ORIGINAL CONTRIBUTION

Reducing child conduct disordered behaviour and improving parent mental health in disadvantaged families: a 12-month follow-up and cost analysis of a parenting intervention

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Abstract The effectiveness of the Incredible Years Basic parent programme (IYBP) in reducing child conduct problems and improving parent competencies and mental health was examined in a 12-month follow-up. Pre- to post-intervention service use and related costs were also analysed. A total of 103 families and their children (aged 32–88 months), who previously participated in a randomised controlled trial of the IYBP, took part in a 12-month follow-up assessment. Child and parent behaviour and well-being were measured using psychometric and observational measures. An intention-to-treat analysis was carried out using a one-way repeated measures ANOVA. Pairwise comparisons were subsequently conducted to determine whether treatment outcomes were sustained 1 year post-baseline assessment. Results indicate that post-intervention improvements in child conduct problems, parenting behaviour and parental mental health were maintained. Service use and associated costs continued to decline. The results indicate that parent-focused interventions, implemented in the early years, can result in improvements in child and parent behaviour and well-being 12 months later. A reduced reliance on formal services is also indicated.

Keywords Conduct disorder · Child development · Parenting · Parenting intervention · Parent–child relationships · Cost analysis

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Introduction

Conduct disordered behaviour is the primary cause of functional disability in childhood and affects around 10 % of children in the UK and Ireland [1, 2]. Children who experience social adversity (including socioeconomic disadvantage, parental neglect and abuse, parental psychopathology, parental substance abuse and/or criminality) are particularly vulnerable to conduct disordered behaviour and/or mental health problems [3]. Numerous studies have highlighted links between early exposure to inadequate care in early childhood and negative outcomes for children [4]. Harsh and inconsistent discipline, inadequate supervision and low levels of parental warmth and involvement are some of the most important precursors of early onset conduct problems. Positive parent–child interactions, on the other hand, predict good child psychological and behavioural adjustment in childhood [5].

The negative impact of early childhood conduct disorder is substantial. Children who display behavioural difficulties are at increased risk of adverse long-term outcomes, including poor educational attainment and early school leaving [6], mental health and social difficulties, substance

abuse [7], poor employment prospects and increased reliance on welfare and social care systems in later life [8]. It has also been found that the costs of health, special educational and social welfare services associated with the treatment of children with conduct disordered behaviour may be up to ten times higher than in those with no conduct problems [9]. Economic costs can also accumulate over the lifespan. Scott et al. [9] reported that welfare payments until the age of 28 were 1.65 times higher for children with conduct problems than for those with none. In a recent UK study, the costs of adverse outcomes associated with poor adjustment in childhood were estimated to be as high as £225,000 over an individual's lifetime [10].

There is now strong evidence to show that parenting interventions which are based on behavioural and social cognitive principles and which aim to improve parent–child relationships, are effective in tackling behavioural disorders in childhood [11, 12]. The Incredible Years Basic parent-training programme (IYBP) is a brief, group-based intervention that has been considered a "model" programme for addressing early childhood conduct problems [13, 14]. Existing evidence indicates that the IYBP leads to significant improvements in child adjustment [3, 15], including improvements in conduct disordered behaviour [16, 17], hyperactivity and oppositional defiant problems [18–20]. Benefits of the IYBP for parenting skills, parent mental health and sibling adjustment have also been documented [21–23]. Previous research also supports the effectiveness of the IYBP for disadvantaged families [24, 25].

Despite the evidence in support of the effectiveness of parenting programmes, less is known about their longer-term impact [26]. Webster-Stratton [3] found that the effects of the IYBP on child and parent behaviour were maintained 1 year after parent training and a small number of other studies have also identified the potential longer-run benefits of parenting interventions [27, 28]. A recent systematic review (involving eight RCTs) on the long-term impact of parenting interventions for young children found that positive child and family outcomes, such as reduced externalising and internalising problems and improved social competence, were generally maintained at 1-year post-intervention [29]. A further study in Norway [30] demonstrated a maintenance of positive effects from parent training 5 to 6 years later, whilst Webster-Stratton et al. [31] also found that children whose parents attended the IY parenting programme, showed fewer severe conduct problems (criminal behaviour, delinquency and substance abuse) than would be expected later in adolescence.

Cost analyses of parent-training programmes typically focus on short-term outcomes [32]. Group-based parenting programmes are generally characterised by low costs and increasing evidence indicates that they may be more cost-efficient in the longer term than later interventions [10, 33, 34]. A recent cost-effectiveness analysis of the IYBP—based on results from our RCT evaluation—indicated a substantial decline in service use for the intervention group when compared to the control group, thereby supporting the cost-effectiveness of the programme [35], whilst further research [28] indicates that the intervention can result in long-term reductions in the utilisation of health and social care services. However, whilst the longer-term effects of parenting programmes appear quite promising, a need for further research is indicated, especially in community-based settings [36, 37].

