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Reducing child conduct problems and promoting social skills in a middle-income country: cluster randomised controlled trial

Helen Baker-Henningham, Stephen Scott, Kelvyn Jones and Susan Walker

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Background
There is an urgent need for effective, affordable interventions to prevent child mental health problems in low- and middle-income countries.

Aims
To determine the effects of a universal pre-school-based intervention on child conduct problems and social skills at school and at home.

Method
In a cluster randomised design, 24 community pre-schools in inner-city areas of Kingston, Jamaica, were randomly assigned to receive the Incredible Years Teacher Training intervention ($n = 12$) or to a control group ($n = 12$). Three children from each class with the highest levels of teacher-reported conduct problems were selected for evaluation, giving 225 children aged 3–6 years. The primary outcome was observed child behaviour at school. Secondary outcomes were child behaviour by parent and teacher report, child attendance and parents' attitude to school. The study is registered as ISRCTN35476268.

Results
Children in intervention schools showed significantly reduced conduct problems (effect size (ES) = 0.42) and increased friendship skills (ES = 0.74) through observation, significant reductions to teacher-reported (ES = 0.47) and parent-reported (ES = 0.22) behaviour difficulties and increases in teacher-reported social skills (ES = 0.59) and child attendance (ES = 0.30). Benefits to parents' attitude to school were not significant.

Conclusions
A low-cost, school-based intervention in a middle-income country substantially reduces child conduct problems and increases child social skills at home and at school.

Declaration of interest
S.S. is a trainer in the Incredible Years Parenting Programme.

Although almost 90% of the world population of children and adolescents live in low- and middle-income countries, few trials of psychosocial interventions to prevent child mental health problems have been conducted in these countries.[1] Early-onset conduct problems are the most common mental health concern in childhood, affecting 5–8% of the population at the severity level for an ICD-10 diagnosis.[2] Long-term outcomes are very poor, with three- to sixfold increases in the prevalence of adult criminal violence, drug misuse, school failure, teenage pregnancy and unemployment.[3] Although proven preventative interventions exist, they reach few children, even in high-income countries. This problem is amplified in low- and middle-income countries where child mental health services are extremely limited.[4,5]

Schools offer a logical setting for interventions for children, and school-based violence prevention programmes in high-income countries have shown significant reductions to children's aggressive and disruptive behaviour and increases in child competencies. Universal interventions promote the mental health of all children, avoid stigmatisation and generally attract community support.[6] However, there is limited information on the effectiveness of these programmes in low- and middle-income countries where schools often have few resources and poor conditions. In Jamaica, violence among youth and adults is particularly prevalent.[7] However, there are good opportunities for early intervention as 98% of 3- to 6-year-old children attend pre-schools so there is potential for almost universal coverage. In pilot studies we implemented the Incredible Years Teacher Training programme and showed large benefits to teachers' practices and to class-wide measures of child behaviour,[8] and also demonstrated that the intervention was acceptable, feasible and relevant.[9] The aim of this study was to evaluate on a larger scale the effect of the intervention on the behaviour of high-risk children at home and at school.

Method

Study design and participants

A cluster randomised trial was conducted in the school year September 2009 to June 2010 in 24 community pre-schools in inner-city areas of Kingston, Jamaica. Over 75% of pre-school children in Jamaica attend community pre-schools, which are provided through community organisations with government oversight. Parents pay a small fee and also provide school materials such as books and pencils. Most teachers are paraprofessionals and the schools generally have poor physical conditions, including overcrowding and few teaching and learning materials. We used 'pre-school' as the unit of randomisation to prevent contamination among teachers. Inclusion criteria for pre-schools were: three to four classes of children, at least 20 children per class, situated in a specified geographical area and all teachers consented to the trial. In total, 50 pre-schools were approached and 24 meeting the inclusion criteria were recruited (Fig. 1).

