

A meta-analysis update on the effects of early family/parent training programs on antisocial behavior and delinquency

Alex R. Piquero¹ · Wesley G. Jennings² · Brie Diamond³ ·
David P. Farrington⁴ · Richard E. Tremblay^{5,6} ·
Brandon C. Welsh^{7,8} · Jennifer M. Reingle Gonzalez⁹

© Springer Science+Business Media Dordrecht 2016

Abstract

Objective To update Piquero et al.'s meta-analysis on early family/parent training programs.

Methods Screening of eligible studies was carried out for the period between January 2008 and August 2015. An additional 23 studies were identified, which were added to the original database of 55 studies, totaling an overall sample of 78 eligible studies. A random-effects model was used to obtain an overall mean effect size estimate. Additional analyses were performed to assess publication bias and moderation.

Results An overall average, positive, and significant effect size of 0.37 was calculated, which corresponds to 32 out of 100 in a treated group versus 50 out of 100 in a control group who offended. There was some evidence of publication bias and moderation.

Conclusions Early family/parent training programs are an effective evidence-based strategy for preventing antisocial behavior and delinquency.

✉ Alex R. Piquero
apiquero@utdallas.edu

¹ University of Texas at Dallas, Richardson, TX, USA

² University of South Florida, Tampa, FL, USA

³ Texas Christian University, Fort Worth, TX, USA

⁴ Cambridge University, Cambridge, UK

⁵ University of Montréal, Montréal, QC, Canada

⁶ University College Dublin, Dublin, Ireland

⁷ Northeastern University, Boston, MA, USA

⁸ Netherlands Institute for the Study of Crime and Law Enforcement, Amsterdam, The Netherlands

⁹ University of Texas School of Public Health, Houston, TX, USA

Keywords Antisocial behavior · Crime · Delinquency · Family · Interventions · Meta-analysis · Parenting · Parent training

Introduction

Antisocial, delinquent, and criminal behavior, especially when sustained throughout the life-course, exerts a significant financial and human cost (Cohen and Piquero 2009). As a result, intervention in adolescence or even adulthood, while important, may occur a bit too late to thwart early-onset criminal careers. As a result, efforts at developing and evaluating prevention strategies early on in the life-course is of critical importance to building a safer society (Sherman et al. 2002; Tremblay and Craig 1995) and deterring the onset of early and especially persistent criminal careers.

One prominent set of prevention strategies surrounds early family/parent training programs. In brief, these efforts seek to provide families and parents with training and skills that help them better attend to the physical, mental, and social skills of their children. And while a variety of these programs exist, including several evidence-based efforts like The Incredible Years, Triple P Parenting, and Nurse Family Partnerships, they all focus on improving child outcomes via helping parents more effectively socialize their children.

In 2009, we published a meta-analysis of 55 high-quality early family/parent training programs, the results of which provided very strong support for the delivery of these programs in deterring subsequent antisocial behavior (Piquero et al. 2009). In this more recent meta-analysis, we provide an update to that original analysis that includes an additional 23 studies uncovered by our update spanning the January 2008–August 2015 period.

Methods

Criteria for inclusion and exclusion of studies

The primary inclusion/exclusion criteria for the Piquero et al. (2009) and the current review were as follows:

1. Types of studies: randomized controlled experimental design.
2. Types of participants: families with a child under age 5 or the mean age of the sample was approximately age 5 at the beginning of the intervention. Programs with physically and/or mentally handicapped children were excluded.
3. Type of intervention: parent training was a major component of the intervention.
4. Types of outcomes: child behavior problems such as conduct problems, delinquency, and/or antisocial behavior.
5. Sufficient data: adequate data was needed for calculating an effect size if one was not provided (i.e., means and standard deviations, *t*-tests, *F*-tests, *p*-values, etc.).

6. No time frame restrictions, except that the search began with the first study identified by Bernazzani et al. (2001).
7. No geographic restrictions.
8. Studies needed to be written in English.

A more detailed description of the methods related to the search strategy for the identification of relevant studies and the criteria for determination of independent findings can all be found in Piquero et al. (2009, pp. 91–94). In short, the current meta-analysis adopted the exact same strategies outlined in Piquero et al. (2009), although with a specific focus on identifying relevant published and unpublished studies that have become available since their 2009 review. Thus, this meta-analysis combines all of the relevant studies available from 2008 to 2015 with the data from Piquero et al.'s (2009) meta-analysis to provide a comprehensive and up-to-date resource on the effectiveness of early family/parent training programs on antisocial behavior and delinquency.

Results

Literature search

Our initial literature search for relevant studies available from January 2008 to August 2015 produced over 3,400 hits. Following this initial search, we reviewed these studies and discarded any duplicates, studies that were not published in English, and studies that did not upon further examination conform to our pre-defined inclusion criteria. This cleaning process left 29 studies. After further reviewing this reduced list, six additional studies were removed because they failed to provide data relevant for the coding of an effect size.¹ As such, our final sample of relevant studies identified post-Piquero et al.'s (2009) meta-analysis was 23 studies, which after combining these studies with the 55 studies from Piquero et al.'s (2009) meta-analysis left us with a total sample size of 78 randomized, controlled trials of early family/parent training programs. A complete description of all of these 78 studies can be found in the [Appendix](#).

Types of interventions

Generally speaking, the types of interventions identified in this review can broadly be classified as home visitation programs or parent training programs. The home visitation programs typically involve health professionals such as nurses, doctors, or paraprofessionals conducting in-home visits with the mothers to educate them on how to properly care for their children (for example, see 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. 2004; Stone et al. 1988). Comparatively, the parent training

¹ The descriptive results reported in these six studies indicated that significant and positive effects in terms of a reduction in problem behavior were detected for the treatment group relative to the control group in four of the six studies. These results are consistent with the significant effects noted for the 78 studies that are included in this review, where 67 out of 78 of the effects were positive and 38 of the 67 were significant at the $p < .05$ level.

programs often relied on individual or group-based parent training sessions that were either conducted at a clinic, school, or some alternative community-based setting. The most recognizable of these types of parent training programs are the Incredible Years Parenting Program, the Triple P Positive Parenting Program, and Parent–child interaction therapy (PCIT). These types of programs often focus on methods of instruction to strengthen the parent’s competencies in monitoring and disciplining their child’s behavior and promoting the child’s social and emotional competence (Edwards et al. 2007; Gardner et al. 2006; Helfenbaum-Kun and 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, 1990b, 1992, 1998; Webster-Stratton and Hammond 1997; Webster-Stratton et al. 1988, 2001, 2004). In addition, these programs at times can also attempt to train parents to use positive and nonviolent techniques to manage their children’s behavior (Leung et al. 2003; Markie-Dadds and Sanders 2006; Morawska & Sanders, Sanders et al. 2000a, 2000b), or aim to foster a caring and responsive relationship between the parent and child through modeling and role playing (Brestan et al. 1997; Eyberg et al. 1995; McNeil et al. 1991; Schuhmann et al. 1998; Zangwill 1983).