The study reported here, involved a 12-month follow-up of families who received the IYBP and who had previously participated in a RCT evaluation of the programme [25]. The findings from the RCT illustrated significant short-term benefits of the IYBP for child behaviour, parenting skills and parental mental health. We subsequently set out to examine whether these positive effects were maintained in the longer run, at 12-month post-baseline assessment. We also examined patterns of service utilisation (health, social and special educational) and associated costs amongst intervention children over time.

Our hypotheses were as follows: (a) improvements in child behaviour would be sustained at 12-month follow-up; (b) improvements in parenting skills, parenting stress and depression would also be sustained 12 months later; (c) there would be positive effects of parent training on sibling behaviour and marital conflict; and (d) the use of health, social, and special educational services would decrease in the longer run.

Method

Study design

The RCT included 149 families who were blindly and randomly allocated to an IYBP intervention group (n = 103) or a waiting-list control group (n = 46). At baseline, two cohorts of parents were recruited and assessed (cohort 1 = 53 parents; cohort 2 = 96 parents) (two cohorts were required as it took much longer than anticipated to recruit willing and eligible parents into the trial). Follow-up assessments were completed 6-month post-baseline assessment. During this 6-month interval, parents in the intervention group received the intervention. This study reports a subsequent 12-month post-baseline assessment which was conducted on intervention group families only (n = 103). For ethical reasons, the participants in the control group were offered the intervention after the 6-month follow-up assessment. Therefore, it was not possible to compare the intervention and control groups at the 12-month follow-up.
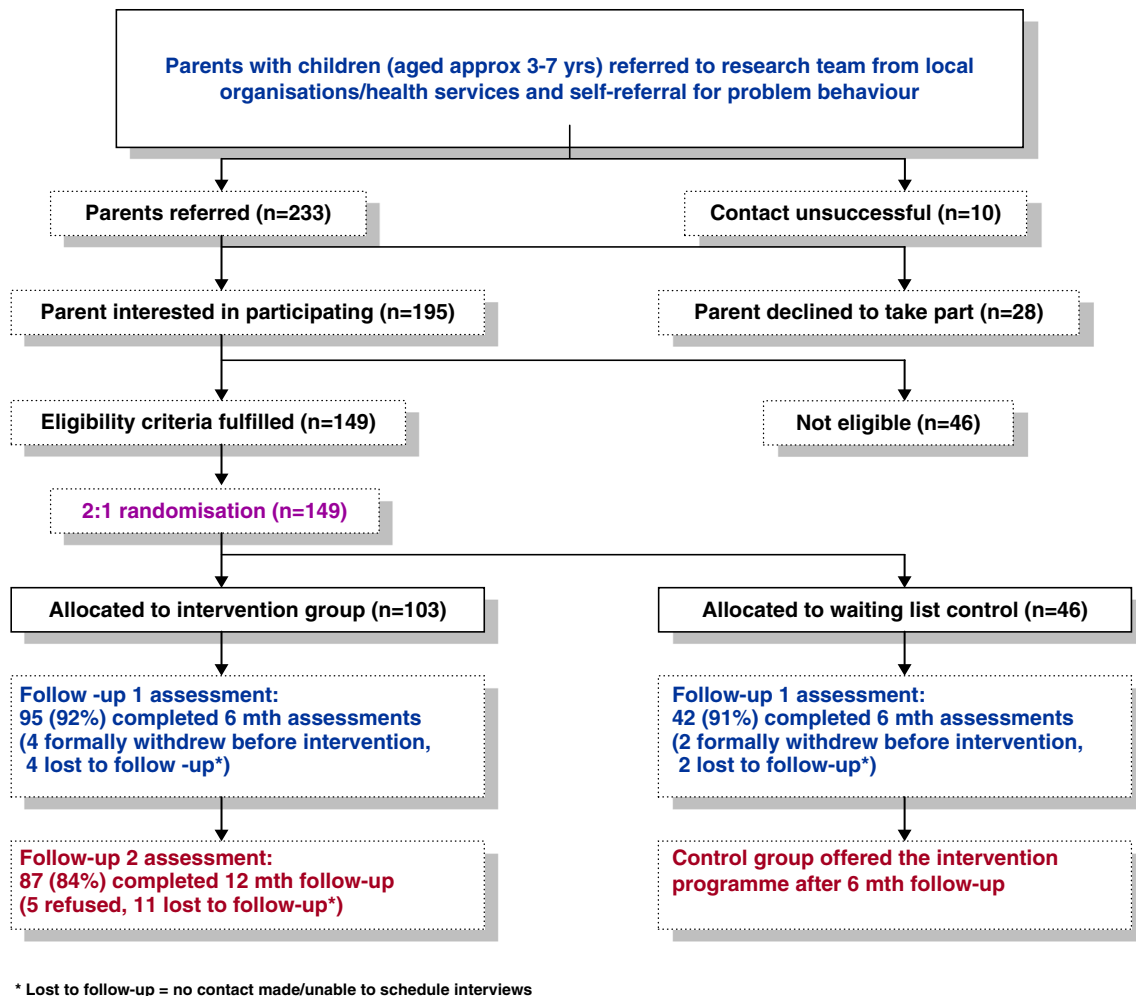
Fig. 1 Flow of participants through trial

