In a systematic review of early parent training interventions designed to impact children's delinquency limited to families with a *child under age three* at the start of the intervention (but without limits concerning the child's age at the end of the intervention), Bernazzani and Tremblay (2006) identified seven studies. Although the studies varied greatly with respect to outcome measures, child's age at evaluation, the nature and duration of the intervention and sample size, and the study's geographic location and its inclusion criteria (selective vs. universal), their analysis indicated that, overall, results concerning the effectiveness of parent training in the prevention of behavior problems in children were mixed: four studies reported no evidence of

[2] It is important to note that these authors did not conduct an exhaustive review as they did not search major abstracting services such as PSYCHINFO, which would have, using general search terms, identified a great many more studies that they likely identified through their process.

effectiveness, two reported beneficial effects, and one study reported mainly beneficial effects with some very minor harmful effects (p. 26). Only one study in their review evaluated the effectiveness of home visitation and parent training on delinquency, and it reported very positive, crime-reduction effects (Olds et al., 1998). In short, it is still too early, from their review, to draw any definitive statement as to whether early parent training and support is effective in preventing disruptive behaviors in children and delinquency during adolescence. This is so because of the limited number of adequately designed studies, the results of the well-designed studies available are mixed and where positive often modest in magnitude, and very few studies were specifically designed to prevent disruptive behaviors in children.

With respect to parent management training, several narrative and comprehensive vote-counting reviews, as well as one meta-analysis (Serketich & Dumas, 1996) provided support that this is an effective early family-based intervention to prevent delinquency and offending. And while cost/benefit analyses have been rare, Greenwood et al. (2001) reported a benefit/cost ratio of 4:1 of the Elmira nurse home visitation program (i.e., the Olds et al., 1998 study). Both Greenwood (2006) and Aos et al. (2004, 2006) have recently reported similar benefit/cost ratios for nurse home visitation programs generally, and early family/parent training programs in particular.[3]

Defining Early Family/Parent Training

Since it can be construed as a very general term, it is useful here to define what parent training is and is not (though this was not done in the Bernazzani and Tremblay review). There are two general subcategories that deal with prevention programs for early childhood based on their general approach (Greenwood, 2006:52). The first, home visitation, include those programs for mothers with infants, with or without additional services. According to Greenwood (2006:52), these programs "work with at-risk mothers to improve their prenatal health status, reduce birth complications, and provide guidance and support in caring for the infant and improving the quality of their own lives. Programs differ in how they identify at-risk mothers, when the home visits begin and end, who the visitors are, what the visits cover, and what other services are provided." The main goals of home visiting programs center around educating parents to improve the life chances of children from a very young age, often beginning at birth and sometimes in the final trimester of pregnancy.[4] Accord-

[3] We should also note that recent public polling data indicates that the public is willing to pay significant dollars for early-life nurse home visitation programs (Nagin, Piquero, Scott, & Steinberg, 2006).

[4] To be sure, some home visiting programs start prior to the third trimester, and thus operate during pregnancy.

ing to Farrington and Welsh (2007:123), "Some of the main goals include the prevention of preterm or low-weight births, the promotion of healthy child development or school readiness, and the prevention of child abuse and neglect. Home visits very often also serve to improve parental well-being, linking parents to community resources to help with employment, educational, or addiction recovery." The second subcategory includes those programs that combine parent training, daycare, and preschool for parents with preschool children. According to Greenwood (2006:54), these programs "attempt to advance cognitive and social development of the children, as well as the parenting skills of their caregivers, so that participants will be better prepared and more successful when they enter regular school. Some programs include home visits as well." According to Farrington and Welsh (2007:125), "[D]aycare programs are distinguished from preschool programs, in that the daycare programs are not focused on the child's intellectual enrichment or necessarily on readying the child for kindergarten and elementary school, but serve largely as an organized form of daycare to allow for parents (especially mothers) to return to work. Daycare also provides children with a number of important benefits, including social interaction with other children and stimulation of their cognitive, sensory, and motor control skills." Another set of programs within this subcategory include parent management training programs which refer to treatment procedures in which parents are trained to alter their child's behavior at home (Farrington & Welsh, 2007:126). Many of these programs are based on Patterson's (1982) behavioral parent management training theory and policy efforts.

To conclude this section, it is useful to repeat Farrington and Welsh's (2007:136) summary of the evaluation literature on this issue: "parent education plus daycare services and parent management training are effective in preventing delinquency and later offending. There is seemingly less consensus among evidence-based reviews on the effectiveness of parent education in the context of home visiting. Our meta-analytic review, based on four clearly defined, well-implemented, and methodologically rigorous home visitation programs, found that this form of early intervention was effective in preventing child antisocial behavior and delinquency. None of the other reviews (one a narrative review) utilized meta-analytic techniques to assess results, and in two of the reviews, programs other than home visiting were included. In our estimation, these differences go a long way toward explaining why these reviews found mixed results regarding the efficacy of home visiting."

2. Review objectives

The objective of this systematic review is to synthesize the extant empirical evidence (published and unpublished) on the effects of early family/parent training programs implemented in early childhood in preventing child behavior problems including antisocial behavior and delinquency. The report will conform to the systematic review methodology and will incorporate meta-analytic techniques to assess results. It will build on and update (actually add and complete) the Bernazzani et al. (2001) and Bernazzani and Tremblay (2006) systematic reviews of the effectiveness of early parenting training programs (for families with children up to age 3) in preventing child disruptive behavior (i.e., opposition to adults, truancy, aggression) and delinquency. Their review included parent education in the context of home visiting and parent education plus daycare. As such, the primary question of this review is: What is the effectiveness of early family/parent training programs implemented in early childhood in reducing child behavior problems including antisocial behavior and delinquency? When data are available, we will also collect information on cost-effectiveness of early family/parent training programs and their effect on antisocial behavior, delinquency, and crime.

This review is divided into five sections. The second section provides some background on the policy issues regarding the use of family programs to prevent crime as well as a brief overview of prior family program reviews. The third section, on research methods, reports on the criteria for inclusion of family program studies in this review and the methods used to search for evaluation studies. The fourth section reports on the key features of the studies that were included and the results of the meta-analysis. The final section provides some concluding comments and explores implications for policy and research.

Policy Relevance

In recent years, there has been a marked and sustained growth in the use of family programs in many Western nations as one method of crime prevention and intervention. The Canadian province of Quebec, for example, has taken on family prevention as a key social component. Because of the importance and visibility of this social policy, we review its background in some detail below.

For nearly a decade the Measurement, Methods, and Statistics Section of the National Science Foundation (NSF) and the NSF-sponsored National Consortium on Violence Research (NCOVR) have supported research on the development of a group-based method for identifying distinctive groups of individual trajectories within the population and for profiling characteristics of group members (Nagin, 2005; Nagin & Land, 1993). As applied to delinquency and crime, the use

of trajectory-based methods has identified a particularly interesting group of individuals who offend at fairly high and stable rates over the life course (see review in Piquero, 2008). These offenders typically constitute a very small percentage of the population and have extraordinarily high levels of contact with the juvenile justice system, violent delinquency, and school failure. A key finding of this line of research also shows that certain risk/protective factors distinguish between trajectory groups. One set in particular emerging from Nagin and Tremblay's (2001) research using data from a sample of over 1,000 low-income males from Quebec, are boys born to mothers who were poorly educated and who began childbearing as teenagers. These risk factors were associated with a high probability of following a chronic offender trajectory. This result was key to convincing the provincial government of Quebec to initiate a multi-faceted program to support certain at-risk mothers (i.e., young mothers living in poverty). Specific objectives of the Quebec program are to improve the mother's parenting skills and to increase their use of prenatal services. At full scale, the program will be funded at the level of $70 million annually.[5]

In addition to this social policy, there is some research indicating that the public does believe in prevention efforts generally, and funding these efforts at an increase to taxes in particular. In one study, Nagin et al. (2006) collected data from a random sample of 2,000 Pennsylvania residents to examine their willingness to pay for an early-child/nurse-home intervention program (largely one modeled after the Olds et al. Nurse Home Partnership Program). Specifically, these authors developed a survey that assessed Pennsylvania citizens' willingness to pay for early childhood prevention. After reading a hypothetical vignette designed to gauge their interest in spending additional tax dollars for a program that they were told reduced children's later involvement in crime and also cut their alcohol use during adolescence (as well as cut welfare use of the women themselves and reduced the chances of their abusing their children), respondents were asked if they would be willing to pay an additional $150 in taxes for that specific change in the law. If the respondents indicated yes to the initial question, they were asked if they would be willing to pay double, and if they said no to the original $150 question, they were asked if they would be willing to pay $75. They found that willingness to pay for early childhood prevention was substantial. Specifically, the average willingness to pay for the program was $125 (65% of the respondents would be willing to pay a non-zero amount for funding the program), and a rough benefit to cost ratio yielded an estimate of 1.79, implying that the benefits of the program would exceed its costs.

[5] The program is also now being extended to Dublin and Paris. In Dublin, the objective is to reach 200 women (within an experimental design), while the experimental program in Paris is intended to include 400 high-risk women.

In short, there has been much debate about the effectiveness of early family/parent training programs to prevent crime and hence, on the wisdom of spending large sums of money on this effort. A key issue is how far funding for these programs, especially in the United States and Canada, has been based on high quality scientific evidence demonstrating its efficacy in preventing child behavior problems including antisocial behavior and delinquency. Recent reviews of these efforts have noted the need for more and higher quality, independent evaluation studies.

