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Efficacy of a Home Visiting Enhancement for High-Risk Families Attending Parent Management Programs
A Randomized Superiority Clinical Trial

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IMPORTANCE Antisocial behavior and adult criminality often have origins in childhood and are best addressed early in the child's life using evidence-based parenting programs. However, families with additional risk factors do not always make sufficient changes while attending such programs; these families may benefit from additional support.

OBJECTIVE To evaluate the efficacy of adding a 10-session, structured home parent support (HPS) intervention to enhance outcomes for high-risk families attending the Incredible Years Parent (IYP) program.

DESIGN, SETTING, AND PARTICIPANTS A randomized clinical superiority trial of 126 parents of children aged 3 to 7 years with conduct problems compared the IYP program plus HPS with treatment as usual of the IYP program alone. Child behavior measures were collected before and after treatment and at the 6-month follow-up. Recruitment from 19 IYP groups began February 13, 2013, and follow-up data collection was completed June 4, 2015. All data were analyzed using an intention-to-treat design with last observation carried forward. Statistical analysis took place from May 20, 2015, to March 31, 2016.

INTERVENTION Parents were randomly assigned to receive IYP program plus HPS or IYP alone.

MAIN OUTCOMES AND MEASURES The primary outcome measure was the posttreatment change in Eyberg Child Behavior Inventory Total Problem Scale (ECBI-P) score. Secondary outcomes included maintenance of change on the ECBI-P score, ECBI Intensity Scale score, and Social Competence Scale score at the 6-month follow-up; percentage of child behavior scores in the clinical range after treatment; retention; and attendance.

RESULTS A total of 126 parents (112 women and 14 men; mean [SD] age, 34.7 [8.4] years) were included; 63 parents were randomly assigned to each intervention group. Analysis of variance using intention to treat showed no significant difference between groups after treatment (P = .62). At follow-up, there was a medium effect (d = 0.63) showing a significant benefit from IYP plus HPS of 3.6 (95% CI, 0.8-6.5) on the ECBI-P score ($F_{1,124}$ = 6.3; P = .01). Families receiving the IYP plus HPS intervention had significantly fewer children with child behavior scores in the clinical range after treatment (9 of 51 [17.6%]) compared with families receiving the IYP program alone (18 of 45 [40.0%]), and this status was maintained at follow-up. The HPS intervention had better retention than the IYP program (dropout, 7 [5.6%] vs 16 [12.7%]) as well as better attendance.

CONCLUSIONS AND RELEVANCE In this trial, the IYP plus HPS intervention significantly improved outcomes for the most vulnerable families at 6 months. This study demonstrated that the HPS intervention is an effective addition to the IYP program to improve engagement and implementation of IYP program strategies and enhance child behavior outcomes for the most vulnerable families.

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Editorial
Supplemental content

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Conduct problems in young children include aggressive, dishonest, defiant, and disruptive behaviors.[1] The prevalence and intensity of these conduct problems are increasing, which negatively affects child, parent, and community well-being, resulting in increased demands on health, education, and social services.[2-5] Without effective intervention, conduct problems in young children have the potential to lead to conduct disorder and/or long-term difficulties including substance abuse, mental health difficulties, criminal behavior, and poor physical health.[6-8] The best outcomes for children with conduct problems are achieved with early intervention using evidence-based parent training programs.[9]

Even with the best programs, not all families respond equally.[10,11] Up to one-third of families still have significant child behavior problems immediately after treatment, which is associated with poorer long-term outcomes.[11-13] Vulnerable families have additional parental risk factors such as depression or substance abuse,[14,15] low self-efficacy, and punitive parenting practices.[16] These factors affect parents' ability to remain engaged in programs and to implement new parenting skills.[17] Providing additional support in the home for parents while attending parent training may improve outcomes for high-risk families.[12] During the last 20 years, there has been an increase in home visit programs in an attempt to improve child well-being,[18] but these programs do not provide specific strategies to address conduct problems, and only a few home visit programs have demonstrated long-term benefits for parents and young children.[19-21]

Having skilled therapists visit homes to support parents provides an opportunity to observe interactions and assess factors preventing change such as parental psychopathologic characteristics, difficult marital relationships, and parenting style.[22] Combining an individualized home visiting treatment along with an evidence-based group parent program has the potential to address some of the barriers to achieving good outcomes but has not previously been evaluated, to our knowledge.