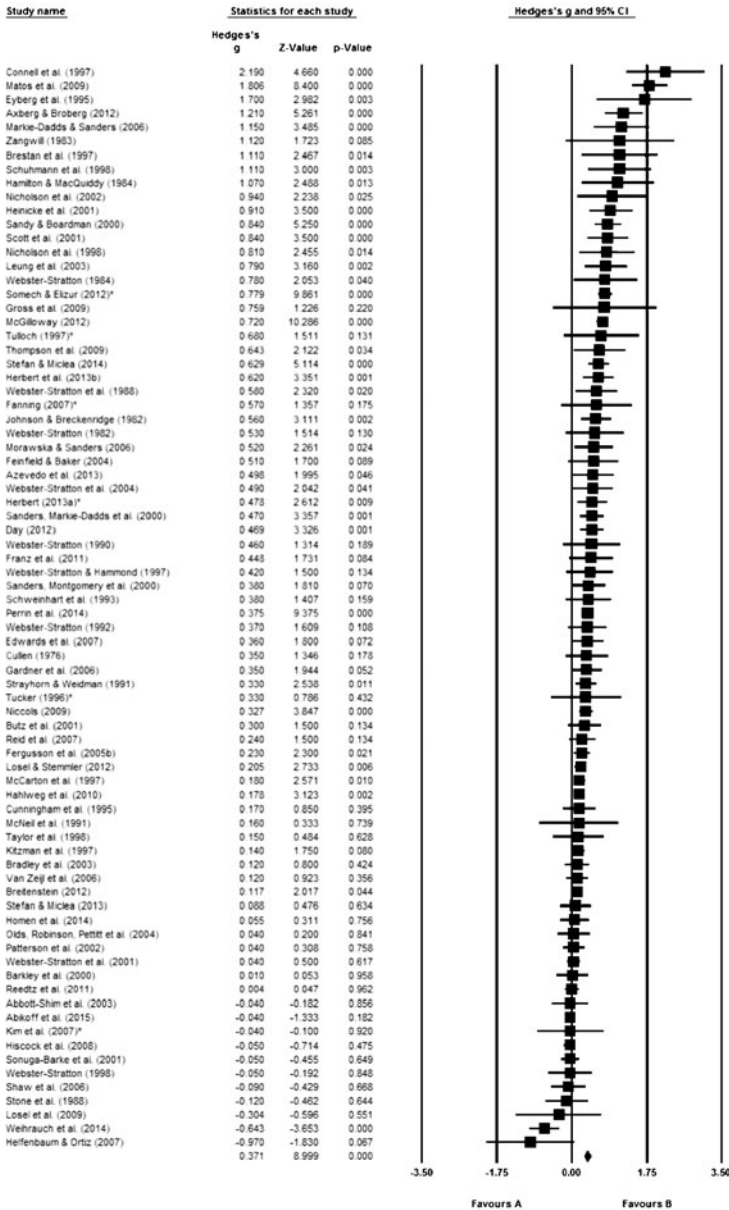
Effect size

We relied on Cohen’s *d* (Cohen 1988) for determining the effect sizes for this meta-analysis, and the primary source for calculating Cohen’s *d* was the standardized mean difference. However, in the event where Cohen’s *d* effect size estimates were not provided or in situations where means and standard deviations were not provided, we relied on *t*-values, *f*-values, *p*-values, correlations, odds-ratios, etc. to calculate the effect sizes (see Lipsey and Wilson 2001 for the relevant formulas). Further, we applied the Hedges and Olkin (1985) adjustment and used inverse variance weights in calculating the effect sizes to be consistent with Piquero et al. (2009). All of the meta-analytic results described here and below were performed using Comprehensive Meta-Analysis (CMA) software, version 2 (Borenstein et al. 2005).

Figure 1 provides the results of a forest plot illustrating the individual study effects sizes that were obtained and/or calculated. These Hedges’s *g* estimates in the forest plot are organized in descending order of effect size magnitude along with their associated *z* statistic and corresponding *p*-values. In addition, the graph on the right side of Fig. 1 displays these estimates with their corresponding 95 % confidence intervals. As can be seen, the overwhelming majority of the effect sizes were positive (67 out of 78) and significant at the $p < .05$ level (38 of the 67 positive effect sizes were statistically significant). Comparatively, only 11 of the studies yielded a negative effect size estimate, with only one of these negative effect sizes being statistically significant (Weihrauch et al. 2014). Also, as shown in Fig. 1, the overall mean effect size (with random effects) for these 78 studies was 0.37 ($z = 8.99$, $p < .001$).²

² We also calculated the average effect size for the 23 studies identified during the search period January 2009–August 2015. These results indicated a positive and significant average effect size of 0.39 (95 % CI = 0.24–0.54; $z = 5.148$, $p < .001$).

Meta Analysis



Meta Analysis

Fig. 1 Forest plot of the distribution of effect sizes sorted by magnitude ($n = 78$ studies). Note: * = unpublished study

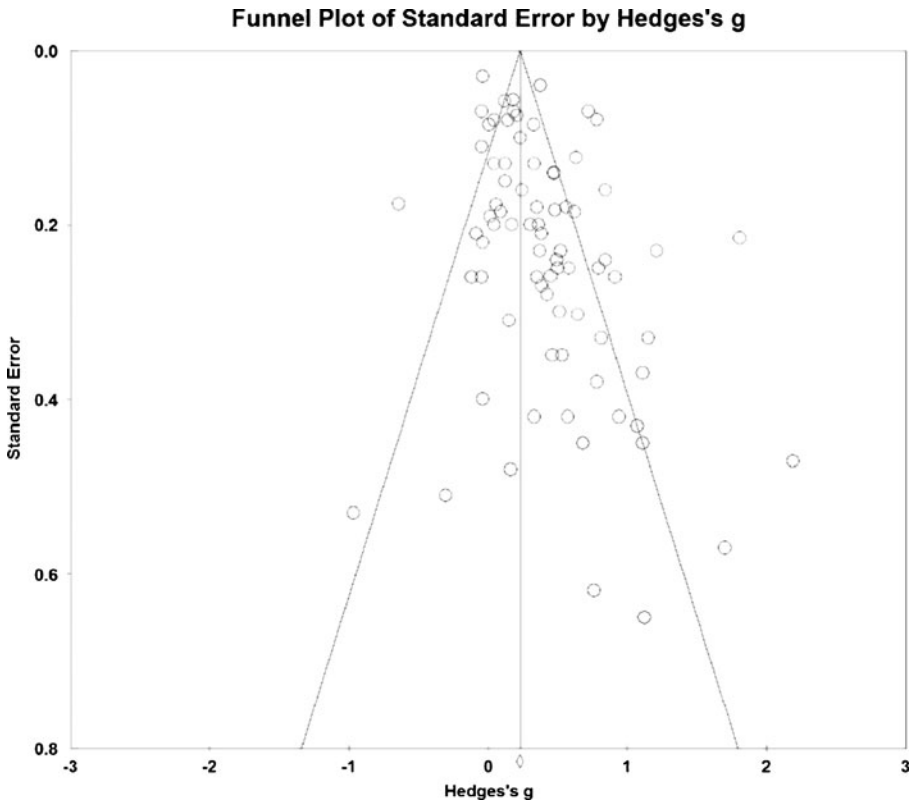


Fig. 2 Funnel plot examining publication bias. Note: Kendall's tau statistic = 0.18, $z=2.38$, $p=.02$; Eggers regression intercept = 1.49, standard error = 0.41, $t=3.66$, $p<.001$