Prior Reviews

Prior to 2008, there have been several reviews of family prevention programs through age 3, and these include both quantitative and narrative reviews. A detailed overview of these studies and their main findings was highlighted earlier. One other review, which used a somewhat different methodology for identifying studies than those discussed above, is also worthy of mention. Greenwood (2006) recently reviewed successful delinquency prevention programs for infants and children. Specifically, in order to identify the most promising programs, Greenwood relied on the review efforts of the Blueprints Program administered by the Center for the Study and Prevention of Violence at the University of Colorado and the review of prevention strategies and programs contained in the surgeon general's report on youth violence. His focus was on violence and delinquency outcomes.

Greenwood's review identified six promising prevention programs: (1) home visits by nurses, (2) day care and home visits, (3) multicontextual (home visits, parent training, services), (4) preschool and home visits, (5) parent training, and (6) parent training plus other skills training and structured play. Greenwood subsequently parceled out these programs into two subcategories based on their general approach: (1) home visitation programs with/without additional services and (2) various combinations of parent training, daycare, and preschool for parents with preschool children.

Because the six prevention programs were identified as meeting Greenwood's criteria for programs that 'work', he reached several additional conclusions. First, infancy and early-childhood programs that prevent delinquency can also prevent a number of other developmental and family problems. Second, cost-benefit assessments indicate that the programs produce important savings in future governmental expenses for program investment, and the benefits increase when a variety of outcomes (beyond crime) are included. In particular, data and relevant calculations from Aos et al.'s (2001) cost-benefit analyses regarding two specific prevention programs, Nurse Family Partnership (NFP) and Perry Preschool (PP), indicate that these two

programs are somewhat costly largely because they serve each youth and family for two years and require highly trained staff (Greenwood, 2006:75). And although they do not prevent as many convictions as other efforts (and hence incur higher program costs per conviction prevented), this is likely due to the program's focus on families at high-risk for poor child outcomes, of which crime is but one feature. In fact, long-term follow-up studies show that these programs also attain a wider range of benefits that include better educational and employment outcomes, reduced alcohol/drug use, and savings with respect to healthcare and welfare costs. In short, taxpayer benefits/savings compared to cost per youth were quite high for both NFP and PP. Finally, these programs work best when they target at-risk families, especially when considering their cost-benefit estimates.[6]

Summary & Current Focus

Across all of the reviews highlighted above, a few summary conclusions can be reached. First, most family prevention programs have been focused on either parental education (sometimes combined with daycare, other times combined with nurse home visitation) or parental management training. With respect to the family prevention programs that include home visitation, the evidence that has accumulated from the very small research base yields mixed results, though the one main experimental evaluation of a nurse home visitation program provided strong delinquency prevention benefits. With respect to parent education including daycare, the evidence is a bit more supportive of a delinquency reduction. And with respect to parent management training programs, there is some evidence about their effect on child behavior problems including antisocial behavior and delinquency, but the reviews have generated mixed findings (Serketich & Dumas, 1996) or are narrative-based (Duncan & Magnusson, 2004).

Second, there are very few family prevention programs that are carried out with strong methodological research designs, especially randomized experiments containing experimental and control groups, that contain delinquency as an outcome and that include long-term follow-ups.

Third, it is also true that several of the family prevention programs have involved multiple interventions targeted on parents (and indirectly their children). This makes it difficult to establish that it is the family-focused intervention exclusively that caused the observed program effects.

In sum, the evidence across the small number of (especially experimentally-based) studies reviewed has been mixed in general, but ac-

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[6] In fact, Karoly et al.'s (1998) economic analysis shows that NFP programs are not cost-effective with lower risk families and also that periods of service longer than two years do not increase long-term effects.

cording to Farrington and Welsh (2007:136) there is a trend suggesting that the programs do offer some delinquency reduction, but that there is variation within family-based prevention programs (including the lack of separating the results across the specific intervention types; Bernazzani & Tremblay, 2006). The point of departure for the current study begins with the Farrington and Welsh and Bernazzani and Tremblay reviews. Our review advances these efforts in several important ways including: (1) allowing for interventions through age 5, (2) separating the various types of interventions (parent training versus home visitation), and (3) updating the database regarding parenting prevention programs through early 2008.

3. Methods

Criteria for Inclusion and Exclusion of Studies in the Review

Following the earlier Bernazzani and Tremblay (2001:92) review and the more general systematic (Campbell) reviews, the scope of this current review is randomized, controlled experimental studies including pre-post evaluations of family programs. Studies lacking random assignment were excluded as they cannot help differentiate intervention effects from other effects including developmental effects. The preliminary eligibility criteria are as follows:

Types of Studies: The study must have used a randomized controlled experimental design.

Types of Participants: The review was primarily limited to families with a child under age 5 or the mean age of the sample was approximately age 5 at the start of the intervention to ensure that the interventions were provided early in the child's life. Following from this criterion, the study also had to have measured a child behavioral outcome in this same developmental period.

Type of Intervention: Studies were eligible for this review when parent training or support was a major component of the intervention, i.e., parent training was the central component of the intervention, although not necessarily the only one.

Types of Outcomes: Studies had to provide outcome measures of child behavioral problems including antisocial behavior and delinquency.

Sufficient Data: The study had to provide adequate data for calculating an effect size if one was not provided (i.e., means and standard deviations, *t*-tests, *F*-tests, *p*-values, etc.) in order to calculate an effect size. Thus, studies were excluded if they did not provide sufficient data or if the results were merely reported as non-significant. In addition, studies that failed to provide any information on the sample size for either the treated or control groups for which their analysis was based on were also excluded.

There is no restriction to timeframe, other than we will begin with the first study identified by Bernazzani et al. (2001).

There are no geographic restrictions.

Studies needed to be published in English.

Search Strategy for Identification of Relevant Studies

Several strategies were used to perform an exhaustive search for literature fitting the eligibility criteria. First, a key word search was performed on an array of online abstract databases (see lists of keywords and databases below). Second, we reviewed the bibliographies of four past reviews of early family/parent training programs (Mrazek & Brown, 1999; Tremblay, LeMarquand, & Vitaro, 1999; Bernazzani et al., 2001; Farrington & Welsh, 2007). Third, we performed forward searches for works that have cited seminal studies in this area.[7] Fourth, we performed hand searches of leading journals in the field.[8] Fifth, we searched the publications of several research and professional agencies (see list below). Sixth, after finishing the above searches and reviewing the studies as described later, we e-mailed the list to leading scholars knowledgeable in the specific area. These scholars were defined as those who authored two or more studies that appear on our inclusion list. These experts referred us to studies we may have missed, particularly unpublished pieces such as dissertations. Finally, we consulted with an information specialist at the outset of our review and at points along the way in order to ensure that we have used appropriate search strategies.

The following databases were searched:

1. Criminal Justice Periodical Index
2. Criminal Justice Abstracts
3. National Criminal Justice Reference Services (NCJRS) Abstracts
4. Sociological Abstracts
5. Social Science Abstracts (SocialSciAbs)
6. Social Science Citation Index
7. Dissertation Abstracts
8. Government Publications Office, Monthly Catalog (GPO Monthly)
9. PsychINFO
10. C2 SPECTR (The Campbell Collaboration Social, Psychological, Educational and Criminological Trials Register)

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[7] The seminal pieces used here were: Tremblay and Craig (1995); Olds et al. (1998); Bernazzani et al. (2001).

[8] These journals include: Criminology, Criminology and Public Policy, Justice Quarterly, Journal of Research in Crime and Delinquency, Journal of Criminal Justice, Police Quarterly, Policing, Police Practice and Research, British Journal of Criminology, Journal of Quantitative Criminology, Crime and Delinquency, Journal of Criminal Law and Criminology, Policing and Society, as well as psychology/psychiatry journals including among others, Child Development.

11. Australian Criminology Database (CINCH)
12. MEDLINE
13. Web of Knowledge
14. IBSS (International Bibliography of the Social Sciences
15. *Future of Children* (publications)

The publications of the following groups were searched:
1. Washington State Institute for Public Policy
2. Institute for Law and Justice
3. Vera Institute for Justice
4. Rand Corporation

The following agencies' publications were searched and the agencies were contacted if necessary:
1. Home Office (United Kingdom)
2. Australian Institute of Criminology
3. Swedish National Council for Crime Prevention
4. Cochrane Library
5. SAMSHA
6. Institute of Medicine
7. American Psychiatric Association
8. OJJDP (Office of Juvenile Justice & Delinquency Prevention)
9. Youth Justice Board, Department of Health and Department of Children, Schools, and Families (UK)
10. NICE (National Institute for Health and Clinical Excellence) UK
11. National Children's Bureau (which publishes 'Child Data Abstracts')

The following keywords were used to search the databases listed above:
1. "Parent Training" and "childhood" or "pre-school" and "delinquency" or "conduct disorder" or "antisocial behavior" or "aggression" or "physical aggression" or "behavior problems".
2. "Family Training" and "childhood" or "pre-school" and "delinquency" or "conduct disorder" or "antisocial behavior" or "aggression" or "physical aggression" or "behavior problems".

Several strategies were used to obtain full-text versions of the studies found through searches of the various abstract databases listed above. First, we attempted to obtain full-text versions from the electronic journals available through the John Jay/CUNY library research port as well as those from the University of Maryland and the University of Louisville. When electronic versions were not available, we used print versions of journals available at the library. If the journals were not available at the university libraries, we used the Interlibrary Loan Office (ILL) to try to obtain the printed version from the libraries of other area schools. When these methods did not work, we contacted the author(s) of the article and/or the agency that funded the research to try to obtain a copy of the full-text version of the study.

