

# Could scale-up of parenting programmes improve child disruptive behaviour and reduce social inequalities? Using individual participant data meta-analysis to establish for whom programmes are effective and cost-effective

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## Scientific summary

### Parenting programmes to improve child disruptive behaviour

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# Scientific summary

## Background

Disruptive behaviour problems in children are a large and costly public health problem, which, if not remediated, raise the risk of drug use, criminality, unemployment and poor (mental) health later in life. Many interventions have been developed to prevent these problems but only a few have strong UK evidence of effectiveness. There is growing government interest across the UK and globally in finding solutions to these problems. The Incredible Years® (IY) parenting programme has been disseminated across the UK with government support and shown to be effective in seven randomised trials. However, it is vital for policy-making to know for which families these interventions are most effective, in order to be sure that they are helping to reduce, rather than widen, social inequalities. This is a realistic concern, as we know that for some public health and social interventions (e.g. Sure Start), more advantaged families make better use of these facilities. Surprisingly, there are no clear answers to these questions about social inequality from existing trials of parenting interventions, because each individual trial is quite small and thus lacks the power to test these questions.

## Research questions

Underlying population, intervention, comparison, outcome, study design (PICOS) question for main effects in the pooled trials:

- Population: families with children aged 2–10 years
- Intervention: IY parenting programme
- Comparison: waiting list, minimal intervention or care as usual
- Outcome (benefit): child disruptive behaviour post test
- Study design: randomised controlled trial (RCT).

Specific questions for this individual participant data (IPD) meta-analysis:

- To what extent does the IY parenting intervention benefit:
  - the most socially disadvantaged compared with average families?
  - families from ethnic minorities compared with from ethnic majority?
  - children with different characteristics, including age, gender, severity of conduct problems and comorbid problems at baseline?
  - children whose parents have different levels of depression and parenting skill at baseline?
- To what extent do trial-level effects predict outcome, including contextual variables (country, rural vs. urban), factors indexing intervention fidelity (staff training, certification or supervision) and sessions offered and taken up?
- What are the wider public health benefits and potential harms of the IY parenting intervention?
- What are the costs, cost-effectiveness and potential longer-term savings of the IY parenting intervention?

## Methods

### Protocol and trial registration

The protocol is available on the National Institute for Health Research Public Health Research website (project number 12/3070/04).

### **Eligibility criteria**

Completed randomised trials of the IY parenting programme in Europe. Non-RCTs were excluded. No restrictions were placed on when trials were conducted or included outcome measures.

### **Identifying studies: information sources**

Studies were identified in 2013 based on (1) systematic literature search in databases [Cumulative Index to Nursing and Allied Health Literature (CINAHL), EMBASE, Global Health, MEDLINE and PsycINFO], (2) the IY website, which lists trials evaluating IY, (3) the European IY mentors' network and (4) the advice of experts. Searches in January 2015 revealed no further completed trials.

### **Identifying studies: search**

EMBASE, Global Health, MEDLINE (< 1946–present) and PsycINFO were searched via OvidSP using the following search terms:

1. incredible year\$.mp
2. webster-stratton.mp
3. 1 or 2.

CINAHL was searched via EBSCOhost.

### **Study selection processes**

Eligibility was assessed by the first author and double-checked by additional authors. There were no differences of opinion.

### **Data collection process**

Anonymised data for 15 randomised trials were requested for all families randomised. Data for 14 trials were supplied; investigators for the 15th reported that the data were no longer available. Raw (i.e. not recoded) individual item-level data were supplied in IBM SPSS Statistics version 21 (IBM Corporation, Armonk, NY, USA) and checked for missing items, internal consistency and consistency with trial protocols and reports. Copies of the original questionnaires were requested to check for consistent use across trials. Investigators were contacted for additional information for interpretation of IPD.

### **Data items**

All available data on socioeconomic disadvantage, demographics, moderators, wider benefits and service use were requested. The instrument for the primary outcome (disruptive child behaviour) was chosen based on the measures used most frequently. If trials did not include this measure (three trials), data from a similar measure were requested and converted to a score on the primary measure using norm deviation scores. Instruments for secondary outcomes were chosen based on those that were available in each trial.

## **Results**

### **Moderators of intervention effectiveness (maximum n = 1696)**

#### **Social and socioeconomic disadvantage as moderators**

We considered five variables as capturing socioeconomic disadvantage: low income, low education, unemployment, lone parent or teenage parent. Results were robust across variables: there was no evidence to suggest that any indicator of socioeconomic disadvantage affected the benefit of the IY programme. More specifically, there was no moderation by low income compared with high-income status [effect modification index 1.9 points, Eyberg Child Behavior Inventory Intensity scale (ECBI-I), 95% confidence interval (CI) –4.8 to 8.6 points;  $p = 0.58$ ], by low or high education status (modification index 4.4 points, 95% CI –2.2 to 10.9 points;  $p = 0.49$ ), by being employed or unemployed (modification index 4.88 points, 95% CI –2.7 to 12.4

points;  $p = 0.21$ ), by lone parent status (modification index 0.5 points, 95% CI  $-6.1$  to  $7.1$  points;  $p = 0.88$ ) or by teenage parent status (modification index 7.3 points, 95% CI  $-2.2$  to  $16.9$  points;  $p = 0.13$ ).