Table 1 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	46	.39	.28	.50	7.14***	239.62***
Non US-based	32	.35	.22	.48	5.41***	227.05***
Type of program						
Parent training	67	.39	.30	.48	8.67***	328.44***
Home visits	11	.28	.07	.49	2.67**	113.09***
Small vs large samples						
$N < 100$	50	.49	.35	.62	6.86***	312.19***
$N > 100$	28	.26	.16	.35	5.33***	158.41***
Publication bias						
Published	73	.37	.29	.45	8.74***	477.77***
Not published	5	.43	.16	.70	3.11**	1.93
Total	78	.37	.29	.45	8.99***	481.899***

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

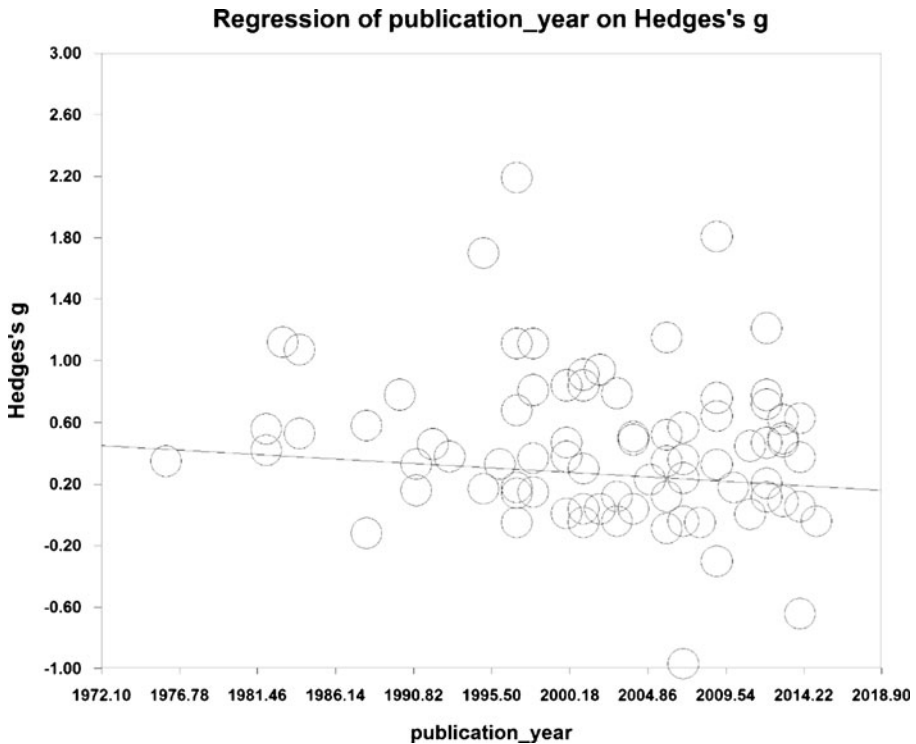
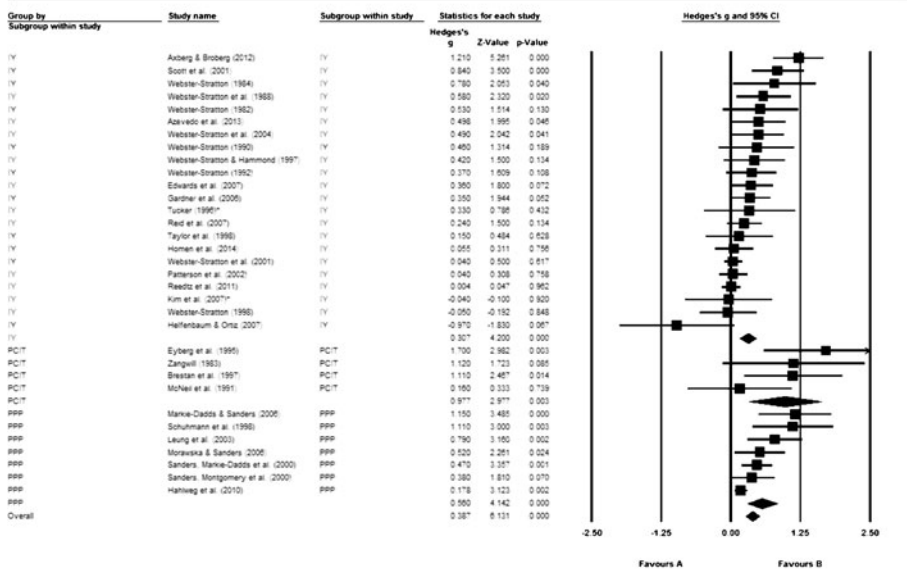


Fig. 3 Meta-regression (with random effects, maximum likelihood). Note: publication year: regression coefficient (slope) = $-.001$, standard error = $.001$; $z = -1.14$, $p = .26$

In order to remain consistent with Piquero et al. (2009), we included unpublished studies to address the “file drawer” problem. In this vein, we assessed the potential for publication bias through the use of a funnel plot and calculated relevant test statistics (e.g., Kendall’s and Egger’s tests) (see Fig. 2). Upon reviewing the funnel plot (where the larger studies are plotted at the top and the smaller studies are plotted at the bottom) and the associated Kendall’s ($z = 2.38$, $p = 0.02$) and Egger’s ($t = 3.66$, $p < .001$) test statistics, it appears that there is some evidence that publication bias may be present as the smaller studies do seem to be clustering more to the right. This asymmetry suggests that there seems to be a tendency for smaller studies to be published if they have larger than average effects.

Following Piquero et al. (2009) and our own analysis that revealed that there was not homogeneity in the effect sizes ($Q = 481.89$, $p < .001$), we estimated a series of moderator analyses to further explore where some of the source of this heterogeneity may exist. Table 1 presents the results for the categorical ANOVA moderator analyses (with random effects), relying on the exact same moderators evaluated by Piquero et al. (2009). The findings suggest that country of

Meta Analysis



Meta Analysis

Fig. 4 Forest plot of the distribution of effect sizes sorted by magnitude and grouped by “brand” of early/ family parent training programs ($N=33$ studies). Note: * = unpublished study. *IV* = Incredible Years; *PCIT* = Parent-child interaction therapy; *PPP* = Triple P Parenting

publication (US versus not US), type of program (parent training versus home visits), sample size (small sample versus large sample), and publication bias (published versus unpublished) were all statistically significant effect size moderators. Finally, as plotted in Fig. 3, the results of a meta-analytic regression model (with random effects and estimated using a maximum likelihood function) did not demonstrate the year of the publication of the study to be a statistically significant effect size moderator.³

³ It is important to note that we did also estimate a meta-analytic regression model (with random effects and using a maximum likelihood function) with all four of the categorical moderators and the continuous moderator of year of publication included simultaneously. However, as none of these variables were determined to be a statistically significant effect size predictor, we opted to not present the results of this full regression model.