Description of Methods Used in the Included Studies

All studies included in this review will be randomized controlled experiments. In all cases, the participant samples will be families and children, a sample of who will participate in the program and a sample who will not participate in the program. Also, all studies contained in the review included a post-program measure of childhood behavior problems (i.e., antisocial behavior, delinquency, or crime). These included dichotomous indicators or more differentiated indicators that indicated the specific types of offenses or the frequency of offenses committed. A few studies reported on other outcomes, such as school performance. We did not code these other outcomes.

Criteria for Determination of Independent Findings

One issue that must be confronted and dealt with in meta-analytic research is the assumption of statistical independence. It is certainly common for a lot of studies to report multiple outcomes and for the same and/or different authors to report additional findings (i.e., long-term follow-ups) for the same sample that was targeted in an earlier intervention. Relying on more than one observation (i.e., time 1, 2, 3) and/or multiple sources of observations (i.e., parent reports, teacher reports, direct observer reports) can lead to underestimating error variance and inflating significance tests (see Tabachnick & Fidell, 2001). While some meta-analytic studies in this line of research have opted to rely only on one outcome source over another for reasons such as teacher ratings are likely to be more independent of a parent/family-based intervention than parent reports and systematic "unbiased" observer ratings may be more accurate than teacher ratings (see Farrington & Welsh, 2003), other parenting intervention meta-analyses have favored averaging effect sizes (ESs) across outcome measures

and outcome sources when creating an ES for each study (see McCart et al., 2006).

Some studies reported multiple findings on different outcomes and/or different samples of treated groups. In the case of independent samples, the results will be treated as separate findings and all such results will be included in the analysis. Other studies reported on several groups that received various forms of the intervention (i.e., parent training only, parent training plus a special classroom program, etc.). Our final decision here was to pool together the separate ESs into a single summary ES for each individual study because we were primarily interested in the overall effect of the early family/parent training programs on child behavior problems including antisocial behavior and delinquency in general. (Note: We do indicate that future evaluation studies parcel out and specifically focus on the effect of early family/parent training on unique child behavior problems including antisocial and delinquent behaviors).

As previously mentioned, the studies that only reported long-term (i.e., adolescent/adult) outcomes were not included in generating the effect size in this study but their results are further elaborated on in the analysis that follows. Similarly, in studies that included follow-up assessments after post-treatment assessment only the post-treatment assessment was utilized for calculating the effect size for the study. This enhances the comparability of the studies included in this review as well as reduces the potential bias of having some studies that have short- and long-term and/or repeated assessments incorporated in the ES whereas others are only based on a post-treatment assessment. Furthermore, it is often the case that follow-up measures are only collected on the treated sample and not the control group. This is a common result of the treatment/wait-list condition nature of a majority of the studies included in this analysis where the control group (i.e., the wait list group) immediately receives the treatment after the initial post-assessment.

Similarly, the concern with statistical non-independence was also handled in the studies that used multiple sources of outcome measures such as parent reports, teacher reports, and/or direct observer reports by generating an effect size for each measure and then calculating an averaged effect size per source and then generating an average effect size across sources. For example, if parent responses were provided for the Achenbach Child Behavior Checklist (CBCL) and the Eyberg Child Behavior Inventory (ECBI) then an ES would be generated for the CBCL scores and a separate ES would be generated for the ECBI scores. The ESs of these two parent report measures would be averaged to generate one ES. Following this same logic, if the outcome measures were from multiple sources, then an ES would be estimated per source (i.e., parent report, teacher report, and/or direct observer

report) and then one ES would be created by averaging across the outcome sources. Furthermore, it was relatively common for some studies to use both mother and father reports. In cases such as this, a separate ES was generated for each parent across all relevant measures and then one ES for the parent reports was generated by averaging the two ESs estimated from the parents.

Treatment of Qualitative Research

Qualitative studies were not included in the current review.

4. Results

Literature Search

As mentioned previously we utilized a variety of mechanisms for trying to locate studies that may be relevant for the meta-analysis. The preliminary key word searches across the numerous computer databases and government/agency websites, forward and backward searches of relevant literature reviews and previous meta-analyses, hand searches through key identified journals, and email/phone contacts with leading scholars in the subject area produced over 4,000 hits.

Next, after a substantial number of duplicate sources and sources not available in the English language were removed, potentially relevant titles and abstracts were examined and studies removed if not applicable, and verification was made after retrieving the entire article that the intervention was in fact early family/parent training, these results yielded 166 studies. These studies were analyzed carefully according to the inclusion criteria described previously and 87 of these studies were excluded for not meeting the inclusion criteria for either lacking random assignment, targeting mostly older children and/or adolescents (i.e., over mean age 5), focusing on developmentally disabled children, or failing to report any child outcome behavioral data or enough information to calculate an ES. A brief examination of the results of the excluded studies indicated that the overwhelming majority of the studies found that early family/parent training was effective for reducing a host of childhood and adolescent behavior problems; however, much credence cannot be given to these results given the drastic differences in sample size, methodology, targeted age groups for intervention, and/or lacking random assignment or an adequate control group, or in some cases not including a control group at all.

Thus, 79 studies remained after the initial exclusion criteria were analyzed. Next, these remaining studies were further examined in order to address the issue of independence. In other words, it was necessary to exclude studies that were based on the same sample that previous author(s) had already reported on. Twenty-five of these 79 studies were determined to be based on the same sample of one of the included studies and these supplemental (i.e., non-independent studies) were excluded from this meta-analysis (Baydar et al., 2003; Bor et al., 2002; Brooks-Gunn et al., 1994; Cullen & Cullen, 1996; Farnworth et al., 1985; Fergusson, 2005a; Foster et al., 2007; Gross et al., 1995; Hutchings et al., 2007; Johnson, 2006; Johnson & Walker, 1987; Jones et al., 2007; McCormick et al., 2006; Olds et al., 2002, 2004, 2007; Reid et al., 2001, 2004; Schweinhart, 2007; Schweinhart & Xiang, 2003; Schweinhart et al., 1985; Tucker et al., 1998). Furthermore, two studies (Olds et al., 1998; Reynolds et al., 2001) only

provided data on adolescent/adult outcomes and were not included in the meta-analysis.[9] Thus, the final sample of studies included in this review was 55 studies.

Characteristics of Studies Included in Meta-Analysis

As mentioned previously after the rigorous assessment of all studies, 55 studies were determined to meet all of the criteria for inclusion and the analysis that follows now focuses on these particular studies. Table 4.1 below describes the author(s), the date of publication, the location of the intervention, the type of the intervention, the original sample size of the treatment and control groups and the targeted age(s) of the early family/parent training intervention. The majority of the interventions were carried out in the United States (n=39), followed by Australia (n=7), the United Kingdom (n=4), Canada (n=2), the Netherlands (n=1), New Zealand (n=1), and China (n=1). Similarly, the majority of the studies were based on published data (n=51), however, there were four interventions that met the inclusion criteria that were from unpublished data. Three of the four unpublished studies were dissertations (Fanning, 2007; Tucker, 1996; Tulloch, 1996); and another was a paper that has yet to have been published (Kim et al., 2007). Based on the selection criteria described previously, all of the interventions were randomized controlled experiments. Most of the interventions (n=47) could be broadly classified as parent training programs although some of these studies might have also included home visits (e.g., Abbott-Shimm et al., 2003; Johnson & Breckenridge, 1982; Schweinhart et al., 1993; Songua-Barke et al., 2001), whereas eight of the studies were considered home visitation programs as defined by Greenwood (2006) (i.e., the Olds et al., 1998 research design for example) (Butz et al., 2001; Cullen, 1976; Fergusson et al., 2005b; Heinecke et al., 2001; Kitzman et al., 1997; McCarton et al., 1997; Olds, Robinson, Pettitt et al., 2004; Stone et al., 1988). The majority of the studies were considered small sample studies, with 37 of the studies being based on samples of less than 100 children. The studies covered more than a thirty-year time span, with the earliest study published in 1976 (Cullen, 1976) and the most recent study published in 2008 (Hiscock et al., 2008). On average, the studies were published in 1997.

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[9] Farrington and Welsh (2003) provided a recent meta-analysis examining the effects of early family/parent training on adolescent and adult outcomes of these two excluded studies and found an ES (d) 0.54 for Olds et al. (1998), and 0.28 for Reynolds et al. (2001). In addition, the outcomes in these two studies were based on official data (i.e., arrests), whereas the outcomes in all of the 55 included studies were based on self-report instruments (i.e., parent-, teacher, -and/or direct observer reports).

Table 4.1. Early Family/Parent Training Program Evaluations Included in Meta-Analysis.