### **Ethnicity as moderator**

There was no evidence of moderation by ethnicity (modification index  $-1.4$  points, 95% CI  $-9.8$  to  $7.1$  points;  $p = 0.75$ ).

### **Child characteristics as moderators**

#### ***Age and gender***

There was no evidence of moderation by child age (modification index 0.04 points, 95% CI  $-0.1$  to  $0.2$  points;  $p = 0.65$ ), across the range 2–10 in the pooled trials. There was a large moderation effect by gender (modification index  $-6.6$  points, 95% CI  $-13.0$  to  $-0.3$  points;  $p = 0.04$ ), such that boys benefited more than girls.

#### ***Disruptive behaviour***

Effectiveness of the intervention was moderated by baseline level of disruptive behaviour, with children with more severe problems benefiting more. This effect was found both at an individual level (modification index  $-4.3$  points, 95% CI  $-7.9$  to  $-0.7$  points;  $p = 0.02$ ) and at a trial level (modification index  $-18.3$  points, 95% CI  $-24.6$  to  $-12.0$  points;  $p < 0.001$ ).

#### ***Attention deficit hyperactivity disorder and emotional problems***

There was a suggestion that the putative moderator effect by attention deficit hyperactivity disorder (ADHD) was non-linear; thus, a quadratic term was included in the model ( $p = 0.02$ ). The test for effect moderation did not reach significance at the 5% level ( $p = 0.07$ ). We conclude that there is insufficient evidence for moderation by level of ADHD at baseline, either linear or quadratic. We found no evidence of moderation by emotional problems (modification index  $-2.3$  points, 95% CI  $-6.7$  to  $0.9$  points;  $p = 0.13$ ).

### **Parent characteristics as moderators**

#### ***Depression***

We found a large and significant effect moderation by depression (modification index  $-4.8$  points, 95% CI  $-8.4$  to  $-1.1$  points;  $p = 0.01$ ), in the direction that children whose parent was more depressed benefited more from the intervention.

#### ***Parenting behaviour***

None of the parenting variables (e.g. monitoring, praise or punishment) showed a moderation effect, suggesting no differential benefit for children by level of positive or negative parenting at baseline.

### **Individual-level moderators after adjusting for confounding**

We adjusted significant moderation effects for potential confounders. The finding of a treatment effect by baseline ECBI-I was relatively robust to adjustment, in terms of the size of the moderation index and statistical significance. In contrast, moderation by parent depression was affected by adjustment for praising, with the effect size reduced and non-significant. It is therefore unclear what causes this detected effect moderation: parental clinical characteristics or parenting approach.

### **Trial-level moderators**

We assessed whether variables characterising the setting of the trial (UK/Ireland vs. other locations) or affecting programme delivery (e.g. % staff clinically trained/% IY certified) moderated outcome. Note that, as in aggregate-level meta-regression, we effectively have a maximum of only 13 programme effects on which to base these analyses. Thus, we could only investigate trial-level variables with a reasonable number of replicates in the data set (e.g. rural locations were rare, 4% of intervention sites). The number of sessions offered moderated the programme effect ( $p < 0.001$ ), with treatment benefits decreased for

trials offering more sessions. This finding, although potentially interesting, is hard to interpret, as variation between trials is very low (range 12–14 sessions) and unlikely to make much difference to outcome. No other trial-level variables moderated the intervention effect.

### *Wider health benefits*

#### **Children’s mental health (attention deficit hyperactivity disorder symptoms and emotional problems)**

The intervention had wider benefits on child ADHD symptoms ( $\beta = -0.30$ , 95% CI  $-0.44$  to  $-0.17$ ). The percentage of intervention children scoring above the borderline threshold on ADHD fell from 54% to 42%, a 12% reduction, compared with a 2% reduction in control participants.

No difference in child emotional symptoms was detected ( $\beta = -0.06$ , 95% CI  $-0.18$  to  $0.06$ ;  $p = 0.303$ ); these were reduced in both groups. In both groups the percentage scoring above the borderline threshold on emotional problems fell from 40% to 32%.

#### **Parental mental health**

The intervention did not affect parental mental health, with a non-significant trend towards reduced symptoms of depression ( $\beta = -0.08$ , 95% CI  $-0.17$  to  $0.01$ ). Neither parenting stress ( $\beta = -0.18$ , 95% CI  $-0.44$  to  $0.07$ ) nor self-efficacy ( $\beta = 0.32$ , 95% CI  $-0.77$  to  $0.13$ ) improved because of the intervention.

#### **Harsh and inconsistent parenting**

The intervention reduced harsh and inconsistent parenting practices. The results were robust across three of the indicators of harsh and inconsistent parenting practices: corporal punishment ( $\beta = -0.22$ , 95% CI  $-0.42$  to  $-0.01$ ), threatening ( $\beta = -0.21$ , 95% CI  $-0.36$  to  $-0.06$ ) and shouting ( $\beta = -0.31$ , 95% CI  $-0.61$  to  $-0.01$ ). IY did not reduce parental laxness ( $\beta = -0.15$ , 95% CI  $-0.37$  to  $0.07$ ). Parents allocated to IY thus reported fewer harsh parenting practices post test, although not fewer inconsistent practices.