The home parent support (HPS) program was developed by one of us (D.L.) to enhance outcomes from the Incredible Years Parent (IYP) program. The basic IYP intervention was selected as the parent program because of its strong empirical evidence for children with conduct problems.[4,11,23-26] The IYP program covers strategies to build a strong parent-child relationship, to promote positive behaviors, and to reduce inappropriate behaviors. The IYP program draws on social learning and behavioral theories. Details of IYP can be found at http://www.incredibleyears.com.

The HPS program is a 10-session home-based coaching intervention delivered while parents attend the IYP program. The aim is to support parents to effectively implement IYP strategies in their homes. With the combination of group and individualized support, it was expected that outcomes from the IYP program would be maximized. An initial pilot study found that HPS was acceptable and showed benefits in both retention and satisfaction.[27]

The aim of this research was to evaluate the efficacy of adding HPS for high-risk families attending the IYP program. The primary hypothesis was that HPS would improve child behavior scores immediately after treatment compared with the IYP program alone. Secondary hypotheses included improved child behavior at the 6-month follow-up, improved attendance at the IYP program, improved retention in the program, and fewer participants with child behavior scores in the clinical range immediately after treatment.

Key Points

Question Does adding a home parent support program to the Incredible Years Parent program improve child behavior outcomes for vulnerable families?

Findings In this randomized clinical trial, the home parent support program improved child behavior outcomes at the 6-month follow-up compared with those who received parent management training only. Families who received the home parent support intervention had significantly fewer children with child behavior scores in the clinical range after treatment; this outcome was maintained at the 6-month follow-up.

Meaning Additional home parent support is a practical intervention to improve outcomes for vulnerable families; this program represents potential benefits by reducing future health and social problems, and it immediately improves the quality of life for the individual, the family, and the community.

Methods

Trial Design

A superiority randomized clinical trial was conducted in accordance with the Consolidated Standards of Reporting Trials (CONSORT) reporting guideline. Full design details are in the published protocol[28] (trial protocol is available in Supplement 1). Outcomes data were collected before and after treatment and at the 6-month follow-up. All data were analyzed using an intention-to-treat design with last observation carried forward. Approval was received from the New Zealand Northern B Health and Disability Ethics Committee (NTY/12/06/050). All participants received information on the trial and provided written consent. Participants received NZ$25 (US $17.1) for the pretrial and posttrial interviews and NZ$50 (US $34.3) for the follow-up interview for a total of NZ$100 (US $68.5).

Participants

Recruitment began February 13, 2013, and follow-up data collection was completed June 4, 2015. Participants were recruited from 19 IYP groups delivered in a community mental health service in New Zealand. Parents were eligible for the trial if they met the following criteria: they were English-speaking parents or caregivers of a child aged 3 to 7 years and were enrolled to attend the basic IYP program (1 child per family was included); parent-rated child behavior scores were in the clinical range for 1 psychometric scale (Eyberg Child Behavior Inventory Total Problem Scale [ECBI-P] score, >11 [$t > 55$]; ECBI Intensity Scale [ECBI-I] score, >127 [$t > 59$]; or Social Competence Scale [SCS] score, <17), or there was 1 risk factor (involvement of the Child, Youth and Family agency; school exclusion; or the parent received a diagnosis of a mental health disorder).

Measures

Our primary outcome measure was the change in ECBI-P score after treatment. The ECBI is a well-validated instrument[29] that assesses frequency (problem scale) and severity (intensity scale) of disruptive behaviors in children and adolescents. It distinguishes normal behavior problems from conduct-disordered behavior and is frequently used to measure behavior change.[5,11,23,30-33] The problem scale was the primary outcome measure, as this measure is more sensitive to change.[34] Both scales were reported. Although a parent-report measure of child behavior lacks the objectivity of an independent measure, it has a very good correlation with independent observation.[35,36]

Secondary Outcomes Measures

The SCS-parent version was developed by the Conduct Problems Prevention Research Group (α = .86).[37,38] It consists of 12 items measuring child prosocial behaviors (eg, "my child shares things with others"), communication skills (eg, "my child listens to others' points of view"), and self-control (eg, "my child controls his or her temper when there is a disagreement") on a 5-point Likert scale (where 0 indicates not at all and 4 indicates very well). Scores less than 17 indicated poor social skills, and a score of 17 is considered a clinically important cutoff point.