Participants and study setting

Families were recruited to the study using existing service systems including public health service waiting lists, local schools, community-based agencies and self-referral. Written informed consent was provided by parents and guardians of participating children. Participants were eligible if the primary caregiver rated their child (aged 32–88 months) above the clinical cut-off on either the 'intensity' subscale (intensity score ≥ 127) or the 'problem' subscale (problem score ≥ 11) of the Eyberg Child Behaviour Inventory (ECBI) [38]. Parents also had to be willing and able to attend the programme.

The intervention was delivered in typical community-based services in Ireland. These services are based in four urban areas which are designated as 'disadvantaged' according to information on demographic profile, social class composition and labour market situation [39].

Attrition

The flow of participants through the study is shown in Fig. 1. At 6-month post-baseline assessment, 95 intervention group participants (92 %) were retained in the study. At 12-month follow-up, 87 participating families (84 %) completed assessments (see Fig. 1). Five parents withdrew from the research and 11 could not be contacted despite vigorous efforts by the research team.

Randomisation and masking

Following baseline assessments, participants were blindly and randomly allocated to the intervention group using a computer-generated random number sequence. Researchers were originally blind to allocation, but at the 12-month follow-up, only the intervention group could be assessed. Therefore, researchers could not be blind to intervention allocation at this time point.

The intervention

The IYBP is a manualised, collaborative-based intervention which uses group discussions and role plays in combination with video material to foster positive parent–child relationships and illustrate positive parenting techniques and non-aversive discipline strategies. The assumed mechanism of action is that the intervention improves positive parenting which, in turn, impacts child behaviour. The IYBP intervention is based on behavioural and social learning theory and, at the time of the study, consisted of 14 2-h sessions. Nine intervention groups, each with approximately 11–12 members, were delivered by two fully trained facilitators. Both participant cohorts received the 14-session intervention. However, due to time/resource limitations, the first cohort of participants received the intervention over 12 weeks rather than (as in the case of the second cohort) a 14-week period; the intervention was identical in both cases. Implementation fidelity was monitored by means of facilitator-completed self-evaluation checklists. Approximately three-quarters (76 %) of the first cohort of participants attended seven or more sessions (mean attendance 10.8 sessions) compared to half (52 %) of the second cohort (mean attendance 6.6 sessions). In total, 31 % of participants attended three or fewer sessions.

Procedure and measures

A battery of standardised psychometric measures was administered at all three time points by means of a face-to-face interview with the main caregiver. The internal consistency of all scales was calculated on baseline data using Cronbach's α. Observations were also used to provide an objective measure of parent and child behaviour. Demographic and background information was collected by means of a standardised Personal and Demographic Information Form.

Child measures

The ECBI was the primary outcome measure and was used to assess the frequency of child delinquency, temper tantrums and aggressive behaviour. This widely used measure consists of two subscales: an 'intensity subscale', which comprises a seven-point Likert scale and measures the frequency of 36 problem behaviours ($\alpha = 0.89$); the 'problem subscale' elicits a 'yes–no' response from parents on whether or not the parent considers the child's behaviour to be problematic ($\alpha = 0.87$). The ECBI was also administered to the sibling closest in age to the index child (where applicable; $n = 63$) to assess possible intervention effects on other family members.

The Strengths and Difficulties Questionnaire (SDQ) is a 25-item scale which measures emotional symptoms, conduct problems, peer problems, hyperactivity and pro-social behaviour; this was used to provide a secondary measure of child conduct problems [40]. The scores on each subscale (except for the 'pro-social' subscale) are summed to generate a 'total difficulties' score ($\alpha = 0.77$).

The Conners Abbreviated Parent Rating Scale (CPRS) provided a brief, 10-item measure of child hyperactivity and inattentive behaviours ($\alpha = 0.86$), including restlessness, over-activity, emotional reactivity and inattention [41]. The Social Competence Scale [42] was used to assess child social functioning including emotional self-regulation and pro-social behaviours ($\alpha = 0.86$). Typical questions on this 12-item scale are: "Your child shares things with others" or "Your child can accept things not going his/her way". Parents rate how well the items reflect their child's behaviour on a five-point scale (0 = not at all/4 = very well).