In one final interesting and supplemental analysis, we filtered the 78 studies down to 33 studies that were specifically early family/parent training interventions of the three most popular “brands” of early family/parent training programs, that is, The Incredible Years Program, Parent–child interaction therapy, and the Triple P Parenting Program. Figure 4 illustrates the Hedges’s g estimates of these programs only in the forest plot, which are organized in descending order of effect size magnitude along with their associated z statistic and corresponding p -values and grouped by “brand” on the left side of Fig. 4. In addition, the graph on the right side of Fig. 4 displays these estimates with their corresponding 95 % confidence intervals. As illustrated, the overall mean effect sizes for all three “brands” are positive and statistically significant, with the largest mean effect size being observed for Parent–child interaction therapy (mean effect size=0.98, $p < .01$), followed by the Triple P Parenting Program (mean effect size=0.56, $p < .001$), and the Incredible Years Parenting Program (mean effect size=0.31, $p < .001$).

Discussion

The purpose of this paper was to update the early family/parent training meta-analysis conducted by Piquero et al. (2009) and published in the *Journal of Experimental Criminology*. Our updated search, from January 2008 to August 2015, yielded an additional 23 methodologically rigorous studies that we added to the existing database of 55 studies, which yielded a total sample size of 78 studies to be used in this update.

Four main findings emerged from our analysis. First and foremost, we replicated the substantive finding of our previous work; namely, that early family/parent training “is an effective intervention for reducing behavior problems among young children” (Piquero et al. 2009, p. 83). The overall mean effect size in our analysis of 78 individual effect sizes was 0.37, slightly higher than we obtained in our 2009 analysis (0.35). Second, we did find some evidence of publication bias, in that there was a tendency for smaller studies to be published if they have larger than average effects. Third, we also detected some evidence of moderating effects. In particular, country of publication, type of program, sample size, and publication bias were all statistically significant effect size moderators. Lastly, in one final and supplemental analysis, we determined that the overall mean effect sizes for all three “brands” of the most popular early family/parent training programs are positive and statistically significant, with the largest mean effect size being observed for Parent–child interaction therapy (mean effect size=0.98), followed by the Triple P Parenting Program (mean effect size=0.56), and the Incredible Years Parenting Program (mean effect size=0.31). In short, early family/parent training programs are an important evidence-based strategy that deserves continued application and expansion as part of a more general strategy for building a safer society.

Appendix

Table 2 Early family/parent training program evaluations included in meta-analysis

Author, publication date	Location	Type of intervention	Time of study ^b	Original sample size ^a	Targeted age(s)
Abbott-Shimm and Lambert (2003)	Southern Urban Setting USA	Parent training	1998–1999	E = 87 C = 86	4 years old
Abikoff et al. (2015)	New York, NY, USA	Home visits	2008–2012	E = 67 C = 34	3–4 years old
Axberg and Broberg (2012)	Sweden	Incredible Years Parenting Program Parent training	NR	E = 38 C = 24	4–8 years old
Azevedo et al. (2013)	Portugal	Incredible Years Parenting Program Parent training	2009–2011	E = 69 C = 56	3–6 years old
Bankley et al. (2000)	Worcester, MA, USA	Parent training	1991–1996	E = 79 C = 42	Kindergarteners ≈ 5 years old
Bradley et al. (2003)	Metropolitan Toronto Canada	Parent training	1998	E = 119 C = 109]	3–4 years old
Breitenstein et al. (2012)	Chicago, IL, USA	Chicago Parent Program Parent training	2002–2011	E = 267 C = 237	2–4 years old
Brestan et al. (1997)	USA	Parent–child interaction therapy Parent training	NR	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 years old
Cullen (1976)	Australia	Home visits	1964–1967	E = 124 C = 122	1 year old
Cunningham et al. (1995)	Hamilton Schools USA	Parent training	1991–1993	E = 94 C = 56	Junior Kindergarten ≈ 4 years old
Day et al. (2012)	London UK	Parent training	2010	E = 54 E = 50	2–11 years old
Edwards et al. (2007)	North and Mid Wales UK	Incredible Years Parenting Program Parent training	NR	E = 86 C = 47	3–4 years old

Table 2 (continued)

Author, publication date	Location	Type of intervention	Time of study ^b	Original sample size ^a	Targeted age(s)
Eyberg et al. (1995)	USA	Parent-child interaction therapy Parent training	NR	E = 19 C = 8	3–6 years old
Fanning (2007)*	USA	Parent training	2005–2006	E = 14 C = 14	3–5 years old
Fenfield and Baker (2004)	Los Angeles, CA, USA	Parent training	NR	E = 24 C = 23	4–8 years old
Fergusson et al. (2005b)	Christchurch New Zealand	Home visits	2000–2001	E = 220 C = 223	Birth
Franz et al. (2011)	Germany	Home visits	NR	E = 26 C = 35	3–6 years old
Gardner et al. (2006)	Oxford UK	Incredible Years Parenting Program Parent training	NR	E = 44 C = 32	2–9 years old
Gross et al. (2009)	Chicago, IL, USA	Chicago Parent Program Parent training	2002–2004	E = 135 C = 118	2–4 years old
Hahlweg et al. (2010)	Germany	Triple P Parenting Program Parent training	NR	E = 196 C = 94	3–6 years old
Hamilton and MacQuiddy (1984)	USA	Parent training	NR	E = 18 C = 9	2–7 years old
Heinicke et al. (2001)	Los Angeles, CA, USA	Home visits	NR	E = 31 C = 33	Birth
Helffenbaum-Kun and Ortiz (2007)	New York, NY, USA	Incredible Years Parenting Program Parent training	NR	E = 23 C = 16	3–5 years old
Herbert (2013)*	Massachusetts USA	Parenting Your Hyperactive Preschooler program Parent training	2009–2011	E = 17 C = 14	3–6 years old
Herbert et al. (2013)	Massachusetts USA	Parenting Your Hyperactive Preschooler program Parent training	2009–2011	E = 17 C = 14	3–6 years old
Hiscock et al. (2008)	Melbourne, Victoria Australia	Parent training	2004	E = 329 C = 404	6–7 month old
Homen et al. (2014)	Portugal	Incredible Years Parenting Program Parent training	2009–2011	E = 24 C = 12	3–6 years old
Johnson and Breckenridge (1982)	Houston, TX,	Parent training	1970	E = 214	1 year old

Table 2 (continued)