The Family Questionnaire was developed by the Incredible Years Pilot Study Working Group for use in a joint agency national evaluation of the Incredible Years Pilot Study.[39] The questions incorporated items from several previously validated measures to provide a comprehensive assessment of child behavior and parent characteristics (parenting practices, relationships, depressions, life events, and cultural characteristics) using Likert scales, yes or no responses, and item selection.

The Incredible Years Parent Satisfaction Questionnaire is a 24-question assessment of parent views on the program content and teaching methods. Parents rated their satisfaction on a 7-point Likert scale (where 1 indicates extremely useless or difficult and 7 indicates extremely useful or easy).[40]

The Follow-up Questionnaire was developed by one of us (D.L.). It is a 12-question assessment using a 5-point Likert scale (where 1 indicates unhelpful and 5 indicates very helpful) to measure levels of engagement, helpful aspects of the trial, and level of competency with implementing IYP strategies (available on request).

Procedure

All parents were visited by IYP group leaders (including D.L.) before beginning the IYP program, given information on the trial, and screened using the ECBI and SCS. A research assistant visited eligible families to obtain consent and collect remaining baseline data. Recruitment continued until 126 participants were enrolled. All participants attended a 14- to 16-week Basic IYP intervention delivered by group leaders (including D.L.) who received supervision every 2 weeks by an IYP mentor (D.L.). An independent HPS therapist (also accredited in the IYP program) was allocated to families in the treatment group to provide the HPS intervention.

Posttreatment measurements were collected by the IYP group leaders using the ECBI, SCS, and the standard Incredible Years Parent Satisfaction Questionnaire. The research assistant repeated the Family Questionnaire within 2 weeks of the final IYP session. Six-month follow-up data were collected by the research assistant. The schedule of data collection is summarized in the eTable in Supplement 2.

Sample Size

Sample size was calculated from previous studies in which 80% of participants completed IYP groups.[31,33] With 50 participants in each arm, there is 80% power to detect an effect size of 0.57 (ie, Cohen *d*), equating to a differential change between groups of approximately 3.5 between the control and experimental group. Allowing for 20% attrition, 126 participants were recruited.

Randomization Sequence Generation

All participants were confirmed for inclusion, allocated a code, and randomized using a computer-generated sequence in a 1:1 ratio in permuted blocks to receive the IYP intervention plus HPS (n = 63) or to the control group of the IYP program alone (n = 63). Stratification was by age, sex, and race/ethnicity.

Blinding

Blinding participants to the treatment group was not possible, nor was it possible to keep IYP group leaders blinded to participant allocation. Research assistants were blinded to participant allocation.

Intervention

The HPS intervention consists of 10 one-hour sessions to provide personalized coaching for families in their homes concurrent with their attendance at an IYP group program. Therapists administering the HPS are qualified mental health clinicians and accredited IYP facilitators. They work collaboratively with parents to review key content from the IYP program and tailor strategies to meet the needs of their child. They also explore possible barriers for change (eg, child learning difficulties or mental health, parental mental health, negative cognition, or parental relationships). Therapists support parents to understand their role in shaping the outcomes for their children and to reflect on their parenting styles, expectations, and communication in terms of social learning theory. This support may include acknowledging parents' own experiences and addressing negative cognitions, emotional regulation, self-care, and well-being. Therapists encourage parents to set realistic goals and to evaluate these regularly. Coaching as part of HPS helps parents integrate prosocial skills into their parenting practices, gain mastery, and build self-confidence. Therapists are flexible with home visits and involve other members of the family in the treatment. Where necessary, referrals to appropriate agencies are facilitated.

A therapist guide was developed specifying key components for each home visit to ensure that the focus of treatment was on successful implementation of IYP strategies and to address barriers to achieving successful implementation. The guide also supported therapists to maintain the integrity of HPS

and to maximize outcomes for parents (guide available on request).

Therapists administering the HPS received supervision every 2 weeks from an IYP mentor. All families were reviewed monthly by a multidisciplinary team (including D.L.) that included a child psychiatrist, pediatrician, psychologist, and social worker.