Author, Publication Date	Location	Type of Intervention	Time of Study	Original Sample Size[a]	Targeted Age(s)
Abbott-Shim et al. (2003)	Southern Urban Setting USA	Parent Training	1998–1999	E=87 C=86	4 year olds
Barkley et al. (2000)	Worcester, Massachusetts USA	Parent Training	1991–1996	E=79 C=42	Kindergarteners ≈5 year olds
Bradley et al. (2003)	Metropolitan Toronto Canada	Parent Training	1998	E=119 C=109	3-4 year olds
Brestan et al. (1997)	USA	Parent-Child Interaction Therapy Parent Training	NR[b]	E=14 C=16	Mean age= 4.54 years
Butz et al. (2001)	Two Urban Hospitals USA	Home Visits	1994–1997	E=59 C=58	Birth
Connell et al. (1997)	Rural South East Queensland Australia	Parent Training	NR	E=12 C=12	2-6 year olds
Cullen (1976)	Australia	Home Visits	1964–1967	E=124 C=122	1 year olds
Cunningham et al. (1995)	Hamilton Schools USA	Parent Training	1991–1993	E=94 C=56	Junior Kindergarten ≈4 year olds
Edwards et al. (2007)	North and Mid Wales United Kingdom	Incredible Years Parenting Program Parent Training	NR	E=86 C=47	3-4 year olds
Eyberg et al. (1995)	USA	Parent-Child Interaction Therapy Parent Training	NR	E=19 C=8	3-6 year olds
Fanning (2007)*	USA	Parent Training	2005–2006	E=14 C=14	3-5 year olds

Author, Publication Date	Location	Type of Intervention	Time of Study	Original Sample Size[a]	Targeted Age(s)
Feinfield & Baker (2004)	Los Angeles, California USA	Parent Training	NR	E=24 C=23	4-8 year olds
Fergusson et al. (2005b)	Christchurch New Zealand	Home Visits	2000–2001	E=220 C=223	Birth
Gardner et al. (2006)	Oxford United Kingdom	Incredible Years Parenting Program Parent Training	NR	E=44 C=32	2-9 year olds
Hamilton & MacQuiddy (1984)	USA	Parent Training	NR	E=18 C=9	2-7year olds
Heinicke et al. (2001)	Los Angeles, California USA	Home Visits	NR	E=31 C=33	Birth
Helfenbaum & Ortiz (2007)	New York City, New York USA	Incredible Years Parenting Program Parent Training	NR	E=23 C=16	3-5 year olds
Hiscock et al. (2008)	Melbourne, Victoria Australia	Parent Training	2004	E=329 C=404	6-7 month olds
Johnson & Breckenridge (1982)	Houston, Texas USA	Parent Training	1970	E=214 C=244	1 year olds
Kim et al. (2007)*	First-Generation Korean Americans USA	Incredible Years Parenting Program Parent Training	2003–2004	E=20 C=9	3-8 year olds
Kitzman et al. (1997)	Memphis, TN USA	Home Visits	1990–1991	E=681 C=458	Birth
Leung et al. (2003)	Hong Kong, China	Triple P Parenting Program Parent Training	2001	E=74 C=17	3-7 year old

Author, Publication Date	Location	Type of Intervention	Time of Study	Original Sample Size[a]	Targeted Age(s)
Markie-Dadds & Sanders (2006)	Australia	Triple P Parenting Program Parent Training	NR	E=32 C=31	2-5 year olds
McCarton et al. (1997)	USA	Home Visits	1984–1985	E=377 C=608	Birth
McNeil et al. (1991)	USA	Parent-Child Interaction Therapy Parent Training	NR	E=10 C=10	2-7 year olds
Morawska & Sanders (2006)	Brisbane, Queensland Australia	Triple P Parenting Program Parent Training	NR	E=85 C=41	Mean age=26.10 months
Nicholson et al. (1998)	USA	Parent Training	NR	E=20 C=20	1-5 year olds
Nicholson et al. (2002)	Large Urban Midwestern city USA	Parent Training	NR	E=13 C=13	1-5 year olds
Olds, Robinson, Pettitt et al. (2004)	Denver, Colorado USA	Home Visits	1994–1995	E=480 C=255	Birth
Patterson et al. (2002)	Oxford United Kingdom	Incredible Years Parenting Program Parent Training	NR	E=60 C=56	2-8 year olds
Reid et al. (2007)	Seattle, Washington USA	Incredible Years Parenting Program Parent Training	NR	E=89 C=97	Kindergarteners ≈5 year olds
Sandy & Boardman (2000)	New York, New York USA	Parent Training	1997-1999	N=404	2-6 year olds

Author, Publication Date	Location	Type of Intervention	Time of Study	Original Sample Size[a]	Targeted Age(s)
Sanders, Markie-Dadds et al. (2000a)	Brisbane, Australia	Triple P Parenting Program Parent Training	NR	E=228 C=77	3-4 year olds
Sanders, Montgomery et al. (2000b)	Metropolitan city Australia	Triple P Parenting Program Parent Training	NR	E=28 E=28	2-8 year olds
Schuhmann et al. (1998)	USA	Parent-Child Interaction Therapy Parent Training	NR	E=37 C=27	3-6 year olds
Schweinhart et al. (1993)	Ypsilanti, Michigan USA	Parent Training	1958–1962	E=58 C=65	3-4 year olds
Scott et al. (2001)	South London United Kingdom	Incredible Years Parenting Program Parent Training	1995–1999	E=90 C=51	3-8 year olds
Shaw et al. (2006)	Pittsburgh, Pennsylvania USA	Parent Training	2001	E=60 C=60	2 year olds
Sonuga-Barke et al. (2001)	USA	Parent Training	1992–1993	E=58 C=20	3 year olds
Strayhorn & Weidman (1991)	USA	Parent Training	1987–1988	E=50 C=48	3-4 year olds
Stone et al. (1988)	USA	Home Visits	1977–1980	E=90 C=60	Birth
Taylor et al. (1998)	Ontario, Canada	Incredible Years Parenting Program and Eclectic Parent Training	NR	E=92 C=18	3-8 year olds

Author, Publication Date	Location	Type of Intervention	Time of Study	Original Sample Size[a]	Targeted Age(s)
Tucker (1996)*	USA	Incredible Years Parenting Program Parent Training	NR	E=12 C=12	2-3 year olds
Tulloch (1997)*	Bronx and Queens, New York USA	Parent Training	NR	E=20 C=7	3-5 year olds
Van Zeijl et al. (2006)	Western region Netherlands	Parent Training	2001–2002	E=120 C=117	1-3 year olds
Webster-Stratton (1982)	USA	Incredible Years Parenting Program Parent Training	NR	E=16 C=19	3-5 year olds
Webster-Stratton (1984)	USA	Incredible Years Parenting Program Parent Training	NR	E=24 C=11	3-8 year olds
Webster-Stratton et al. (1988)	USA	Incredible Years Parenting Program Parent Training	NR	E=85 C=29	3-8 year olds
Webster-Stratton (1990)	USA	Incredible Years Parenting Program Parent Training	NR	E=31 C=14	3-8 year olds
Webster-Stratton (1992)	USA	Incredible Years Parenting Program Parent Training	NR	E=59 C=41	3-8 year olds

Author, Publication Date	Location	Type of Intervention	Time of Study	Original Sample Size[a]	Targeted Age(s)
Webster-Stratton & Hammond (1997)	USA	Incredible Years Parenting Program Parent Training	NR	E=55 C=22	4-8 year olds
Webster-Stratton (1998)	USA	Incredible Years Parenting Program Parent Training	NR	E=345 C=167	Pre-school children ≈4 year olds
Webster-Stratton et al. (2001)	USA	Incredible Years Parenting Program Parent Training	NR	E=191 C=81	4 year olds
Webster-Stratton et al. (2004)	Seattle, Washington USA	Incredible Years Parenting Program Parent Training	1995–1997	E=80 C=26	4-8 year olds
Zangwill (1983)	USA	Parent-Child Interaction Therapy Parent Training	NR	E=8 C=7	2-8 year olds

Note. Group sample sizes that did not receive parenting intervention or were not in the control group are not reported in the figures above.
[a] E = Experimental; C = Control
[b] NR = Not Reported
*unpublished data

Types of Early Family/Parent Training Interventions

Although we do not have space in this review to provide a detailed study-by-study description of all the features and components of the early family/parent training intervention used, we will briefly elaborate on a few of the most well-known/recognizable types of interventions. As mentioned previously the majority of the studies included in this meta-analysis utilized some type of parent training program. These parent training programs typically involved either individual or group-based parent training sessions that were conducted in a clinic, the school, or some other type of community-based site and the main parenting intervention programs were the Incredible Years Parenting Program, the Triple P-Positive Parenting Program, and Parent-Child Interaction Therapy.

Certainly the most internationally recognizable parent training program that was used in a number of the studies in this meta-analysis is Webster-Stratton's Incredible Years Parenting Program (Edwards et al., 2007; Gardner et al., 2006; Helfenbaum & Ortiz , 2007; Kim et al., 2007; Patterson et al., 2002; Reid et al., 2007; Scott et al., 2001; Taylor et al., 1998; Tucker, 1996; Webster-Stratton, 1982, 1984, 1990, 1992, 1998; Webster-Stratton & Hammond, 1997; Webster-Stratton et al., 1988, 2001, 2004). There are a variety of abbreviated and age-appropriate versions of the program, yet the main purpose of the program is to provide parent training to strengthen the parent's competencies in monitoring and appropriately disciplining their child's behaviors along with increasing the parent's overall involvement in the child's school experiences to promote the child's social and emotional competence and reduce their conduct problems. This intervention is typically provided by trained experts and/or through the use of parent training videotapes. The intervention sessions are provided in the home, the school, or at the clinic and can be offered as individual or group parent training.

Five of the studies included in this meta-analysis incorporated the Triple P-Positive Parenting Program (Leung et al., 2003; Markie-Dadds & Sanders, 2006; Morawska & Sanders, Sanders et al., 2000a, 2000b). As originally developed by Sanders et al. (1999), the Triple P-Positive Parenting Program is a comprehensive, multi-level, prevention program that attempts to introduce and train parents to use positive and nonviolent techniques when trying to manage their child's behavior. The program is typically administered at five different levels depending on the severity of the child's behavioral problems. Level 1 is aimed at providing universal parenting information disseminated through the media/videotapes. Level 2 involves one or two sessions with a healthcare provider to offer guidance and advice to parents of children with behavior problems. Level 3 is a four-session parent training program that targets children with mild to moderate behav-

ior problems, and Level 4 is considered a more intensive program for children with serious behavior problems and is typically comprised of eight to ten parenting sessions. Finally, Level 5 is an enhanced program provided for families that have a host of issues including serious child behavior problems (Sanders, 1999; Leung et al., 2003).