Parent and family well-being measures

Parent stress and mental health were assessed using the Parenting Stress Index-Short Form (PSI-SF) and the Beck Depression Inventory (BDI) respectively [43, 44]. The PSI-SF ($\alpha = 0.93$) comprises 36 items which measure the distress experienced by parents in their parenting role as well as dysfunctional parent–child interactions, whilst the BDI ($\alpha = 0.93$) was used to assess the prevalence and severity of parental depression. The O'Leary–Porter Scale [45] was also used to assess parents' overt negative behaviours and index child exposure to inter-partner hostility ($\alpha = 0.78$). This 10-item scale was administered to all those parent participants who were partnered ($n = 62$). Typical items are: "How often do you and your partner argue over disciplinary problems in this child's presence?" or "How often do you complain to your spouse about his/her personal habits in front of this child?". Items are rated on a five-point scale ranging from "Never" to "Very often".

Observational measure

Parent report was supplemented by use of the Dyadic Parent-child Interactive Coding System Revised (DPICS-R) that provided an independent observational measure of parent–child interactions and behaviours based on a 30-min observation period [46]. The coding system comprises 21 parent behaviour categories (e.g., commands, questions, praise, positive affect and physical behaviours) and 7 child behaviour categories (e.g., destructive and physically negative behaviours, smart talk, crying and positive affect). Coding is continuous and is based on the frequency of a given behaviour during parent–child interaction. Observations were conducted at both baseline and follow-up for the second cohort of parent participants only ($n = 59$). It was

not possible to conduct observations during the first wave of participant recruitment due to the need for observational training for the research team and intervention delivery timetabling constraints. However, all participants in the second cohort were included in observations.

All observers were fully trained and reliability checks were conducted on 20 % of observations at all three assessment time points. Summary variables of observational data were created for analysis. 'Child problem behaviour' represents the aggregate of frequency counts for aversive child behaviours including destructive and aggressive behaviours (e.g., throwing items or hitting, shouting, crying, whinging and smart talk). 'Positive parenting', comprising eight parent behaviour categories, represents the summed frequency counts for use of praise and encouragement and positive physical behaviours towards the child (e.g., displays of affection). 'Critical parenting' comprises three parent behaviour categories including the use of negative commands, critical statements, and physically negative behaviours (e.g., snatching an item away from the child). Reliability was measured by intra-class correlation coefficients (ICCs) for summary variables. High inter-rater consistency was found (child problem behaviour 0.95; positive parenting 0.98; critical parenting 0.89).

Service utilisation

For purposes of the cost analysis, parents were also asked to complete a Service Utilisation Questionnaire (SUQ), an adapted version of the Client Service Receipt Inventory (CSRI) [47] to provide information on their child's use of health, social, and special educational services during the previous 6-month time period. These included: the number of visits to a GP, nurse and/or community paediatrician; hospital appointments and/or stays; the frequency of the child's use of speech language, psychological and social work services; and the number of hours the child spent in receipt of special educational resources (including one-to-one help such as the allocation of a Special Needs Assistant and resource teaching hours). All of these services are considered relevant to childhood conduct problems.

Analysis strategy

A strict intention-to-treat analysis was used whereby all families for whom data were collected at baseline were included in the analysis of longer-term outcomes, including those who were lost to either the 6- or 12-month follow-ups and those who did not start the intervention or who had poor treatment adherence. Missing values at follow-up were replaced using a method of multiple imputation [48] carried out using IBM SPSS and based on a fully conditional specification, where imputed values are derived from observed values and their normal distribution [49]. This involves imputing several (M) sets of plausible values for the missing data. Missing data were assumed to be 'missing at random', minimum and maximum values for scores were set (for each scale) and scores at baseline or 6-month follow-up were used as predictors for imputing data at follow-up time points. The goal, therefore, is to "average over" the missing data by generating multiple substitutions for missing data (i.e., creating a database with $M = 10$ versions of our data). In each version of the data, existing or complete data stay the same. However, multiple substitutions for missing data are imputed with some variation from one imputation to another. We then performed analyses on each copy of our data and finally pooled the results of those repeated analysis.

A one-way repeated measures ANOVA was used to examine differences in scores within the intervention group between baseline and 6-month, and between the baseline and 12-month follow-up. Pairwise comparisons (paired t tests) were used to compare each of the time points (i.e., baseline to 6-month follow-up, baseline to 12-month follow-up and 6- to 12-month follow-up) to indicate any significant differences. These post hoc tests were used to ascertain whether treatment outcomes were sustained between follow-up time points. We hypothesised that there would be no significant differences between the 6- and 12-month follow-up if the effects of the intervention had been maintained. This approach has been used in similar previous research [23, 28]. Effect sizes were calculated to provide an estimate of the size of the effect of the intervention on child and parent outcomes; a small effect size is denoted by approx 0.3, 0.5 denotes a medium/moderate effect size, and 0.7 and above denotes a large effect size [50].