Statistical Analysis

Statistical analysis took place from May 20, 2015, to March 31, 2016. Differences in change scores between groups were estimated directly from the analysis of variance models on the primary outcome and secondary outcomes on all continuous variables. χ^2 Tests were used to compare change in the percentage of children with behavior scores in the clinical range. Further analysis using analysis of variance included a per-protocol analysis after treatment and at follow-up and an analysis to determine if either race/ethnicity or parental mental health problems moderated outcomes. All *P* values were from 2-sided tests, and results were deemed statistically significant at $P < .05$ and summarized using 95% CIs. Cohen *d* was calculated to show treatment effect sizes (small, $d = 0.20$; medium, $d = 0.50$; and large, $d = 0.80$).[41]

Results

A total of 226 parents were enrolled in IYP programs, 130 met the inclusion criteria, and 126 consented and were randomized (63 parents in each group). Complete data were collected after treatment for 123 parents (97.6%) and for 115 parents (91.3%) at follow-up. Follow-up data were available for 62 parents (98.4%) in the treatment group and 53 parents (84.1%) in the control group (**Figure 1**).

Parent demographic characteristics were balanced between the 2 groups (**Table 1**). Child demographic characteristics (age, sex, and race/ethnicity) were similar in both groups (**Table 2**).

Primary Outcome

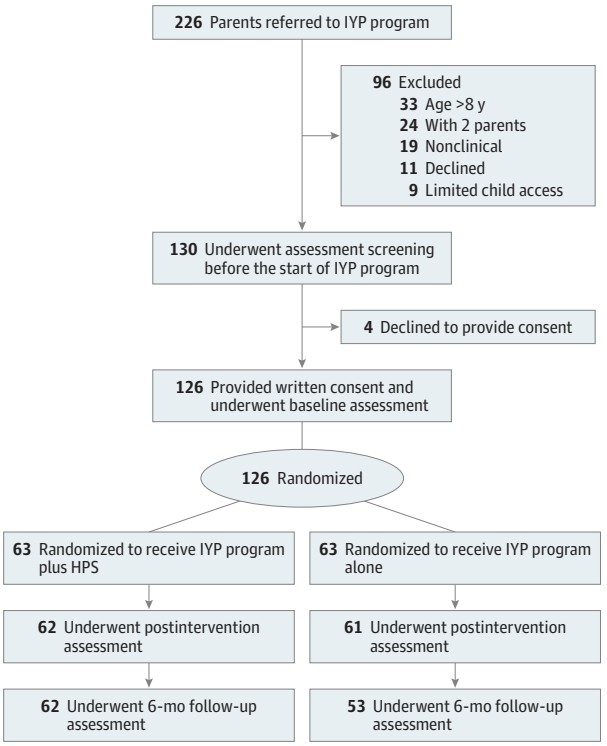
Baseline child behavior measures were similar between the groups. The intent-to-treat analyses showed no significant difference between groups after treatment ($F_{1,124} = 0.2$; $P = .62$). However, at the 6-month follow-up, the difference in the mean ECBI-P score was 3.6 (95% CI, 0.8-6.5), which represents a significant benefit from HPS ($F_{1,124} = 6.3$; $P = .01$). The change of 3.6 is considered a medium effect (Cohen $d = 0.63$) (**Table 3**).

Secondary Outcomes

Secondary outcomes also showed benefits for HPS. At the 6-month follow-up, the mean SCS score showed a significant benefit of 2.9 (95% CI, 0.2-5.6; $F_{1,124} = 4.7$; $P = .03$).

Analysis of families whose children's baseline ECBI-P scores were in the clinical range (51 for HPS and 45 for the IYP program) showed that those receiving HPS had significantly fewer children with child behavior scores in the clinical range after treatment (9 of 51 [17.6%]) compared with families receiving the IYP program alone (18 of 45 [40.0%]) ($\chi^2_1 = 5.91$; $P = .02$).

Figure 1. Participant Flowchart



HPS indicates home parent support; IYP, Incredible Years Parent.

This difference remained significant at the 6-month follow-up (6 of 51 [11.8%] for HPS and 14 of 45 [31.1%] for the IYP program) ($\chi^2_1 = 5.43$; $P = .02$) (**Figure 2**).The change in clinical scores for each measure (ECBI-P, ECBI-I, and SCS) after treatment shows the number needed to treat is 5 individuals.