Parent-Child Interaction Therapy (PCIT) (Eyberg & Durning, 1994; Hembree-Kigin & McNeil, 1995) was another type of early family/parent training program that was rather common (Brestan et al., 1997; Eyberg et al., 1995; McNeil et al., 1991; Schuhmann et al., 1998; Zangwill et al., 1993) in this meta-analysis. PCIT is a parent training program that is designed to foster a caring and responsive relationship between the parent and their child as well as training the child to behave appropriately. The intervention program is typically organized in two phases: (1) child-directed interaction and (2) parent-directed interaction. The goal of the child-directed interaction phase is to modify and enhance the quality of the parent-child relationship, and the parent-directed interaction phase focuses on training the parents how to properly reward child compliance and punish noncompliance. The PCIT program is usually provided by therapists and the therapists train the parents through instruction, modeling, and various role playing techniques (Eyberg et al., 1995).

Comparatively, the home visitation studies (as described previously) typically involved health professionals such as nurses, doctors, or paraprofessionals that visited the mothers and gave them advice about how to effectively manage their child's behavior. All of the early family/parent training interventions (as defined) in these studies began prior to childbirth or early on during infancy (Butz et al., 2001; Cullen, 1976; Fergusson et al., 2005b; Heinicke et al., 2001; Kitzman et al., 1997; McCarton et al., 1997; Olds, Robinson, Pettitt et al., 1997; Stone et al., 1988).

Quality Assessment

Whenever possible, it is important to assess the quality of studies included in a meta-analysis. One of the main determinants of study quality is the research design. Due to the nature of the inclusion criteria, all of the studies included in this review can be considered of high quality insofar as they all utilized a randomized controlled experiment to evaluate the effectiveness of early family/parent training and virtually all of the studies reported the comparable demographics of the treated and controls groups prior to the intervention. However, very few studies provided any detail on whether or not the randomization process was compromised to any extent throughout the course of the intervention or if attrition had any differential effects for the experimental group compared with the control group. Thus, it is possible that some group imbalances might have arisen by chance, par-

ticularly given the small sample in a number of the studies.[10] In addition, it was rare for the studies to provide any information on the comparability of how the groups were treated throughout the course of the intervention by those who administered the intervention.

Calculating Effect Sizes

A description of all of the statistical formulas and procedures that were used at various stages in the analysis are provided in Appendix 1. ESs were computed by calculating Cohen's *d* from the available information, which were predominantly means and standard deviations. Second, the individual ESs for each study were calculated as a pooled ES averaged across the child behavioral outcome measures (i.e., CBCL, ECBI, etc.) and across the outcome sources (parent, teacher, and/or direct observer report). Third, the individual study-based ES was computed using the treated and control group sample sizes for which data was not missing for the relevant child behavioral measures.

The overall unweighted mean ES for early family/parent training based on the individual ESs of these 55 studies was 0.46, which approximately corresponds to 50% recidivism in the control group compared with 28% recidivism in the experimental group (see Farrington & Loeber, 1989). According to Cohen (1978), an ES of 0.46 indicates a medium or moderate effect size, or in practical terms the children who received the early family/parent training intervention reported lower behavioral scores at post-treatment assessment compared with those children who did not receive the early family/parent training intervention but had pre- and post- outcome measures available. Keeping in mind that all of these studies employed random assignment (i.e., the gold standard) it appears that the effect of early family/parent training was rather robust.

Weighting Effect Sizes

While Cohen's *d* is the most common summary effect size statistic, others have cautioned against relying solely on a pooled ES without taking into account the sample size differences across studies (Hedges & Olkin, 1985). Therefore, as per Hedges and Olkin's recommendations (i.e., the unbiased d), the individual ESs were "weighted" according to their samples size, or in other words, the ESs generated from small samples were reduced or "penalized" in relation to those ESs produced from larger sample sizes. Even after this small sample bias adjustment, the mean (unbiased) ES was still 0.45 (22% reduc-

[10] The sample sizes of the studies in this review ranged from a low of n=11 (Zangwill, 1983) to a high of n=870 (McCarton et al., 1997). On average the sample size was n=137 (SD=184.15), and a little over a third of the studies had sample sizes less than n=50, and 10% of the studies had samples > n=25.

tion in recidivism), which was still in the range of early family/parent training having a moderate effect on reducing child behavior problems. More specifically, these results approximately translate to 50% recidivism in the control group compared with 28% recidivism in the experimental group. Table 4.2 p. 37, displays the results of the individual unbiased ESs generated for each study included in the meta-analysis along with their corresponding confidence interval (a graphical display is shown in Figure 1). As can be seen, the ESs varied across studies ranging from a low -0.97[11] to a high of 2.19. This indicates that the effect of early family/parent training ranged from having a large negative effect (i.e., the control group means on the child behavioral outcomes were lower than the treated group means) to a having a substantial positive effect (i.e., the treatment group means were lower than the control group means).

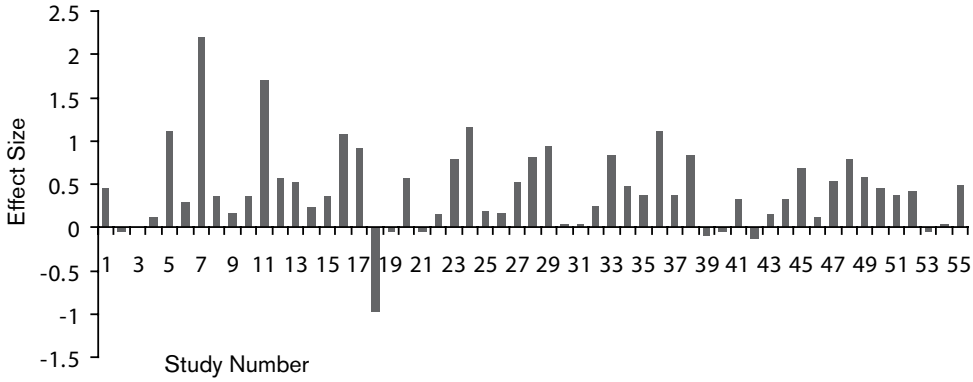

Figure 1. Graphical Display of Unbiased Effect Sizes (N=55 studies).

Unbiased Effect Sizes (mean = 0.45)

Hedges and Olkin (1985) have also proposed another method for adjusting the ESs. More specifically, they suggest using the inverse variance weight to weight each individual ES by the sample size of the treated and control groups to give more weight to the ESs generated from larger samples. For instance, an ES of 0.50 produced from comparing 10 treated and 10 control subjects is not given as much weight as an ES of 0.50 generated from the results of 100 treated and 100

[11] The one study with the worst effect size (-0.97) was Helfenbaum and Ortiz (2007), but it is worth noting that this effect was only based on the father reports because there was not enough information provided on how many mothers participated in providing data for the child outcome measures.

control subjects. Thus, after applying the inverse variance weight to the individual ESs, the mean ES (assuming a fixed effects model) for all of the 55 studies was now reduced to 0.23 with an accompanying confidence interval of 0.18 – 0.28 (z= 9.58; p<.001), which approximately corresponds to 50% recidivism in the control group compared with 39% recidivism in the experimental group. Comparatively, the results from a random effects model produced a mean ES of 0.35 with a confidence interval of 0.26 – 0.44 (z= 7.55; p<.001), corresponding to 50% recidivism in the control group compared with 33% recidivism in the experimental group. While the ES is reduced when a more conservative weighting procedure is used, there is still evidence that early family/parent training has a demonstrable effect on reducing child behavior problems.

Homogeneity Tests and Moderator Analyses

We mentioned previously that it was our general assumption that the individual ESs were not likely to be homogeneous or consistent with an assumption that the *d*s come from the same population. Therefore, we estimated the *Q* statistic in order to examine if the homogeneity assumption was in fact violated (i.e., the ESs are heterogeneous). The *Q* statistic is distributed as a chi-square with k-1 degrees of freedom where k is the number of effect sizes (Hedges & Olkin, 1985). The *Q* statistic generated from these data was 149.29 with 54 degrees of freedom (i.e., 55 studies -1), which was in fact statistically significant indicating that our initial assumption was confirmed and the ESs were heterogeneous. Therefore, it was necessary to further examine other relevant variables that may explain some of the heterogeneity of the ESs.

Some of the variables that were explored in this stage of the analysis were publication year, country of publication, program type, small versus large samples, and the publication bias. All of the analyses presented here were estimated using SPSS macros for the analog to the ANOVA and weighted least squares regression (with random effects).

The oldest study included in this meta-analysis was Cullen (1976) and the most recent study was Hiscock et al. (2008). The correlation between the year of publication and the ES (calculated by taking the square root of R-squared) was marginally statistically significant (r = -.22; p= .06), and the direction of the correlation was negative indicating that older studies tended to have larger ESs. Overall sample size was also significantly negatively correlated with ES (r = -.39, p<.001), with smaller studies reporting greater ESs.

Table 4.2. Effect Sizes, Confidence Intervals and Significance.