Author, publication date	Location	Type of intervention	Time of study ^b	Original sample size ^a	Targeted age(s)
Kim et al. (2007)*	USA First-generation Korean Americans, USA	Incredible Years Parenting Program Parent training	2003–2004	C = 244 E = 20 C = 9	3–8 years old
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 years old
Lösel and Stemmeler (2012)	Germany	Parent training	NR	E = 282 C = 327	Mean age = 4.7 years old
Lösel et al. (2009)	Germany	Parent training	NR	E = 54 E = 54	Mean age = 4.7 years old
Mankie-Dadds and Sanders (2006)	Australia	Triple P Parenting Program Parent training	NR	E = 32 C = 31	2–5 years old
Matos et al. (2009)	Puerto Rico USA	Parent training	2002–2004	E = 12 C = 20	4–6 years old
McCantton et al. (1997)	USA	Home visits	1984–1985	E = 377 C = 608	Birth
McGilloway et al. (2012)	Ireland	Parent training	2009	E = 103 C = 46	32–88 months old
McNeil et al. (1991)	USA	Parent–child interaction therapy Parent training	NR	E = 10 C = 10	2–7 years old
Morawska and Sanders (2006)	Brisbane, Queensland Australia	Triple P Parenting Program Parent training	NR	E = 85 C = 41	Mean age = 26.10 months
Niccols (2009)	Canada	COPing with Toddler Behaviour Parent training	2002–2005	E = 45 E = 45	1–3 years old
Nicholson et al. (1998)	USA	Parent training	NR	E = 20 C = 20	1–5 years old
Nicholson et al. (2002)	Large Urban Midwestern city USA	Parent training	NR	E = 13 C = 13	1–5 years old
Olds, Robinson, Pettitt et al. (2004)	Denver, CO, USA	Home visits	1994–1995	E = 480 C = 255	Birth

Table 2 (continued)

Author, publication date	Location	Type of intervention	Time of study ^b	Original sample size ^a	Targeted age(s)
Patterson et al. (2002)	Oxford United Kingdom	Incredible Years Parenting Program Parent training	NR	E = 60 C = 56	2–8 years old
Perrin et al. (2014)	Massachusetts USA	Parent training	2007–2010	E = 123 C = 61	Mean age = 2.8 years old
Reedtz et al. (2011)	Norway	Incredible Years Parenting Program Parent training	NR	E = 89 C = 102	2–8 years old
Reid et al. (2007)	Seattle, WA, USA	Incredible Years Parenting Program Parent training	NR	E = 89 C = 97	Kindergarteners ≈5 years old
Sandy and Boardman (2000)	New York, NY, USA	Parent training	1997–1999	N = 404	2–6 years olds
Sanders et al. (2000a)	Brisbane, Australia	Triple P Parenting Program Parent training	NR	E = 228 C = 77	3–4 years old
Sanders et al. (2000b)	Metropolitan city, Australia	Triple P Parenting Program Parent training	NR	E = 28 E = 28	2–8 years old
Schuhmann et al. (1998)	USA	Parent–child interaction therapy Parent training	NR	E = 37 C = 27	3–6 years old
Schweinhart et al. (1993)	Ypsilanti, MI, USA	Parent training	1958–1962	E = 58 C = 65	3–4 years old
Scott et al. (2001)	South London United Kingdom	Incredible Years Parenting Program Parent training	1995–1999	E = 90 C = 51	3–8 years old
Shaw et al. (2006)	Pittsburgh, PA, USA	Parent training	2001	E = 60 C = 60	2 years old
Somech and Elizur (2012)	Israel	Home visits	2007–2009	E = 140 C = 69	Mean age = 48 months
Sonuga-Barke et al. (2001)	Southampton	Parent training	1992–1993	E = 58 C = 20	3 years old
Strayhorn and Weidman (1991)	USA	Parent training	1987–1988	E = 50 C = 48	3–4 years old
Stefan and Miclea (2013)	Romania	Fast Track program Parent training	2009	E = 121 C = 83	Mean age = 50 months
Stefan and Miclea (2014)	Romania	Fast Track program	2009	E = 89	Mean age = 50 months

Table 2 (continued)

Author, publication date	Location	Type of intervention	Time of study ^b	Original sample size ^a	Targeted age(s)
Stone et al. (1988)	USA	Parent training Home visits	1977–1980	C = 69 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 years old
Thompson et al. (2009)	United Kingdom	Parent training	NR	E = 17 C = 13	30–77 months old
Tucker (1996)*	USA	Incredible Years Parenting Program Parent training	NR	E = 12 C = 12	2–3 years old
Tulloch (1997)*	Bronx and Queens, New York USA	Parent training	NR	E = 20 C = 7	3–5 years old
Van Zeijl et al. (2006)	Western region Netherlands	Parent training	2001–2002	E = 120 C = 117	1–3 years old
Webster-Stratton (1982)	USA	Incredible Years Parenting Program Parent training	NR	E = 16 C = 19	3–5 years old
Webster-Stratton (1984)	USA	Incredible Years Parenting Program Parent training	NR	E = 24 C = 11	3–8 years old
Webster-Stratton et al. (1988)	USA	Incredible Years Parenting Program Parent training	NR	E = 85 C = 29	3–8 years old
Webster-Stratton (1990)	USA	Incredible Years Parenting Program Parent training	NR	E = 31 C = 14	3–8 years old
Webster-Stratton (1992)	USA	Incredible Years parenting program Parent training	NR	E = 59 C = 41	3–8 years old
Webster-Stratton and Hammond (1997)	USA	Incredible Years Parenting Program Parent training	NR	E = 55 C = 22	4–8 years old
Webster-Stratton (1998)	USA	Incredible Years Parenting Program Parent training	NR	E = 345 C = 167	Pre-school children ≈4 years old
Webster-Stratton et al. (2001)	USA	Incredible Years Parenting Program Parent training	NR	E = 191 C = 81	4 years old
Webster-Stratton et al. (2004)	Seattle, WA, USA	Incredible Years Parenting Program	1995–1997	E = 80	4–8 years old

Table 2 (continued)

Author, publication date	Location	Type of intervention	Time of study ^b	Original sample size ^a	Targeted age(s)
Wehrauch et al. (2014)	Germany	Parent training	2005–2006	C = 26 E = 26	3 years olds
Zangwill (1983)	USA	Parent-child interaction therapy Parent training	NR	C = 32 E = 8 C = 7	2–8 years old

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

References

*unpublished data

- Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2005). *Comprehensive meta analysis, version 2*. Englewood: Biostat.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale: Lawrence Erlbaum Associates.
- Cohen, M., & Piquero, A. R. (2009). New evidence on the monetary value of saving a high risk youth. *Journal of Quantitative Criminology*, *25*, 25–39.
- Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. New York: Academic.
- Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis (applied social research methods series)* (Vol. 49). Thousand Oaks: Sage.
- Piquero, A. R., Farrington, D. P., Welsh, B. C., Tremblay, R., & Jennings, W. G. (2009). Effects of early family/parent training programs on antisocial behavior and delinquency. *Journal of Experimental Criminology*, *5*, 83–120.
- Sherman, L. W., Farrington, D. P., Welsh, B. C., & MacKenzie, D. L. (Eds.). (2002). *Evidence-based crime prevention*. London: Routledge.
- Tremblay, R. E., & Craig, W. M. (1995). Developmental crime prevention. In M. Tonry & D. P. Farrington (Eds.), *Building a safer society: Strategic approaches to crime prevention, vol. 19 of crime and justice: a review of research* (pp. 151–236). Chicago: University of Chicago Press.