Overall engagement in IYP sessions was high for both groups, with 93 of 126 (73.8%) participants completing more than 70% of IYP sessions (at least 10 of 14 sessions). Significantly more parents who received HPS completed more than 70% of sessions (52 of 63 [82.5%]) compared with parents who received the IYP program alone (41 of 63 [65.1%]) ($\chi^2_1 = 4.97$; $P = .03$).

Retention in the trial was better in the HPS group, where dropout (7 [5.6%]) was less than half that of the IYP group (16 [12.7%]). The Family Questionnaire measures showed that both groups improved but failed to detect any significant differences between the groups. Satisfaction was high in both groups.

Exploratory Analyses

Per-protocol analysis was carried out to test the hypothesis that adherence to treatment affects outcome. This analysis included all participants who attended more than 70% of IYP group sessions, attended at least 70% of HPS visits (for the treatment group), and had complete data for each time point. Results showed a significant benefit of HPS at the 6-month follow-up on all 3 measures: ECBI-P ($F_{1,83} = 4.7$; $P = .03$), ECBI-I ($F_{1,83} = 4.8$; $P = .03$), and SCS ($F_{1,83} = 4.4$; $P = .04$). We analyzed race/ethnicity and parental mental health as possible moderators and were unable to document any significant effects.

Table 1. Demographic Characteristics of Parents at Baseline

Characteristic	Parents, No. (%)		
	HPS Program (n = 63)	IYP Program (n = 63)	Total (N = 126)
Female sex	58 (92.1)	54 (85.7)	112 (88.9)
Single or separated marital status	22 (34.9)	28 (44.4)	50 (39.7)
Natural parent	57 (90.5)	57 (90.5)	114 (90.5)
Referral from primary sector	19 (30.2)	19 (30.2)	38 (30.2)
Referral from secondary sector	33 (52.4)	34 (54.0)	67 (53.2)
≥1 Mental health problem[a]	27 (42.9)	33 (52.4)	60 (47.6)
≥6 Major life events[b]	10 (15.9)	10 (15.9)	20 (15.9)
Tertiary qualification[c]	22 (34.9)	22 (34.9)	44 (34.9)
Receive a benefit[d]	38 (60.3)	38 (60.3)	76 (60.3)
Parent or caregiver age, mean (SD), y	34.7 (8.3)	34.8 (8.5)	34.7 (8.4)

Abbreviations: HPS, home parent support; IYP, Incredible Years Parent.

[a] Depression or alcohol and drug abuse or other mental health problem.

[b] Some examples include moved house, became unemployed, death of family member, serious financial problems, or divorce.

[c] Any qualifications gained after secondary school or high school from a recognized educational provider (eg, university, trade school, or technical college).

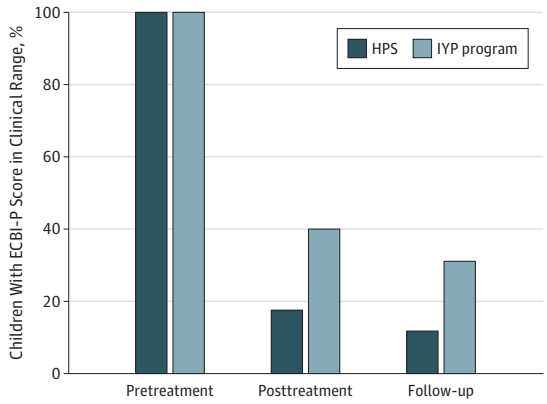
[d] Government subsidy for low-income families.

Table 2. Demographic Characteristics of Children at Baseline

Characteristic	Children, No. (%)		
	HPS Program (n = 63)	IYP Program (n = 63)	Total (N = 126)
Age <5 y	26 (41.3)	26 (41.3)	52 (41.3)
Male sex	43 (68.3)	43 (68.3)	86 (68.3)
Māori	20 (31.7)	19 (30.2)	39 (31.0)
Excluded from school	1 (1.6)	1 (1.6)	2 (1.6)
Age, mean (SD), y	5.4 (1.5)	5.5 (1.4)	5.4 (1.4)

Abbreviations: HPS, home parent support; IYP, Incredible Years Parent.

Figure 2. Percentage of Children With Behavior Scores in the Clinical Range for Each Group



Last observation carried forward was used for missing data (home parent support [HPS] group, 4; Incredible Years Parent [IYP] program group, 2). ECBI-P indicates Eyberg Child Behavior Inventory Total Problem Scale.