Author, Publication Date	Effect Size (d)	95% CI (Lower Bound)	95% CI (Upper Bound)	Significance
Abbott-Shim et al. (2003)	-0.04	-0.47	0.39	ns
Barkley et al. (2000)	0.01	-0.36	0.38	ns
Bradley et al. (2003)	0.12	-0.17	0.41	ns
Brestan et al. (1997)	1.11	0.23	1.99	s
Butz et al. (2001)	0.30	-0.09	0.69	ns
Connell et al. (1997)	2.19	1.27	3.11	s
Cullen (1976)	0.35	0.00	0.70	ns
Cunningham et al. (1995)	0.17	-0.22	0.56	ns
Edwards et al. (2007)	0.36	-0.03	0.75	ns
Eyberg et al. (1995)	1.70	0.58	2.82	s
Fanning (2007)*	0.57	-0.25	1.39	ns
Feinfield & Baker (2004)	0.51	-0.08	1.10	ns
Fergusson et al. (2005b)	0.23	0.03	0.43	s
Gardner et al. (2006)	0.35	-0.16	0.86	ns
Hamilton & MacQuiddy (1984)	1.07	0.22	1.91	s
Heinicke et al. (2001)	0.91	0.40	1.42	s
Helfenbaum & Ortiz (2007)	-0.97	-2.01	0.06	ns
Hiscock et al. (2008)	-0.05	-0.19	0.09	ns
Johnson & Breckenridge (1982)	0.56	0.20	0.91	s
Kim et al. (2007)*	-0.04	-0.82	0.75	ns
Kitzman et al. (1997)	0.14	-0.02	0.30	ns
Leung et al. (2003)	0.79	0.30	1.28	s
Markie-Dadds & Sanders (2006)	1.15	0.50	1.80	s
McCarton et al. (1997)	0.18	0.04	0.32	s
McNeil et al. (1991)	0.16	-0.78	1.10	ns

Morawska & Sanders (2006)	0.52	0.06	0.97	s
Nicholson et al. (1998)	0.81	0.17	1.46	s
Nicholson et al. (2002)	0.94	0.12	1.76	s
Olds, Robinson, Pettitt et al. (2004)	0.04	-0.12	0.20	ns
Patterson et al. (2002)	0.04	-0.35	0.43	ns
Reid et al. (2007)	0.24	-0.07	0.55	ns
Sandy & Boardman (2000)	0.84	0.52	1.15	s
Sanders, Markie-Dadds et al. (2000)	0.47	0.19	0.74	s
Sanders, Montgomery et al. (2000)	0.38	-0.14	0.91	ns
Schuhmann et al. (1998)	1.11	0.39	1.84	s
Schweinhart et al. (1993)	0.38	-0.03	0.79	ns
Scott et al. (2001)	0.84	0.37	1.31	s
Shaw et al. (2006)	-0.09	-0.50	0.32	ns
Sonuga-Barke et al. (2001)	-0.05	-0.56	0.46	ns
Strayhorn & Weidman (1991)	0.33	0.07	0.58	s
Stone et al. (1988)	-0.12	-0.63	0.39	ns
Taylor et al. (1998)	0.15	-0.46	0.76	ns
Tucker (1996)*	0.33	-0.49	1.15	ns
Tulloch (1997)*	0.68	-0.20	1.56	ns
Van Zeijl et al. (2006)	0.12	-0.14	0.37	ns
Webster-Stratton (1982)	0.53	-0.16	1.21	ns
Webster-Stratton (1984)	0.78	0.04	1.53	s
Webster-Stratton et al. (1988)	0.58	0.09	1.07	s
Webster-Stratton (1990)	0.46	-0.22	1.15	ns
Webster-Stratton (1992)	0.37	-0.08	0.82	ns

Webster-Stratton & Hammond (1997)	0.42	-0.12	0.97	ns
Webster-Stratton (1998)	-0.05	-0.27	0.17	ns
Webster-Stratton et al. (2001)	0.04	-0.21	0.29	ns
Webster-Stratton et al. (2004)	0.49	0.02	0.96	s
Zangwill (1983)	1.12	-0.15	2.40	ns
TOTAL	**0.45**	**0.41**	**0.49**	**21/55[a]**

[a] Proportion of significant ESs
*unpublished data

Table 4.3. Weighted Effect Sizes, Confidence Intervals, z-tests and Q statistics of Moderators (with Random Effects)

Variables	**N**	**Weighted ES**	**Lower 95% CI**	**Upper 95% CI**	***z*-test**	***Q*-statistic**
Country of Publication*						
US-based	39	.43	.32	.54	7.76***	51.51
Non US-based	16	.17	.02	.33	2.23*	12.97
Publication Bias						
Published	51	.35	.26	.44	7.28***	66.55*
Not Published	4	.37	-.11	.85	1.50	1.27
Type of Program						
Parent Training	47	.36	.26	.46	7.08***	55.60
Home Visits	8	.30	.04	.56	2.25*	11.73
Small vs. Large Samples***						
N<100	37	.47	.35	.59	7.80***	55.62*
N>100	18	.21	.09	.32	3.51***	13.69
Outcome Source						
Parent Reports	52	.34	.26	.43	7.87***	75.65*
Teacher Reports	14	.24	.08	.40	2.92*	8.46
Direct Observer Reports	16	.28	.12	.44	3.52**	12.52
Total	**55**	**.35**	**.26**	**.44**	**7.55*** **	**149.29*** **

*p<.05 **p<.01 ***p<.001

The results of the analog to the ANOVA estimated for the following moderator variables are presented in Table 4.3. As discussed earlier, the early family/parent training intervention in the majority of the studies in this meta-analysis were based in the United States (n=39)

and the other countries that provided relevant studies included Australia (n=7), the United Kingdom (n=4), Canada (n=2), the Netherlands (n=1), New Zealand (n=1), and China (n=1). Given the small number of studies in the countries other than the United States the remaining countries were combined to create the "Non US-based" category prior to examining the results. The mean ESs were substantively and significantly different when comparing US-based studies with those studies not conducted in the US ($Q_{between}$= 7.14; df= 1; p= .007). More specifically, the weighted ES for US-based studies was .43 (21% reduction in recidivism) compared with a .17 weighted ES (8% reduction in recidivism) for Non US-based studies.

Eight of the studies were considered home visitation studies where the intervention children received home visits typically by doctors, nurses, or paraprofessionals relatively early on in life (i.e., pre-birth and/or during infancy). Comparatively, the bulk of the studies were broadly classified as parent training programs (n=47) that involved some type of parent training and were typically provided in either individual or group settings. Although the weighted ESs were different between the two types of programs (parent training= .36; 17% reduction in recidivism vs. home visits= 0.30; 14% reduction in recidivism), the analog to the ANOVA results failed to indicate that the ESs were significantly different ($Q_{between}$= 0.19; df= 1; p= .663)

Keeping in mind that some of the studies employed multiple data sources for the outcome measures (i.e., parent, teacher, and direct observer) and others only focused on one data source for reporting, it was still important to examine the possible differences in the mean ES across the three main types of outcome sources. It appears that the effect of early family/parent training was largest when based on parent reports (weighted ES= .34; 16% reduction in recidivism), which is not surprising given the closeness of the intervention with the reporting source (i.e., providing parent training/home visits to the parents and then asking the parents to report on their child's behaviors). The next largest weighted ES was based on direct observer reports (weighted ES= .28; 13% reduction in recidivism) followed by teacher reports (weighted ES= .24; 11% reduction in recidivism). Although these ESs varied across outcome measures, they were not statistically different from one another ($Q_{between}$= 1.55; df= 1; p= .461), which further supports the rationale for pooling the ESs across the outcome sources.

The last two variables that were explored as moderators were comparing small samples (n<100) with large samples (n>100) and comparing published with unpublished studies. The weighted ESs appeared to differ substantially when based on small samples (weighted ES= .47; 23% reduction in recidivism) instead of having utilized samples with more than 100 children (weighted ES= .21; 10% reduction in recidivism). Thus, it was not surprising that the analog to the ANO-

VA results demonstrated a significant difference in these ESs ($Q_{between}$= 9.81; df= 1; p= .002). Lastly, while disagreement exists as to whether including literature such as this is necessary for meta-analytic research (see Dush et al., 1989; Eppley et al., 1989; McLeod & Weisz, 2004), we erred on the side of inclusion and attempted to locate any unpublished sources of data. We were only able to find four studies that were not published (Fanning, 2007; Kim et al., 2007; Tucker, 1996; Tulloch, 1997) and a comparison between these four studies with the other 51 studies that were based on published data failed to reveal any real substantive and/or significant differences ($Q_{between}$= 0.01; df= 1; p= .934) between the weighted ES of published (.35; 17% reduction in recidivism) and unpublished studies (.37; 18% reduction in recidivism). Although the mean ES was slightly higher for the unpublished studies and the confidence interval was much larger, both ESs were in the same range pointing toward a moderate effect for early family/parent training for reducing child behavior problems.

One final weighted least squares regression model (with random effects) was estimated in order to determine the significant predictors of the variation in the ESs across the studies (see Table 4.4). The results of the regression model further confirmed the findings detected at the bivariate level. The only significant moderators of ES were country of publication and the study being based on a small sample (n<100). More specifically, the strongest predictor in the model of the weighted ES was being considered a small sample study followed by a marginally significant direct effect for the study having been conducted in the US, controlling for year of publication, published data, and being a parent training program.

Table 4.4. Meta-Analysis Weighted Least Squares Regression (with Random Effects).