References of included studies

- Abbott-Shimm, M., & Lambert, R. (2003). A comparison of school readiness outcomes for children randomly assigned to a head start program and the program's wait list. *Journal of Education for Students Placed at Risk*, *8*, 191–214.
- Abikoff, H.B., Thompson, M., Laver-Bradbury, C., Long, N., Forehand, R.L. ... (2015). Parent training for preschool ADHD: A randomized controlled trial of specialized and generic programs. *Journal of Child Psychology and Psychiatry*, *56*, 618–631.
- Axberg, U., & Broberg, A. G. (2012). Evaluation of “the incredible years” in Sweden: the transferability of an american parent-training program to Sweden. *Scandinavian Journal of Psychology*, *53*, 224–232.
- Azevedo, A. F., Seabra-Santos, M. J., Gaspar, M. F., & Homen, T. C. (2013). The incredible years basic training for Portuguese preschoolers with AD/HD behaviors: does it make a difference? *Child Care Youth Forum*, *42*, 403–424.
- Barkley, R. A., Shelton, T. L., Crosswait, C., Moorehouse, M., Fletcher, K., Barrett, S., Jenkins, L., & Metevia, L. (2000). Multimethod psychoeducational intervention for preschool children with disruptive behavior: two-year post-treatment follow-up. *Journal of Abnormal Child Psychology*, *41*, 319–332.
- Bernazzani, O., Cote, C., & Tremblay, R. E. (2001). Early parent training to prevent disruptive behavior problems and delinquency in children. *ANNALS*, *578*, 90–103.
- Bradley, S. J., Jadaa, D. A., Brody, J., Landy, S., Tallett, S. E., Watson, W., Shea, B., & Stephens, D. (2003). Brief psychoeducational parenting program: an evaluation and 1-year follow-up. *Journal of the American Academy of Child and Adolescent Psychology*, *42*, 1171–1178.
- Breitenstein, S. M., Gross, D., Fogg, L., Ridge, A., Garvey, C., Julion, W., & Tucker, S. (2012). The Chicago Parent Program: comparing 1-year outcomes for African American and Latino parents of young children. *Research in Nursing & Health*, *35*, 475–489.
- Brestan, E. V., Eyberg, S. M., Boggs, S. R., & Algina, J. (1997). Parent–child interaction therapy: parents' perceptions of untreated siblings. *Child and Family Behavior Therapy*, *19*, 13–28.
- Butz, A. M., Pulsifer, M., Marano, N., Belcher, H., Lears, M. K., & Royall, R. (2001). Effectiveness of a home intervention for perceived child behavioral problems and parenting stress in children with in utero drug exposure. *Archives of Pediatrics & Adolescent Medicine*, *155*, 1029–1037.
- Connell, S., Sanders, M. R., & Markie-Dadds, C. (1997). Self-directed behavioral family intervention for parents of oppositional children in rural and remote areas. *Behavior Modification*, *21*, 379–408.
- Cullen, K. J. (1976). A six year controlled trial of prevention of children's behaviour disorders. *Journal of Paediatrics*, *88*, 662–666.

- Cunningham, C. E., Bremner, R., & Boyle, M. (1995). Large group community-based parenting programs for families of preschoolers at risk for disruptive behaviour disorders: utilization, cost effectiveness, and outcome. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 36, 1141–1159.
- Day, C., Michelson, D., Thomson, S., Penney, C., & Draper, L. (2012). Evaluation of a peer led parenting intervention for disruptive behavior problems in children: community based randomized controlled trial. *British Medical Journal*, 344, 1–10, e1107.
- Edwards, R. T., C elleachair, A., Bywater, T., Hughes, D. A., & Hutchings, J. (2007). Parenting programme for parents of children at risk of developing conduct disorder: cost effectiveness analysis. *British Medical Journal*, 334, 682–685.
- Eyberg, S. M., Boggs, S. R., & Algina, J. (1995). New developments in psychosocial, pharmacological, and combined treatments of conduct disorders in aggressive children. *Psychopharmacology Bulletin*, 31, 83–91.
- *Fanning, J.L. (2007). *Parent training for caregivers of typically developing, economically disadvantaged preschoolers: An initial study in enhancing language development, avoiding behavior problems, and regulating family stress*. Unpublished dissertation, University of Oregon.
- Feinfield, K. A., & Baker, B. L. (2004). Empirical support for a treatment program for families of young children with externalizing problems. *Journal of Clinical Child and Adolescent Psychology*, 33, 182–195.
- Fergusson, D., Horwood, J., Ridder, E., & Grant, H. (2005). *Early start: evaluation report*. New Zealand: Christchurch.
- Franz, M., Weinrauch, L., & Schafer, R. (2011). PALME: a preventive parental parent training program for single mothers with preschool aged children. *Journal of Public Health*, 19, 305–319.
- Gardner, F., Burton, J., & Klimes, I. (2006). Randomised controlled trial of a parenting intervention in the voluntary sector for reducing child conduct problems: outcomes and mechanisms of change. *Journal of Child Psychology and Psychiatry*, 47, 1123–1132.
- Gross, D., Garvey, C., Julion, W., Fogg, L., Tucker, S., & Mokros, H. (2009). Efficacy of the Chicago Parent Program with low-income African American and Latino parents of young children. *Prevention Science*, 10, 54–65.
- Hahlweg, K., Heinrichs, N., Kuschell, A., Bertram, H., & Naumann, S. (2010). Long-term outcome of a randomized controlled universal prevention trial through a positive parenting program: is it worth the effort? *Child and Adolescent Psychiatry and Mental Health*, 4, 1–14.
- Hamilton, S. B., & MacQuiddy, S. L. (1984). Self-administered behavioral parent training: enhancement of treatment efficacy using a time-out signal seat. *Journal of Clinical Child Psychology*, 13, 61–69.
- Heinicke, C. M., Fineman, N. R., Ponce, V. A., & Guthrie, D. (2001). Relation-based intervention with at-risk mothers: outcome in the second year of life. *Infant Mental Health Journal*, 22, 431–462.
- Helfenbaum-Kun, E. D., & Ortiz, C. (2007). Parent-training groups for fathers of head start children: a pilot study of their feasibility and impact on child behavior and intra-familial relationships. *Child & Family Behavior Therapy*, 29, 47–64.
- *Herbert, S. D. (2013). *Parent training for families of hyperactive preschool-aged children*. Unpublished dissertation, University of Massachusetts.
- Herbert, S. D., Harvey, E. A., Roberts, J. L., Wichowski, K., & Lugo-Candelas, C. I. (2013). A randomized controlled trial of a parent training and emotion socialization program for families of hyperactive preschool aged children. *Behavior Therapy*, 44, 302–316.
- Hiscock, H., Bayer, J. K., Price, Ukoumunne, O. C., Rogers, S., & Wake, M. (2008). Universal parenting programme to prevent early childhood behavioural problems: cluster randomised trial. *British Medical Journal*, 336, 318–321.
- Homen, T. C., Gaspar, M. F., Seabra-Santos, M. J., Canavarro, M. C., & Azevedo, A. (2014). A pilot study with the incredible years parenting training: does it work for fathers of preschoolers with oppositional behavior symptoms? *Fathering*, 12, 262–282.
- Johnson, D. L., & Breckenridge, J. N. (1982). The Houston parent-child development center and the primary prevention of behavior problems in young children. *American Journal of Community Psychology*, 10, 305–316.
- *Kim, E., Cain, K.C., & Webster-Stratton, C. (2007). *The preliminary effect of a parenting program for Korean American mothers: A randomized controlled experimental study*. Unpublished manuscript.
- Kitzman, H., Olds, D. L., Henderson, C. R., et al. (1997). Effect of prenatal and infancy home visitation by nurses on pregnancy outcomes, childhood injuries, and repeated childbearing: a randomized controlled trial. *Journal of the American Medical Association*, 278, 644–652.
- Leung, C., Sanders, M. R., Leung, S., Mak, R., & Lau, J. (2003). An outcome evaluation of the implementation of the Triple P-Positive Parenting Program in Hong Kong. *Family Process*, 42, 531–544.