#### **Positive parenting**

The IY programme improved some aspects of positive parenting practices, including praising the child more frequently ( $\beta = 0.26$ , 95% CI  $0.01$  to  $0.51$ ). Parents did not report using more tangible rewards ( $\beta = 0.15$ , 95% CI  $-0.16$  to  $0.45$ ) and monitoring of child behaviour did not increase ( $\beta = 0.05$ , 95% CI  $-0.08$  to  $0.18$ ).

#### **Possible harms**

We checked the direction of effects of all secondary outcomes for signs of harmful effects of IY. All effects pointed in the direction of benefits, and none in the direction of harm.

### *Costs, cost-effectiveness and longer-term savings*

Economic data were available for five trials in the UK and Ireland (maximum  $n = 608$ ). The cost of the intervention ranged from £1733 to £2586 per trial. The probability that the intervention will be considered cost-effective reaches 80% at a willingness to pay of £121 per 1-point improvement on the ECBI-I. There were no cost variations associated with social disadvantage, ethnicity, ADHD or child emotional problems at baseline. In contrast with the main effectiveness analysis, there were also no cost variations associated with baseline levels of disruptive behaviour or parental depression. Potential longer-term savings are estimated at £1400–8400, probably offsetting the cost of the intervention. Thus, the intervention is likely to be cost-effective.

#### **Risk of bias within and across studies**

This was assessed within studies using the Cochrane risk of bias tool; the risk of bias was judged low in most trials. Risk of bias was also low with regard to availability of studies, as all but one eligible trial supplied data. Risk of bias may be higher with regard to availability of data, and how some constructs were harmonised and synthesised.

## Parent involvement

Despite our findings being at odds with much of the literature, they resonated with the parents' experiences; indeed, parents in our focus groups expected many of the findings.

## Discussion

The underpinning question for this study concerns equity effects of parenting interventions. Successful synthesis of data from almost all randomised trials of the IY parenting intervention in Europe led to a uniquely large (maximum  $n = 1799$ ) and diverse sample that allowed for the most stringent and well-powered tests of equity effects to date, of wider health benefits and of cost-effectiveness of parenting interventions for children.

The IY parenting intervention does not increase social or socioeconomic inequalities in children's disruptive behaviour problems. Families with a range of social and socioeconomic disadvantages, and those from ethnic minorities, are just as likely to benefit. If anything, the intervention reduces inequalities because some of the more distressed families (those with more severe disruptive child behaviour and parental depression) benefit more. In addition to reducing disruptive child behaviour, the intervention reduces the ADHD symptoms of children and improves several aspects of positive parenting (e.g. parents praised their children more) and negative parenting (e.g. parents used less harsh and inconsistent discipline).

Why do our results show such an encouraging lack of adverse equity effects? The content of IY is much like that of several other programmes derived from social learning theory and attachment theory. However, the collaborative and culturally sensitive approach of IY may be of paramount importance to reach similar effectiveness across a wide range of families with different social and socioeconomic status and ethnic backgrounds. Perhaps the careful focus on individual needs and values in the IY programme helps to offset any adverse effect that might otherwise result from education-based programmes.

The study has many strengths that increase our confidence in the findings. First, our unique pooled data set means that we have a large sample, which is potentially generalisable across countries, service settings and level of child problems. Second, plausibility of the findings is enhanced by our analytical strategies. We included only RCTs, controlled for the possibility of confounding effect by the type of trial (e.g. whether it was selective prevention compared with indicated prevention or treatment trial, which makes a considerable difference in terms of the initial severity of child disruptive behaviour) and we were able to check for non-linear effects. Finally, we account for missing data in moderator analyses using multiple imputation, which requires fewer restrictive assumptions than using only cases with no missing values.

Limitations of this study include, first, that we focused on only one parenting programme, albeit one of the programmes that is most established in the UK. Second, several assumptions had to be made in the process of data harmonisation, for example that different measures from different trials actually measured the same construct. Third, we had data only on equalities in effectiveness and were unable to analyse potential inequalities in access to the intervention, a topic needing further research.

To conclude, the IY parenting intervention does not increase social or socioeconomic inequalities in children's disruptive behaviour problems and is likely to be cost-effective, especially for families with higher levels of child behaviour problems or parent depression. Families with a wide range of social and socioeconomic disadvantages, and those from ethnic minorities, are just as likely to benefit from the intervention as families without these disadvantages. Older and younger children are equally likely to benefit. Moreover, children with more disruptive behaviour or with parents who are more depressed benefit more than their less distressed counterparts. This study is potentially a valuable model for other public health policy questions, which we suggest could mine existing data, using IPD meta-analysis, at relatively low cost in order to enhance understanding of cost-effectiveness and equity effects of different commissioning strategies and promote social mobility.

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