Adverse Events

An adverse event is a negative reaction or result that is unintended, unexpected, or unplanned.[42] Intensive monitoring by therapists did not identify any adverse events during the trial.

Discussion

Statement of Principal Findings

Although we were unable to show a significant difference in child behavior scores immediately after the intervention (our primary outcome), there was a significant difference in the percentage of children with behavior scores in the clinical range at this point, with better outcomes for those receiving HPS. By the 6-month follow-up, there was a clear and significant benefit from HPS compared with the IYP program alone on symptom measures, and the reduction in the percentage of children with behavior scores in the clinical range was maintained. Those receiving HPS had significantly better attendance at the IYP group. Per-protocol analyses showed benefits for HPS on all measures. Furthermore, the number needed to treat is only 5 individuals, making this an effective intervention. These improvements held for parents with mental health problems, and there was no difference by race/ethnicity. These results are important. For many years, the problem of dropout and poorer outcomes in families most in need of parenting interventions has been a concern. We have been able to show a significant reduction of participants with children whose behavior scores were in the clinical range after the addition of a home visiting program.

Child behavior scores in the clinical range are a risk factor for adolescent engagement in delinquent acts.[11,14] Having more young children with behavior scores in the nonclinical range must be a priority. Children with low levels of aggression have less risk of developing serious, violent behavior in adolescence and young adulthood.[43]

The findings in the trial showed that additional home support not only improved attendance at the IYP group but also improved child behavior outcomes. One could argue that additional interventions should be provided only after a group approach has been shown to fail. We saw merits in identifying parents who were likely to have poorer response to a group intervention (but were motivated to enroll) and provide concurrent support. In this way, parents saw positive change in their families early in the program and remained engaged.

Table 3. Comparison of Treatment Effect Over Time

Measure	Pretreatment	Pretreatment to Posttreatment						Posttreatment to Follow-up						Pretreatment to Follow-up				
	Score, Mean (SD) (n = 63)	Posttreatment Score, Mean (SD) (n = 63)	Mean Change	Difference in Mean Change	$F_{1,124}$ Value	*P* Value	Cohen *d*	Follow-up Score, Mean (SD) (n = 63)	Mean Change	Difference in Mean Change	$F_{1,124}$ Value	*P* Value	Cohen *d*	Mean Change	Difference in Mean Change	$F_{1,124}$ Value	*P* Value	Cohen *d*
ECBI-P																		
HPS program	19.57 (6.82)	9.52 (7.90)	10.05					6.65 (7.25)	2.87					12.92				
				0.80	0.2	.62	0.13			2.84	5.2	.03	0.57		3.64	6.3	.01	0.63
IYP program	19.41 (6.82)	10.16 (7.90)	9.25					10.13 (7.25)	0.03					9.28				
ECBI-I																		
HPS program	147.56 (30.37)	112.24 (34.47)	35.32					106.43 (32.32)	5.81					41.13				
				9.15	3.0	.09	0.44			1.28	0.07	.79	0.69		10.43	3.2	.08	0.45
IYP program	144.00 (30.37)	117.83 (34.47)	26.17					113.30 (32.32)	4.53					30.70				
SCS																		
HPS program	16.94 (7.29)	22.83 (8.78)	5.89					25.41 (8.16)	2.58					8.47				
				1.52	1.2	.27	0.28			1.41	1.6	.21	0.32		2.93	4.7	.03	0.54
IYP program	17.54 (7.29)	21.91 (8.78)	4.37					23.08 (8.16)	1.17					5.54				

Abbreviations: ECBI-I, Eyberg Child Behavior Inventory Intensity Scale; ECBI-P, Eyberg Child Behavior Inventory Total Problem Scale; HPS, home parent support; IYP, Incredible Years Parent; SCS, Social Competence Scale.

Another mechanism for change may be attributed to parents' increased competence and mastery in applying positive parenting skills in their homes. Therapists administering HPS coached parents through practice and motivated with encouragement. As parents gained confidence, these strategies became embedded into daily parenting practices; thus, change continued well after the active intervention. In addition, parents were encouraged to reflect on the power of modeling and how their own behavior, communication, and interactions affected their child's behavior. This insight may have contributed to parental motivation to address personal factors affecting relationships within the family and may have been another mechanism for change. Although not all factors can be addressed quickly, when parents feel well supported, validated, and understood, their level of distress can be reduced, which allows the capacity to take on new learning. This change could contribute to improved optimism, self-efficacy, and more positive parent-child interactions. Durand and colleagues[44] found that the best predictor of future child behavior is parental optimism or pessimism. Thus, having regular coaching in the home may have helped parents master new strategies, model positive interactions, and develop a conscious awareness of how their own behavior and other environmental factors were affecting their child's behavior; this change takes time.