The cost analysis was carried out by obtaining unit cost data for relevant Irish services (detailed in Table 3). The Irish government does not publish a detailed description of unit costs nor are any normative cost data available in Ireland. Some costs, such as those related to GP care are well established whilst others, including those for primary care and educational services, were derived from a variety of sources including official annual governmental publications [51], relevant organisations (e.g., the health service executive) and official Government pay scales [35]. This approach to assessing longer-term costs has been used elsewhere [28]. A cost-effectiveness evaluation was not carried out due to the lack of a control group at 12-month follow-up.

Results

Baseline characteristics

Parents (98 mothers, 5 fathers) were, on average, 33 years old and approximately 60 % (61/103) had partners. Most

Table 1 Intention-to-treat analysis of child outcome measures: longer-term outcomes of the IYBP

| | Mean (SD) intervention (n = 103) | | | Estimated mean differences using repeated measures ANOVA | | | | | |
| | | | | Baseline to 6-month follow-up | | Baseline to 12-month follow-up | | 6-month follow-up to 12-month follow-up | |
	Baseline	6-month follow-up	12-month follow-up	Mean difference (95 % CI), p	Effect size (95 % CI)	Mean difference (95 % CI), p	Effect size (95 % CI)	Mean difference (95 % CI), p	Effect size (95 % CI)
ECBI Intensity subscale (cut off ≥127)	156.71 (30.02)	117.27 (42.46)	119.25 (46)	39.44 (32.2 to 46.68), <0.001	1.08 (0.88 to 1.28)	37.45 (30.13 to 44.78), <0.001	0.97 (0.78 to 1.16)	−1.99 (−8.39 to 4.42), 0.538	−0.05 (−0.19 to 0.1)
ECBI Problem subscale (cut off ≥11)	20.3 (6.95)	10.79 (9.01)	11.17 (10.06)	9.51 (7.68 to 11.34), <0.001	1.19 (0.95 to 1.42)	9.13 (7.25 to 11.01), <0.001	1.06 (0.84 to 1.28)	−0.38 (−1.65 to 0.88), 0.554	−0.04 (−0.18 to 0.09)
SDQ 'total difficulties' (cut off ≥17)	18.11 (5.75)	13.18 (6.98)	14.06 (8.24)	4.93 (3.85 to 6.01), <0.001	0.77 (0.6 to 0.94)	4.05 (2.65 to 5.45), <0.001	0.57 (0.37 to 0.77)	−0.87 (−2.08 to 0.33), 0.153	−0.12 (−0.28 to 0.04)
Conners (cut off ≥15)	28.41 (6.47)	22.23 (8.12)	22.87 (8.66)	6.18 (4.99 to 7.37), <0.001	0.85 (0.68 to 1.01)	5.53 (4.16 to 6.91), <0.001	0.73 (0.54 to 0.91)	−0.65 (−2.01 to 0.72), 0.35	−0.08 (−0.25 to 0.09)
Social competence[a]	1.37 (0.68)	2.14 (0.93)	2.09 (0.94)	−0.77 (−0.91 to −0.62), <0.001	−0.95 (−1.13 to −0.77)	−0.72 (−0.88 to −0.56), <0.001	−0.88 (−1.08 to −0.69)	0.05 (−0.09 to 0.19), 0.51	0.05 (−0.1 to 0.2)
Child Problem Behaviour[b]	10.69 (11.43)	6.52 (8.4)	11.58 (20.77)	4.18 (1.03 to 7.33), 0.009	0.42 (0.1 to 0.74)	−0.89 (−5.86 to 4.08), 0.723	−0.05 (−0.36 to 0.25)	−5.07 (−10.46 to 0.32), 0.065	−0.32 (−0.67 to 0.02)
ECBI intensity (sibling)[c]	115.57 (37.68)	99.87 (39.81)	93.92 (31.73)	15.7 (6.01 to 25.39), 0.002	0.41 (0.15 to 0.66)	21.65 (12.56 to 30.75), <0.001	0.63 (0.36 to 0.89)	5.95 (−1.13 to 13.04), 0.1	0.17 (−0.04 to 0.37)
ECBI problem (sibling)[c]	12.83 (8.23)	8.82 (8.34)	7.59 (7.07)	4 (1.6 to 6.41), 0.001	0.49 (0.19 to 0.78)	5.24 (3.12 to 7.36), <0.001	0.69 (0.41 to 0.97)	1.24 (−0.48 to 2.95), 0.157	0.16 (−0.07 to 0.38)

[a] Higher scores indicate better social competence

[b] Frequency counts in 30 min using the DPICS-R (n = 59/103 intervention index children)