Variables	b	SE	z-test	p-value	Beta
Published	.076	.241	.314	.753	.035
Parent Training	.068	.122	.559	.576	.061
Publication Year	-.005	.006	-.723	.428	-.010
Small Sample	.232	.084	2.78	.006**	.315
US-based	.169	.094	1.78	.074+	.217

+p<.10 *p<.05 **p<.01 ***p<.001

Additional Later Delinquency/Crime Outcomes

As mentioned previously there were 27 studies that were not specifically included in this meta-analysis in order to ensure the independence of the samples or only provided information on adolescent/adult outcomes. However, it is important that we still highlight the important findings gleaned from these studies at least in narrative form. More specifically, based on the descriptive results presented in Table 4.5, it appears that early family/parent training has an effect on delinquency in adolescence and crime in adulthood. More specifically, involvement in early family/parent training has been shown to result in fewer teacher rated behavior problems at ages 8-11 (Johnson & Walker, 1987), fewer instances of running away, fewer arrests, convictions, and probation violations, fewer smoked cigarettes per day, fewer days having consumed alcohol, and fewer behavioral problems related to use of alcohol and other drugs at age 15 (Olds et al., 1998), lower rates of juvenile and violent arrests at age 18 (Reynolds et al., 2001), lower prevalence of arrests for violent, property, drug, and other crimes up to age 27 and also up to age 40 (Schweinhart & Xiang, 2003; Schweinhart, 2007). However, one study failed to find a significant difference for having been in trouble with the law (Johnson, 2006) when comparing those who participated in an early family/parent training intervention compared with the control group (ages ranged from 9-16 years old).

Table 4.5. Additional Later Delinquency/Crime Outcomes of Studies Not Included in Meta-Analysis.

Author, Publication Date	Additional Results and/or Adolescent/Adult Outcomes
I–Cullen (1976) NI–Cullen & Cullen (1996)	Intervention children that received home visitation were less likely to be smokers at age 25-27.
I–Edwards et al. (2007) NI–Hutchings et al. (2007) NI–Jones et al. (2007)	Mothers and direct observers of intervention children who received parent training reported fewer behavior problems. Mothers of intervention children also reported lower levels of inattention and hyperactive/impulsive difficulties in their children at follow-up.
I–Fergusson (2005b) NI–Fergusson (2005a)	The mothers of intervention children that received home visitation reported that their children had fewer behavior problems at age 3.
I–Johnson and Breckenridge (1982) NI–Johnson and Walker (1987) NI–Johnson (2006)	Teacher reports at ages 8-11 years old showed reduction in behavior problems. A long-term follow-up of children who participated in parent training programs in Alabama, Louisiana, and Texas (United States) showed few significant differences in their behavior problems and trouble with the law in late childhood/early adolescence according to both parent and teacher reports (with the exception of the early Texas cohorts).
I–Kitzman et al. (1997) NI–Olds, Kitzman, et al. (2004) NI–Olds, Kitzman, et al. (2007)	Fewer mothers of intervention children that received home visitation reported that their children had behavioral problems in the borderline/clinical range at age 6. Parents and teachers of intervention children who received home visitation reported a lower incidence of conduct problems in grades 1-3 and less antisocial behavior at age 9.
I–McCarton et al. (1997) NI–Brooks-Gunn et al. (1994) NI–McCormick et al. (2006)	Mothers of intervention children that received home visitation reported fewer behavioral problems for their children at age 3. Intervention children (birth weight >2000 g) that received home visits showed lower self-reported scores on general and risky behavior problem measures at age 18.
I–Olds, Robinson, Pettitt et al. (2004) NI–Olds, Robinson, O'Brien et al. (2002)	Intervention children that received home visits had lower behavior problem scores at age 2 according to parent reports.
I–Schweinhart et al. (1993) NI–Schweinhart et al. (2007) NI–Schweinhart & Xiang (2003) NI–Schweinhart et al. (1985) NI–Farnworth et al. (1985)	Intervention children that participated in the Perry Preschool Program showed less involvement in dishonest activities and illegal escape behaviors at age 15. Intervention children were less likely to have been detained or arrested by age 19. Intervention children were less likely to have been arrested for violent, property, drug, and other crimes up to age 27 and these same findings were found when the intervention children were followed up through age 40.

Author, Publication Date	Additional Results and/or Adolescent/Adult Outcomes
I–Sanders et al. (2000a) NI–Bor et al. (2002)	Intervention children who received parent training showed significant reductions in their disruptive behavior problems according to parent reports. In addition, direct observers also noted the intervention children's improvement in their negative behavior problems.
I–Tucker (1996) NI–Gross et al. (1995) NI–Tucker et al. (1998)	Fathers and direct observers of intervention children that received parent training reported less behavior problems at ages 3 and 4. Mothers of the intervention children reported more behavior problems relative to the control children.
I–Webster-Stratton (1998) NI–Baydar et al. (2003) NI–Reid et al. (2001) NI–Reid et al. (2004) NI–Foster et al. (2007)	Children with high baseline levels of conduct problems benefitted the most from the parent training program based on results from structural equation modeling (SEM). According to direct observer ratings, the behavior of intervention children improved over time for all groups that received parent training. Teacher reports also indicated that all intervention children that received parent training showed reductions in their total problem behaviors over time with the exception of intervention children who received child training, parent training, and teacher training.
NI–Olds et al. (1998)	Intervention children in Elmira, New York (USA) who received home visitation reported significantly fewer instances of running away, fewer arrests, fewer convictions, fewer probation violations, fewer smoked cigarettes per day, fewer days having consumed alcohol at age 15. Mothers of intervention children who received home visits reported that their children had fewer behavioral problems related to use of alcohol and other drugs at age 15.
NI–Reynolds et al. (2001)	Intervention children in Chicago, Illinois (USA) who completed participation in the Child-Parent Center Preschool Program had lower rates of juvenile arrests and violent arrests at age 18.

Notes. I=Included; NI=Not Included *unpublished data

5. Discussion & Conclusions

There has been some debate about the effectiveness of early family/parent training programs to prevent crime and hence, on the wisdom of spending large sums of money on this effort. A key issue is how far funding for these programs has been based on high quality scientific evidence demonstrating its efficacy in preventing child behavior problems including antisocial behavior and delinquency. In general, while there have been few rigorous evaluations, far-fewer randomized experimental designs with which to conduct such evaluations, and mixed evidence with respect to the effectiveness of early family/parent training programs across the studies, there is a trend suggesting that the programs do offer some delinquency reduction, but that there is variation within family-based prevention programs (including the lack of separating the results across the specific intervention types). Nevertheless, recent reviews of these efforts have noted the need for more and higher quality, independent evaluation studies.

The objective of this current systematic review was to synthesize the extant empirical evidence (published and unpublished) on the effects of early family/parent training programs implemented in early childhood in preventing child behavior problems including antisocial behavior and delinquency. The report conformed to the systematic review methodology and incorporated meta-analytic techniques to assess results. The point of departure for the current study begins with the Farrington and Welsh and Bernazzani and Tremblay reviews. Our review advanced these efforts in several important ways including: (1) allowing for interventions through age 5, (2) separating the various types of interventions (parent training versus home visitation), and (3) updating the database regarding parenting prevention programs through 2008.

Summary of Main Findings

Our search identified 55 studies, most in the United States, relying on published data, included randomized controlled trials, and typically followed parent training protocols. All of the studies included in this meta-analysis relied on self-report data for their measured child behavioral outcomes and the majority of the studies used parent reports.

Findings indicated that the overall unweighted mean ES for early family/parent training based on the individual ESs of these 55 studies was 0.46, which corresponds to a 22% reduction in recidivism or approximately 50% recidivism in the control group compared with 28% recidivism in the experimental group. Even after this small sample bias adjustment, the mean (unbiased) ES was still 0.45, which was still in the range of early family/parent training having a moderate

effect on reducing child behavior problems. We also uncovered that there was significant heterogeneity among the ESs; thus, we examined other relevant variables that could explain some of this heterogeneity. This analysis revealed a marginally statistically significant correlation between the year of publication and the ES, indicating that older studies tended to have larger ESs. Sample size was also significantly negatively correlated with ES, with smaller studies generating larger ESs. The results from subsequent analog to the ANOVA and weighted least squares regression analysis (with random effects) indicated that studies that were based on small samples (n<100) and studies that were conducted in the US demonstrated significantly larger ESs when compared to those studies based on large samples (n>100) and Non US-based studies. Statistically significant differences were not detected across program type (parent training versus home visits), published versus unpublished data, or outcome source (parent, teacher, direct observer reports).

Priorities for Research

To the best of our knowledge, our review provides the most exhaustive and authoritative assessment on the evaluation of early family/parent training programs. At the same time, we recognize that our work is certainly not the final word on this issue. As is the case with any meta-analysis/review of any topic in criminology/criminal justice, there will always be specific coding decisions that all interested parties will not agree with or that some coding decisions will not be in full agreement. Nevertheless, our effort represents the largest database from which to go forward, continue, expand and modify with respect to early family/parent training programs. Given the importance of such prevention efforts and the resources afforded to them, it is imperative that continued evaluation of outcomes be carried out going forward. Along these lines, Sherman (2003) suggests that databases such as those being developed by the Campbell Collaboration must be living works that evolve over time. We hope that such a suggestion is embraced fully by researchers and policy-makers alike, especially with respect to the one we have created for this review.