- Lösel, F., & Stemmler, M. (2012). Preventing child behavior problems in the Erlangen-Nuremberg developmental and prevention study: results from preschool to secondary school age. *International Journal of Conflict & Violence*, *6*, 214–224.
- Lösel, F., Stemmler, J., Jursch, S., & Beelmann, A. (2009). Universal prevention of antisocial development: short- and long-term effects of a child- and parent-oriented program. *Monatsschrift für Kriminologie und Strafrechtsreform*, *92*, 289–307.
- Markie-Dadds, C., & Sanders, M. R. (2006). Self-directed Triple P (Positive Parenting Program) for mothers with children at-risk of developing. *Behavioral and Cognitive Psychotherapy*, *34*, 259–275.
- Matos, M., Bauermeister, J. J., & Bernal, G. (2009). Parent-child interaction therapy for Puerto Rican preschool children with ADHD and behavior problems: a pilot efficacy study. *Family Process*, *48*, 232–252.
- McCarton, C. M., Brooks-Gunn, J., Wallace, I. F., et al. (1997). Results at age 8 years of early intervention for low-birth-weight premature infants: the infant health and development program. *Journal of the American Medical Association*, *277*, 126–132.
- McGilloway, S., Mhaille, G., Bywater, T., Furlong, M., Leckey, Y. ... (2012). A parenting intervention for childhood behavioral problems: A randomized controlled trial in disadvantaged community-based settings. *Journal of Consulting and Clinical Psychology*, *80*, 116–127.
- McNeil, C. B., Eyberg, S., Eisenstadt, T. H., Newcomb, K., & Funderburk, B. (1991). Parent-child interaction therapy with behavior problem children: generalization of treatment effects to the school setting. *Journal of Clinical Child Psychology*, *20*, 140–151.
- Morawska, A., & Sanders, M. R. (2006). Self-administered behavioral family intervention for parents of toddlers: part I. Efficacy. *Journal of Consulting and Clinical Psychology*, *74*, 10–19.
- Niccols, A. (2009). Immediate and short-term outcomes of the 'COPEing with Toddler Behaviour' parent group. *Journal of Child Psychology and Psychiatry*, *50*, 617–626.
- Nicholson, B. C., Janz, P. C., & Fox, R. A. (1998). Evaluating a brief parental-education program for parents of young children. *Psychological Reports*, *82*, 1107–1113.
- Nicholson, B., Anderson, M., Fox, R., & Brenner, V. (2002). One family at a time: a prevention program for at-risk parents. *Journal of Counseling and Development*, *80*, 362–372.
- Olds, D. L., Robinson, J., Pettitt, L., et al. (2004). Effects of home visits by paraprofessionals and by nurses: age 4 follow-up results of a randomized trial. *Pediatrics*, *114*, 1560–1568.
- Patterson, J., Barlow, J., Mockford, C., Klimes, I., Pyper, C., & Stewart-Brown, S. (2002). Improving mental health through parenting programmes: block randomised controlled trial. *Archives of Disease in Childhood*, *87*, 472–477.
- Perrin, E. C., Sheldrick, C., McMenamy, J. M., Hensen, B. S., & Carter, A. S. (2014). Improving parenting skills for families of young children in pediatric settings. *JAMA Pediatrics*, *168*, 16–24.
- Reedt, C., Handegard, B., & Morch, W. (2011). Promoting positive parenting practices in primary care: outcomes and mechanisms of change in a randomized controlled risk reduction trial. *Scandinavian Journal of Psychology*, *52*, 131–137.
- Reid, M. J., Webster-Stratton, C., & Hammond, M. (2007). Enhancing a classroom social competence and problem-solving curriculum by offering parent training to families of moderate- to high-risk elementary school children. *Journal of Clinical and Child & Adolescent Psychology*, *36*(4), 605–620.
- Sanders, M. R., Markie-Dadds, C., Tully, L. A., & Bor, W. (2000a). The Triple P-Positive Parenting Program: a comparison of enhanced, standard, and self-directed behavioral family intervention for parents of children with early onset conduct problems. *Journal of Consulting and Clinical Psychology*, *68*, 624–640.
- Sanders, M. R., Montgomery, D. T., & Brechtman-Toussaint, M. L. (2000b). The mass media and the prevention of child behaviour problems: The evaluation of a television series to promote positive outcome for parents and their children. *Journal of Child Psychology and Psychiatry*, *41*, 939–948.
- Sandy, S. V., & Boardman, S. K. (2000). The peaceful kids conflict resolution program. *International Journal of Conflict Management*, *11*, 337–357.
- Schuhmann, E. M., Foote, R. C., Eyberg, S. M., Boggs, S. R., & Algina, J. (1998). Efficacy of parent-child interaction therapy: interim report of a randomized trial with short-term maintenance. *Journal of Clinical Child Psychology*, *27*, 34–45.
- Schweinhart, L. J., Barnes, H. V., & Weikart, D. P. (1993). *Significant benefits: the high/scope perry preschool study through age 27*. Ypsilanti: High/Scope Press.
- Scott, S., Spender, Q., Doolan, M., Jacobs, B., & Aspland, H. (2001). Multicentre controlled trial of parenting groups for childhood antisocial behaviour in clinical practice. *British Medical Journal*, *323*, 194–197.
- Shaw, D. S., Dishion, T. J., Supplee, L., Gardner, F., & Arnds, K. (2006). Randomized trial of a family-centered approach to the prevention of early conduct problems: 2-Year effects of the family check-up in early childhood. *Journal of Consulting and Clinical Psychology*, *74*, 1–9.