[c] n = 63; 32 girls, 31 boys

Table 2 Intention-to-treat analysis of parent outcome measures: longer-term outcomes of the IYBP

| | Mean (SD) intervention = 103 | | | Estimated mean differences using repeated measures ANOVA | | | | | |
| | | | | Baseline to 6-month follow-up | | Baseline to 12-month follow-up | | 6-month follow-up to 12-month follow-up | |
	Baseline	6-month follow-up	12-month follow-up	Mean difference (95 % CI), p	Effect size (95 % CI)	Mean difference (95 % CI), p	Effect size (95 % CI)	Mean difference (95 % CI), p	Effect size (95 % CI)
BDI (cut off ≥19)	16.2 (11.65)	12.61 (12.01)	11.94 (11.65)	3.59 (2.07 to 5.11), <0.001	0.31 (0.17 to 0.43)	4.26 (1.98 to 6.54), <0.001	0.37 (0.17 to 0.56)	0.67 (−1.23 to 2.57), 0.489	0.06 (−0.11 to 0.22)
PSI total	102.39 (23.02)	83.6 (26.57)	84.45 (28.62)	18.79 (14.77 to 22.8), <0.001	0.76 (0.59 to 0.92)	17.94 (13.35 to 22.53), <0.001	0.69 (0.51 to 0.87)	−0.85 (−4.71 to 3.01), 0.666	−0.03 (−0.18 to 0.11)
O'Leary–Porter[a]	29.18 (5.6)	31.85 (5.64)	31.66 (4.85)	−2.67 (−4.17 to −1.18), <0.001	−0.48 (−0.75 to −0.21)	−2.48 (−3.78 to −1.18), <0.001	−0.48 (−0.73 to −0.23)	0.2 (−0.85 to 1.24), 0.712	0.04 (−0.17 to 0.24)
Positive parenting[b]	26.98 (20.97)	42.17 (28.26)	41.39 (28.87)	−15.18 (−21.75 to −8.62), <0.001	−0.62 (−0.89 to −0.35)	−14.4 (−21.21 to −7.6), <0.001	−0.58 (−0.85 to −0.3)	0.78 (−5.88 to 7.44), 0.818	0.03 (−0.21 to 0.26)
Critical parenting[b]	14.64 (13.9)	6.5 (7.34)	8.2 (10.64)	8.14 (4.64 to 11.64), <0.001	0.74 (0.42 to 1.06)	6.44 (2.78 to 10.11), 0.001	0.53 (0.22 to 0.82)	−1.7 (−4.35 to 0.95), 0.208	−0.19 (−0.48 to 0.1)

[a] Higher scores indicate less inter-partner conflict (n = 62/103)

[b] Frequency counts in 30 min using the DPICS-R (n = 56/103)

of the families were socioeconomically disadvantaged and 62 % (64/103) were considered to be at risk of poverty. Child participants were aged, on average, approximately 5 years (Mean 59 months; SD 15.6) and 58 % were boys. There were no socioeconomic or demographic differences between those who were lost to follow-up and those who were retained in the study; neither were there any differences on measures of parenting behaviour or well-being. Children of parents lost to follow-up had significantly higher levels of social competence, although no other significant differences in child characteristics were found.

12-month follow-up findings

Child behaviour outcomes

Statistical analyses highlighted significant differences in both child behaviour and adjustment from baseline to 6-month follow-up on both subscales of the primary outcome measure (the ECBI), as well as on the secondary outcome measures (the SDQ, CPRS and the Social Competence Scale). As hypothesised, there were no statistically significant differences between the 6- and 12-month follow-ups. Hence, it may be inferred, albeit in the absence of a control group, that the post-intervention improvements in child outcomes observed, were maintained in the longer term (Table 1). Analysis of the observational data for child behaviour (n = 59) showed a significant improvement at the 6-month follow-up, although there was a return to baseline levels at the 12-month time point. Results also indicated a significant reduction in problem sibling behaviour (n = 63; 32 girls; 31 boys) from baseline to the 12-month follow-up (mean difference 21.65, 12.56–30.75, p < 0.001). Indeed, larger effect sizes at 12-month follow-up suggest longer-term accumulative benefits with respect to sibling behaviour (effect size 0.63).

Parent outcomes

The intervention was found to have a statistically significant beneficial effect on parental well-being and psychosocial functioning (as measured by the BDI), whilst parents also reported feeling less stressed in their role as parents (measured by the PSI-SF). No change between the 6- and 12-month follow-ups, indicates that improvements in parent mental health were sustained. Similar findings were evident for the observational data, highlighting longer-term increases in positive parenting strategies and decreases in critical parenting. A positive effect of the IYBP was also found with regard to marital conflict (n = 62); significantly higher mean scores at the 6- and 12-month follow-ups when compared to baseline were found on the O'Leary–

Table 3 Proportion of children using health, social care and special educational services at baseline and follow-up

Service	Intention-to-treat ($n = 103$)		
	Baseline	6-month follow-up	12-month follow-up
GP	65.52	48.84	40.23
Nurse	8.05	4.65	2.23
Speech therapist	24.13	15.29	9.20
Physiotherapist	6.90	2.32	3.45
Social worker	10.35	1.16	2.30
Community paediatrician	4.60	3.48	0
SNA	11.49	10.84	12.79
Casualty department (A and E)	14.94	13.95	11.49
Outpatient consultant appointment	22.09	14.11	16.27
Overnight stay in hospital	6.90	8.24	5.75

Table 4 Costs of health, social care and special education services used by children

Service	Intention-to-treat ($n = 103$)		
	Baseline	6-month follow-up	12-month follow-up
Primary care	158.55	127.13	68.61
Hospital services	453.50	234.46	166.19
Special education	428.13	511.67	386.36
Social services	7.74	0.22	5.75
Total	1,047.92	873.48	626.91

Figures are mean total cost per child (€)

Porter Scale. This suggests that parents were less likely, 12 months later, to report conflict with their spouse with respect to disciplinary matters, or in the presence of the child (Table 2).