Comparison With Other Studies

To our knowledge, there is little research to date on the value of adding an enhancement to an evidence-based parent training program. We identified 13 studies with enhancement interventions to improve outcomes of standard parent programs in which the focus was on improving parenting skills. All of these enhancements had relatively small sample sizes ranging from 22 to 153 and generally did not demonstrate additional benefits after treatment, and few included follow-up data. The only studies in which there was some benefit for child problem behavior were those with enhancements that addressed parental stress, mental health, and negative cognition.[44-46] A home visiting enhancement allows for tailored personalized support, an assessment of family systems, and identification of other risk factors affecting family functioning.[22,47,48]

The cost benefit of adding home visiting as a mode of enhancement alongside a group-based parenting program has not been formally evaluated to date, to our knowledge. However, there are clear cost benefits from the IYP group. For example O'Neil et al[2] found cost benefits in terms of education, crime, and unemployment at the 6-month follow-up. Others have found longer-term benefits from the IYP program.[11,32,49,50] This finding indicates the value of the IYP program for families who remain engaged. The cost benefit of adding HPS was not formally assessed in this trial, but the direct cost based on salary hours, delivery costs, and specialist reviews was NZ$5000 (US $3426.7) per child. This outcome represents potential benefits by reducing future health and social problems, and it immediately improves quality of life for the individual, the family, and the community.

Strengths and Limitations

To our knowledge, this is the first study to add a home visit intervention to enhance outcomes for parents attending the IYP group program. This study was adequately powered, included

follow-up data, and demonstrated parent-reported longer-term benefits for child behavior. Although the primary hypothesis was not supported, there was a significant reduction in the percentage of child behavior scores in the clinical range, and there were significant results at follow-up, suggesting potential enduring benefit of HPS. The high levels of engagement in the IYP program and retention in the trial as well as the absence of any adverse events add strengths to this study.

This study has some limitations. Participants were included in the trial if their child's behavior score on any measure (ECBI-P, ECBI-I, or SCS) was in the clinical range. This inclusion criterion may have been generous, as this allowed participants with scores in the nonclinical range on the primary measure (ECBI-P) to be included. As a result, the behavior symptoms for these participants had less room to improve on the primary measure (ECBI-P) and may have reduced our ability to show change after treatment.

Second, the measures of child behavior were based on parent reports alone without independent measures. This choice is defendable as the measures are all reliable and well validated and have shown adequate correlation between parent report and independent observation.[35,36] However, the addition of an independent, and ideally blinded, assessment of outcomes would add to confidence in the findings in any future study.

The cost to implement such an enhancement was not formally analyzed in this study. Previous studies on cost-benefit analysis in many countries have already shown efficacy in committing resources early in the life of a child, with high rates of return on investment.[2-5,11,32,49,50] A formal evaluation of the cost benefit of HPS in a future trial may address potential barriers to implementation. Finally, further exploration of mediators and moderators of change would guide implementation.[31]

Conclusions

Problematic behavior in children is an important public health issue and by necessity requires an integrated approach from all sectors in the community. Public policy is influenced by research, and it is important to know what works in order to allocate financial resources wisely. This study has demonstrated that the addition of HPS could be a realistic and clinically practical intervention to improve outcomes for vulnerable families while they attend the IYP program.

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Author Contributions: Drs Lees and Frampton had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.
Concept and design: All authors.
Acquisition, analysis, or interpretation of data: Lees, Merry.
Drafting of the manuscript: Lees.
Critical revision of the manuscript for important intellectual content: Frampton, Merry.
Statistical analysis: Lees, Frampton.
Obtained funding: Lees.
Administrative, technical, or material support: Lees.
Supervision: Merry.

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Data Sharing Statement: See Supplement 3.

Additional Contributions: The late Emeritus Professor David Fergusson, BA, PhD, Otago University, was instrumental in the concept and design of this research. He also provided supervision and critical revision of the manuscript. He was not compensated for his contributions.

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