Toward this end, we envision a number of priorities for future research in this area. First, more generally, further demonstration (randomized) trials that test the effects of early family/parent training during early childhood on disruptive behavior and delinquency should help to build a more extensive knowledge base for this type of intervention (Farrington & Welsh, 2006:234). Second, there is a need to follow the early intervention cohorts/samples further into adolescence to assess effects on delinquency and then into adulthood for effects on crime and disorder in other life domains (which we suspect that early family/parent training will have indirect effects on). This will take

some time, but periodic updates of the review should produce more information on delinquency in the short term. Third, it would also be of import that future studies parcel out and specifically focus on the effect of early family/parent training on unique child behavior problems including antisocial and delinquent behaviors. It may be that early family/parent training programs have better effects on particular types of behaviors than others. Fourth, there is a need to identify the particular ingredients that make the specific early family/parent training programs successful at inhibiting antisocial and delinquent behaviors. This is important because, at times, it is difficult to identify what features of an early family/parent training program are responsible for the observed effects when there are multiple interventions operating at the same time. Fifth, although we did not do so, it would be interesting to include information on who delivered the specific early family/parent training intervention (i.e., the professional vs. paraprofessional issue has been prominent in debates about home visiting, generally.) Sixth, with respect to the type of outcome, we recognized earlier that the theoretical and operational definition of aggression, antisocial behavior, and delinquency varies across studies and over time. Careful and consistent definitions of aggression and antisocial behavior do not exist in the more general delinquency/criminal career area, and in the early family/parent training area in particular. Dealing with this issue will be important going forward. Seventh, it is entirely plausible that some negative child outcomes may be related to factors beyond parental and family skills. For example, early family/parent training programs may not be able to influence aspects of a child's environment that strongly influence behavior, such as disorganized neighborhoods and access to legitimate opportunity structures. In short, the infusion of sociological understanding in addition to the standard focus on the psychological parts of early family/parent training programs may aid in how these programs are developed, carried out, and then subsequently evaluated. Eighth, more effort should be made to determine links in the causal chain between family processes and offending. In other words, there is a need for more theoretical and especially empirical work that establishes the facts linking parents/families to offspring crime. Such basic research is likely to generate insight and clues into the sorts of applied programs that need to be developed. As a consequence, better designed programs that are built on basic research may be more apt to demonstrate effects, and more long-term follow-ups should be carried out to establish the persistence of the early effects. Ninth, although the focus of the present review was on effectiveness of early family/parent training in preventing children's antisocial behavior and delinquency, it is also the case that future studies should measure costs (which are typically born early) and benefits (which are typically observed later) across a

variety of domains). This, of course, should be followed with repeated calls that policy-makers need to have patience when waiting for early family/parent training programs to show their promise (Dickens and Baschnagel, 2008). Lastly, searches and inclusion of early family/parent training programs carried out and documented in non-English languages should be integrated, as warranted, into the larger database to determine the international generalizability of early family/parent training's effectiveness.

Policy Implications

The policy implications of research on early family/parent training have been well articulated by several researchers. In general, they suggest that early family/parent training can assist parents and families in preventing antisocial and delinquent behavior by providing them with the tools necessary to engage in effective child-rearing. The studies included in this review show that antisocial and delinquent behavior can be prevented, to some degree, with well-conceived and well-implemented early family/parent training programs. Although the exact, optimal circumstances that produce these outcomes among the wide range of early family/parent training programs is not very clear or well understood at the present time and needs to be established in future research, early family/parent training should be considered as a potential strategy in any early-life antisocial behavior prevention program-likely in coordination with other intervention strategies.

Our findings offer further support for a number of large-scale programs that have been implemented in Western nations to improve parenting skills of new mothers and to help prevent their children from embarking on a life of crime. As noted earlier, the provincial government of Quebec is investing $70 million each year to support disadvantaged mothers in improving their parenting skills and increasing their access to and use of prenatal services (with similar demonstration efforts ongoing in Dublin and Paris). In Colorado, the state government is spending tens of millions of dollars ($5.6 million in the first year) on a home visiting services program designed to prevent child maltreatment by targeting poor, first-time mothers. This initiative, known as the Nurse Home Visitor Program (NHVP), was created by state law in 2000 and is founded on the evidence-based home visiting program developed by David Olds (see Olds et al., 1998). Importantly, NHVP is not funded as a one-off program or designed to be limited to the most at-risk families: "The intention of the legislation is that the program be expanded annually so that the services will be available for all eligible mothers who choose to participate in all parts of the state" (Calonge, 2005: 5).

In sum, our analysis clearly shows that early family/parent training can be implemented as a feasible, largely inexpensive (especially when

considered over the full life course), and effective method of reducing antisocial and delinquent behavior in the first decade and half of the life course. Additionally, it is also likely the case that benefits of early family/parent training will permeate into other domains of the life course, although this remains not well-documented. Still, to the extent that this is the case, the long-term impact of early family/parent training programs may likely provide benefits to a range of individuals and situations independent of the family and child. Early family/parent training appears to have few negative effects and clear benefits for parents and children alike.

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Note: *unpublished data

Appendix

Statistical Procedures for Calculating Effect Sizes

Meta-analytic procedures were used to combine data from studies. For eligible studies (with sufficient data present) effect sizes were calculated using the standardized measures of effect sizes as suggested in the meta-analytic literature (Lipsey & Wilson, 2001). The main measure of the effect size was the standardized mean difference *d* which computed using the following formula:

$$d = \frac{\bar{x}_t - \bar{x}_c}{\sqrt{\frac{(n_t - 1)s_t{}^2 + (n_c - 1)s_c{}^2}{n_t + n_c}}}$$

Where, $\bar{x}_t$ is the mean of the treated/experimental group, $\bar{x}_c$ is the mean of the control group, *n* is the respective sample size of the treated and control groups, and the portion of the formula below the square root (i.e., the denominator) is the pooled standard deviation. The majority of the studies provided the means and standard deviations necessary for calculating the ESs, however at times *t*-values, *f*-values, *p*-values, etc. were used to calculate effect sizes, and the Strayhorn and Weidman (1991) *d* was estimated from the partial *r* (see Lipsey & Wilson, 2001 for derivations of formula). Effect sizes are coded such that positive effect sizes indicate treatment success and negative effect sizes indicate that the behavioral measure favored the control group (i.e., the control group scored lower on the behavioral measure compared with those in the treatment group).

Hedges and Olkin (1985) recommend calculating an unbiased ES that accounts for the discrepancy between the sample ES and the population ES. This occurs due to the fact that the standard deviation of the sample is subject to sampling error because it is only one estimate of the true population standard deviation. Therefore, the following formula was utilized to adjust for this discrepancy and the results of both the standardized effect size and the unbiased standardized effect size are presented and discussed in this analysis:

$$d(unbiased) = d * \left[1 - \frac{3}{4N - 9}\right]$$

In addition to Hedges and Olkin's (1985) original recommendation to estimate the unbiased *d* to adjust for the influence of small sample

size ES, we also utilized their second proposed method (i.e., using inverse variance weights) to weight the individual ESs by their sample size. Thus, an ES of a study based on a small sample does not receive as much weight/impact on the aggregate mean ES in comparison with the ES of another study generated from a larger sample. In order to make this statistical adjustment it is first necessary to calculate the standard error (SE) of each individual effect size, which is also considered a direct index of the precision of the ES estimate, or in other words the smaller the SE, the more precise the ES. The standard error was primarily computed using the following formula:

$$SE = \sqrt{\frac{n_1 + n_2}{n_1 n_2} + \frac{\overline{ES}}{2(n_1 + n_2)}}$$

Once the standard error was determined the following formula was primarily used to create the inverse variance weight:

$$w = \frac{1}{SE^2}$$

After computing the weight for each individual study it was necessary to combine all of the individual weighted ES in order to generate the overall aggregate mean ES for the meta-analysis. This procedure relied on multiplying each ES by its corresponding inverse variance weight and then dividing the sum of the weighted ESs by the overall sum of the inverse variance weight. Therefore, the following formulae were used to calculate the overall weighted mean ES and its corresponding standard error:

$$\overline{ES} = \frac{\sum(w \times ES)}{\sum w} \qquad SE_{\overline{ES}} = \sqrt{\frac{1}{\sum w}}$$

After computing the two above statistics, we were able to use the figures in order to calculate a z-score for the mean ES and construct its corresponding confidence interval. The following formula was used to generate the mean ES:

$$Z = \frac{\overline{ES}}{SE_{\overline{ES}}}$$

And, the formula below was utilized in order to construct the appropriate lower and upper bounds of the confidence interval associated with the mean ES:

$$Lower = \overline{ES} - 1.96(SE_{\overline{ES}}) \qquad Upper = \overline{ES} + 1.96(SE_{\overline{ES}})$$

Following the calculation of the mean ES (*d*), the weighted ES (unbiased *d*), and the weighted ES using the inverse variance weight, we examined the Q statistic that has a chi-square distribution with *k*-1 degrees of freedom to assess the heterogeneity of effect sizes across studies. Although, it was our initial assumption that that there are meaningful differences across the studies affecting the size of the effect. More specifically, when ESs are pooled together it is assumed that the individual *d*s that are used to calculate the mean ES come from the same population. In order to investigate whether or not this was the case we calculated the Q statistic using the following formula:

$$Q = \sum (w \times ES^2) - \sum (w \times ES)^2 / \sum w$$

Lastly, assuming that the effect sizes are heterogeneous, we anticipated examining possible contextual or moderating features of these programs. More specifically, we looked at the ESs across different potential moderating factors such as country of publication, type of program, year of publication, outcome source, sample size, and published versus unpublished data using the analog to the ANOVA and weighted least squares regression (with random effects) when relevant.