Costs of service use

Substantial reductions in service use between baseline and 6-month follow-up were found. These reductions were sustained at 12-month follow-up. The fall in service use over the three waves of data collection is also reflected in the total costs, which fell from €1,047.91 per child at baseline to €873.48 at 6 months and then to €626.907 at 12 months. Thus, the cost of service use amongst the intervention group was only 60 % of that observed at baseline (Tables 3, 4).

Discussion

Our results indicate that an evidence-based parent-training programme, the IYBP, can result in significant reductions in

child conduct disordered and hyperactive-inattentive behaviours. At 12-month follow-up, parents continued to report significantly reduced levels of child socioemotional and behavioural difficulties, as well as increases in pro-social behaviour. These findings are in line with the small pool of previous research in the US [3] and Europe [20, 28].

Participation in the IYBP helped to increase parents' use of positive parenting strategies and reduce the frequency of critical disciplinary strategies and these changes were maintained at 12-month follow-up. Positive parenting strategies, characterised by high levels of warmth and appropriate and proactive discipline, can strengthen the parent–child bond and help to reduce the risk of conduct disorder [52, 53]. Benefits to parental psychosocial functioning were also evident, with parents reporting reductions in levels of stress and depression at the 12-month follow-up. Parents also reported lower levels of inter-partner conflict, suggesting general benefits of the intervention for overall family and marital adjustment. Existing evidence suggests that parental psychopathology and family conflict can negatively affect child behaviour and the quality of parent–child relationships [54]. Thus, improvements in parental and family well-being are likely to positively influence child behavioural and psychosocial outcomes.

Previous research has identified positive parenting as a key mediator of change in child outcomes in parent-training intervention trials [55]. However, in the current study, observations of child behaviour did not corroborate parent-report and observed child problem behaviour had returned to baseline levels at the 12-month follow-up, despite continued improvements in positive parenting behaviours. Likewise, a recent meta-analysis found no effect of behavioural parent training on attention deficit hyperactivity disorder (ADHD) when the analysis was based on blinded, third party observations rather than parent report [56]. However, it should be noted that the observational data in this study were available for only a reduced sub-sample ($n = 59$).

Sibling behaviour also improved over time. Our earlier findings from the 6-month RCT evaluation of the IYBP indicated that siblings did not fare better than their control group counterparts at the 6-month follow-up [25]. Nevertheless, our current findings indicate that the benefits of the IYBP for sibling behaviour may accrue over time (i.e., between the 6- and 12-month follow-ups) and may, at least to some extent, reflect 'sleeper effects' whereby the effects of the intervention may only emerge over a longer period of time [57].

Service use was substantially reduced at 12-month follow-up; this is also consistent with improved child behaviour. In some cases, greater reductions in service use were recorded. For example, the proportion visiting a GP fell a further 8 % points and, after 12 months, was 40 %

when compared to 65 % at baseline. Likewise, there was an additional decline in the numbers visiting speech therapists. At 12 months, 9 % of the sample reported having seen a speech therapist during the previous 6 months when compared to 24 % at baseline. Overall, the cost of service use at the 12-month follow-up (€626.91) amongst the intervention group was reduced to 60 % of baseline expenditure on formal services (€1,047.91). These findings in relation to cost-savings compare favourably to those reported in a similar UK-based study [28], which found that reducing child conduct problems through the IYBP led to a reduction in service use costs to 83 % (£826.38/ €929.99) of total baseline costs (£995.81/€1,120.66). This would suggest some level of generalisability of the findings reported here, although it is difficult to be precise in the absence of more benchmark cost studies and possible differences across jurisdictions. However, if the reduction in service use and associated costs reported here is maintained into the future, it is likely that wider economic and societal benefits will be achieved.

These findings further indicate that positive changes in child and parenting behaviour reported from the follow-up study were maintained in the context of reduced support from primary health care and social care services. This supports the general utility of the IYBP for tackling child behaviour problems and improving family well-being whilst also highlighting the dual social and economic benefits of parenting programmes. Our previous findings have also shown that group-based parenting programmes, such as the IYBP, are relatively inexpensive to implement and may result in significant longer-run benefits for society [35].