- Somech, L. Y., & Elizur, Y. (2012). Promoting self-regulation and cooperation in pre-kindergarten children with conduct problems: a randomized controlled trial. *Journal of the American Academy of Child & Adolescent Psychiatry, 51*, 412–422.
- Sonuga-Barke, E. J. S., Daley, D., Thompson, M., Lavar-Bradbury, C., & Weeks, A. (2001). Parent-based therapies for preschool attention-deficit/hyperactivity disorder: a randomized, controlled trial with a community sample. *Journal of American Academy of Child and Adolescent Psychiatry, 40*, 402–408.
- Stefan, C. A., & Miclea, M. (2013). Effects of a multifocused prevention program on preschool children's competencies and behavior problems. *Psychology in the Schools, 50*, 382–402.
- Stefan, C. A., & Miclea, M. (2014). Effectiveness of the social-emotional prevention program as a function of children's baseline risk status. *European Early Childhood Education Research Journal, 22*, 14–44.
- Stone, W. L., Bendell, R. D., & Field, T. M. (1988). The impact of socioeconomic status on teenage mothers and children who received early intervention. *Journal of Applied Developmental Psychology, 9*, 391–408.
- Strayhorn, J. M., & Weidman, C. S. (1991). Follow-up one year after parent-child interaction training: Effects on behavior of preschool children. *Journal of the American Academy of Child and Adolescent Psychiatry, 30*, 138–143.
- Taylor, T. K., Schmidt, F., Pepler, D., & Hodgins, H. (1998). A comparison of eclectic treatment with Webster-Stratton's parents and children series in a children's mental health center: a randomized controlled trial. *Behavior Therapy, 29*, 221–240.
- Thompson, M.J.J., Laver-Bradbury, C., Ayres, M., Le Poidevin, E., Mead, S., et al. (2009). A small-scale randomized controlled trial of the revised new forest parenting programme for preschoolers with attention deficit hyperactivity disorder. *European Journal of Child and Adolescent Psychiatry, 18*, 605–616.
- *Tucker, S. J. (1996). *The long-term efficacy of a behavioral parent training intervention for families with two-year olds*. Unpublished dissertation, Rush University.
- *Tulloch, E.A. (1997). *Effectiveness of parent training on perception of parenting skill and reduction of preschool problem behaviors utilizing an ethnically diverse population*. Unpublished dissertation, Hofstra University.
- Van Zeijl, J., Mesman, J., Van IJzendoorn, M. H., et al. (2006). Attachment-based intervention for enhancing sensitive discipline in mothers of 1- to 3-year-old children at risk for externalizing behavior problems: a randomized controlled trial. *Journal of Consulting and Clinical Psychology, 74*, 994–1005.
- Webster-Stratton, C. (1982). Teaching mothers through videotape modeling to change their children's behavior. *Journal of Pediatric Psychology, 7*, 279–294.
- Webster-Stratton, C. (1984). Randomized trial of two parent-training programs for families with conduct-disordered children. *Journal of Consulting and Clinical Psychology, 52*, 666–678.
- Webster-Stratton, C. (1990). Enhancing the effectiveness of self-administered videotape parent training for families with conduct-problem children. *Journal of Abnormal Child Psychology, 18*, 479–492.
- Webster-Stratton, C. (1992). Individually administered videotape parent training: who benefits? *Cognitive Therapy and Research, 16*, 31–35.
- Webster-Stratton, C. (1998). Preventing conduct problems in Head Start children: strengthening parent competencies. *Journal of Consulting and Clinical Psychology, 66*, 715–730.
- Webster-Stratton, C., & Hammond, M. (1997). Treating children with early-onset conduct problems: a comparison of child and parenting training interventions. *Journal of Consulting and Clinical Psychology, 65*, 93–100.
- Webster-Stratton, C., Kolpacoff, M., & Hollinsworth, T. (1988). Self-administered videotape therapy for families with conduct-problem children: comparison with two cost-effective treatments and a control group. *Journal of Consulting and Clinical Psychology, 56*, 558–566.
- Webster-Stratton, C., Reid, M. J., & Hammond, M. (2001). Preventing conduct problems, promoting social competence: a parent and teacher training partnership in Head Start. *Journal of Clinical Child Psychology, 30*, 283–302.
- Webster-Stratton, C., Reid, M. J., & Hammond, M. (2004). Treating children with early-onset conduct problems: Intervention outcomes for parent, child, and teacher training. *Journal of Clinical Child and Adolescent Psychology, 33*, 105–124.
- Weihrauch, L., Schafer, R., & Franz, M. (2014). Long-term efficacy of an attachment-based parental training program for single mothers and their children: a randomized controlled trial. *Journal of Public Health, 22*, 139–153.
- Zangwill, W. M. (1983). An evaluation of a parent training program. *Child and Family Behavior Therapy, 5*, 1–16.

Alex R. Piquero is Ashbel Smith Professor of Criminology and Associate Dean for Graduate Programs in the School of Economic, Political and Policy Sciences at the University of Texas at Dallas. His research interests include criminal careers, criminological theory, and quantitative research methods. He has received several research, teaching, and service awards and is Fellow of both the American Society of Criminology and the Academy of Criminal Justice Sciences. In 2014, he received The University of Texas System Regents' Outstanding Teaching Award.

Wesley G. Jennings, PhD, is Associate Professor, Associate Chair, and Undergraduate Director in the Department of Criminology, has a Courtesy Appointment in the Department of Mental Health Law and Policy, and is a Faculty Affiliate of the Florida Mental Health Institute in the College of Behavioral and Community Sciences at the University of South Florida. In addition, he also has a Courtesy Appointment in the Department of Health Outcomes & Policy and is a Faculty Affiliate of the Institute for Child Health Policy in the College of Medicine at the University of Florida.

Brie Diamond is an assistant professor of criminal justice at Texas Christian University. Her research focuses on criminological theory and corrections and can be found in such outlets as *Crime and Delinquency*, *Journal of Criminal Justice*, *Intelligence*, and *Justice Quarterly*.

David P. Farrington, O.B.E., is Emeritus Professor of Psychological Criminology in the Institute of Criminology, Cambridge University. He has received the Stockholm Prize in Criminology, and he is Chair of the ASC Division of Developmental and Life-Course Criminology. His major research interest is in developmental criminology, and he is Director of the Cambridge Study in Delinquent Development, which is a prospective longitudinal survey of over 400 London males from age 8 to age 56. In addition to over 650 published journal articles and book chapters on criminological and psychological topics, he has published nearly 100 books, monographs and government reports.

Richard E. Tremblay is Emeritus Professor of Pediatrics and Psychology at the University of Montreal (Canada), Professor of Early Childhood Development in the School of Public Health, Physiotherapy and Sport Sciences at University College Dublin (Ireland) and founding editor of the online Encyclopedia on Early Childhood Development. He initiated six ongoing longitudinal and experimental studies on children's development from pregnancy to adulthood. He received numerous life achievement awards from scientific societies including the American Society of Criminology, the Academy of Experimental Criminology, the International Society for Research on Aggression, the French Academy of Moral and Political Sciences and the Italian Society Libera. He published more than 500 journal articles and over 100 books, book chapters and monographs.

Brandon C. Welsh is a Professor in the School of Criminology and Criminal Justice at Northeastern University and Director of the Cambridge-Somerville Youth Study. He is also the Royal Netherlands Academy of Arts and Sciences Visiting Professor and Senior Research Fellow at the Netherlands Institute for the Study of Crime and Law Enforcement in Amsterdam. Dr. Welsh's research focuses on the prevention of delinquency and crime and evidence-based social policy. His latest book is *Experimental Criminology: Prospects for Advancing Science and Public Policy* (Cambridge University Press, 2013).

Jennifer Reingle Gonzalez is an assistant professor in the Department of Epidemiology, Human Genetics and Environmental Sciences at the University of Texas School of Public Health. She has published more than 70 manuscripts in epidemiology and criminal justice, and her research is funded by the National Institute of Justice and SAMHSA.