Study strengths

This study is one of only a relatively small number that have examined the maintenance effects of a parenting intervention for vulnerable, socially disadvantaged families. Indeed, follow-up data on treatment RCTs involving young children are very important in this field. The current study included a service utilisation and cost analysis to assess any longer-run impact on costs. High quality practices were adhered to, including the use of trained fieldworkers, psychometrically robust measures and observational data (where possible) to complement parent-report measures. Sample attrition was very low, with 84 % of participants completing assessments at the 12-month follow-up and an intention-to-treat approach using a multiple imputation method for missing data was used to ensure that any effects of the programme under real-world conditions were not over-estimated [58]. The magnitude of the effects was also convincing in view of the proportion of parents (almost one-third) who attended three or fewer sessions. Lastly, improvements in the behaviour of siblings

closest in age to the index children point toward potential generalisation effects of parent training to the wider family context.

Study limitations

For ethical reasons, the control group was offered the intervention after initial follow-up. Therefore, a comparative analysis between conditions at 12-month follow-up was not possible and researchers were not blind to the intervention condition. The absence of a control group is a limitation which is typical of this kind of research and future studies which allow for controlled-comparisons of longer-term outcomes (e.g., against treatment as usual) should strengthen our understanding of the longer-term effects of parent-training programmes.

Due to factors beyond our control, observations were conducted only for a reduced sub-sample of participants. Furthermore, intervention fidelity was monitored through facilitator self-report, but there was no independent verification of treatment adherence (e.g., by clinicians or raters/ observers). The relatively low rate of programme attendance, particularly amongst the second cohort of parents, was an additional weakness despite the local delivery of the programme. Previous research has indicated that families who experience high levels of social adversity and who can potentially benefit the most from parenting interventions, can be difficult to engage and poor attendance may, therefore, be associated with poorer outcomes [59]. The attendance rates in the current study may have been negatively impacted by the large proportion of participants who were experiencing significant socioeconomic disadvantage, especially the second cohort which included parents from a particularly highly disadvantaged inner-city area. Post hoc independent sample t-tests were carried out to examine if there were any effects of cohort on intervention outcomes. No differences were found on measures of child outcomes or parent well-being at 12-month follow-up for the intention-to-treat sample, despite a lower rate of attendance amongst parents in the second cohort. Nevertheless, the rates of attendance are lower than those reported elsewhere [3, 16] and this may have implications for family recruitment and programme implementation in these kinds of studies more generally. For example, the process of recruitment and implementation would need to be undertaken mindful of the challenges associated with working with particularly chaotic groups of parents. Indeed, we have explored some of these issues in more detail in a separate qualitative sub-study reported elsewhere [60].

Although this study reports on a 12-month follow-up of the outcomes of a parent-training intervention, it should be noted that this reflects a comparatively brief follow-up time

frame in the context of child development. As indicated earlier, recent research has demonstrated the positive effects of parent training on child behaviour 5–6 years later and into adolescence [29, 30]. However, further longitudinal follow-ups are needed to fully understand the effectiveness of parent-training over time.

Study implications and directions for future research

Our results indicate that a group-based parenting programme—the IYBP—offers an effective means of reducing the risks associated with conduct and psychosocial difficulties in early childhood, whilst also possibly improving parental and family well-being in the longer term and reducing child contact with formal health, educational and social services. The growing number of children who experience adjustment difficulties [61], coupled with an increasing need for better value for money in public spending, highlight the need for effective and cost-efficient child-focused services. Thus, these findings are important in guiding and informing future policy and practice decisions relating to identifying, resourcing and implementing appropriate evidence-based interventions for children with conduct problems and 'at risk' families in disadvantaged communities.

Almost three-quarters (71 %) of children in the current study showed at least modest change in conduct disordered behaviour at 1-year post-intervention, whilst 40 % showed a very large change. However, observations of child behaviour indicated a return to baseline levels of conduct problems, whilst scores on the ECBI problem scale and SDQ 'total difficulties' scale reflected milder, but ongoing levels of borderline, behavioural problems. Thus, whilst parent training may be successful in reducing overall behavioural problems, additional supports, such as child social skills training, may also be needed in some cases to further support any improvements in child psychological adjustment. It should also be noted that a small, but significant proportion of child participants (29 %) showed diminished benefit (<0.3 SD) in response to the intervention at the 12-month follow-up. Previous research has found that almost one-third of children display persistent behavioural difficulties in spite of parent-training intervention, whilst some also respond better than others [24]. High levels of family adversity, including lower socioeconomic status, increased family disruption and conflict, single parenthood, teen parenthood, maternal psychopathology, and parental substance abuse, all predict less change in child behaviour in response to parent training [58]. Thus, further research is needed to explore the moderating effects of longer-term parent-training outcomes to address the critical question of what interventions work best, for whom and under what circumstances.

Future research should also examine the longitudinal impact of parent-training and track developmental outcomes into late childhood and adolescence.

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