Children at high risk for subsequent externalising problems were selected for evaluation.[2] An interviewer-administered screening questionnaire was conducted with each teacher. Teachers rated each child on ten items from the ICD-10 Diagnostic Criteria for Research[10] for conduct disorder (loses temper, back chats, disobedient/breaks rules, annoys others, blames others, easily annoyed, often angry, spiteful to others, fights or bullies and destroys property), using a four-point scale. The three children from each class with the highest scores were enrolled.
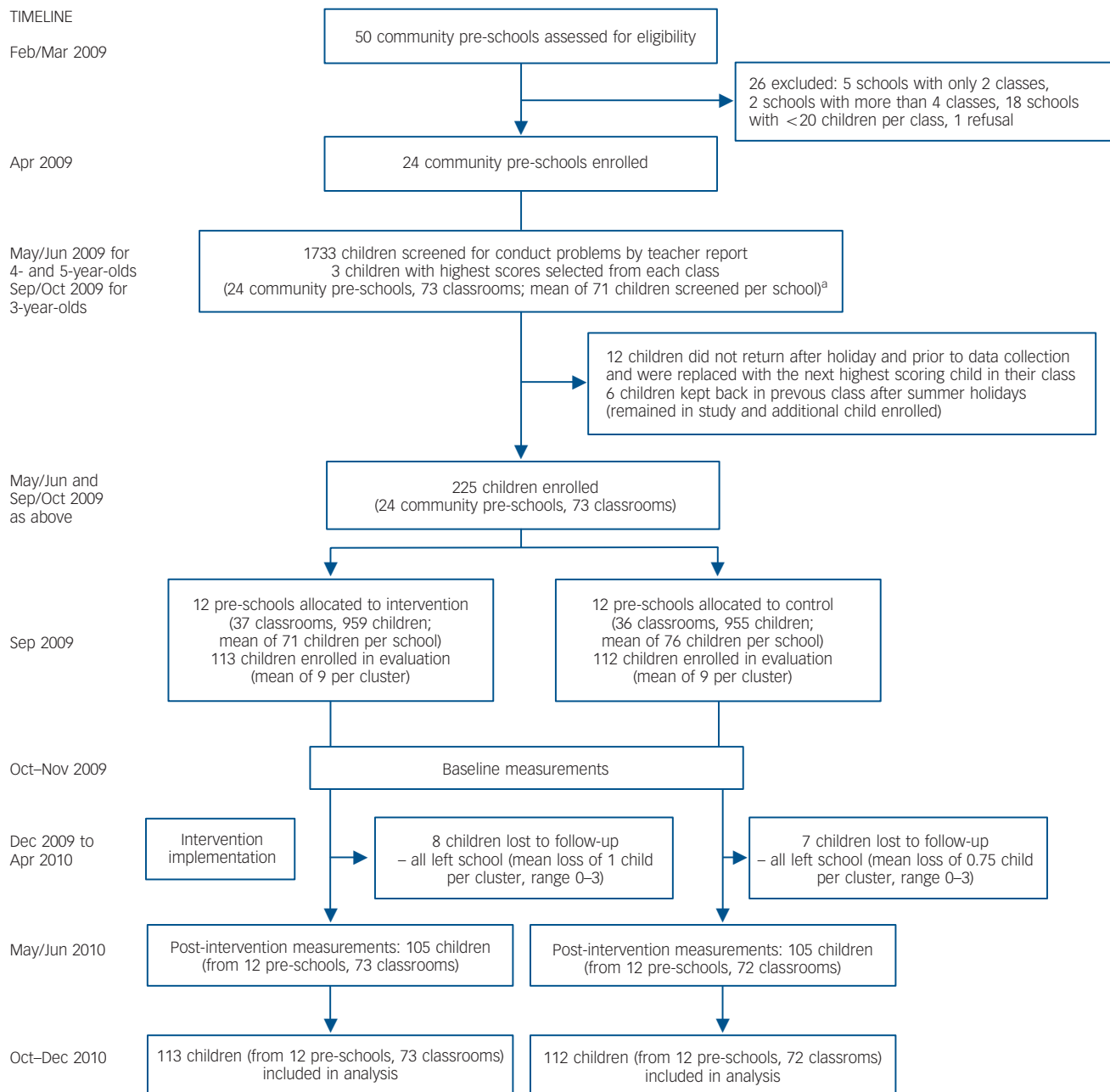
TIMELINE
Feb/Mar 2009

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┌─────────────────────────────────────────────────┐
│   50 community pre-schools assessed for eligibility │
└─────────────────────────────────────────────────┘
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┌──────────────────────────────────────────────────┐
│ 26 excluded: 5 schools with only 2 classes,        │
│ 2 schools with more than 4 classes, 18 schools     │
│ with <20 children per class, 1 refusal             │
└──────────────────────────────────────────────────┘
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Apr 2009

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┌─────────────────────────────────────────────────┐
│         24 community pre-schools enrolled          │
└─────────────────────────────────────────────────┘
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May/Jun 2009 for
4- and 5-year-olds
Sep/Oct 2009 for
3-year-olds

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┌──────────────────────────────────────────────────────────────────────┐
│ 1733 children screened for conduct problems by teacher report          │
│ 3 children with highest scores selected from each class                │
│ (24 community pre-schools, 73 classrooms; mean of 71 children          │
│ screened per school)a                                                   │
└──────────────────────────────────────────────────────────────────────┘
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┌──────────────────────────────────────────────────────────────────────┐
│ 12 children did not return after holiday and prior to data collection  │
│ and were replaced with the next highest scoring child in their class   │
│ 6 children kept back in prevous class after summer holidays            │
│ (remained in study and additional child enrolled)                      │
└──────────────────────────────────────────────────────────────────────┘
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May/Jun and
Sep/Oct 2009
as above

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┌─────────────────────────────────────────────────┐
│         225 children enrolled                      │
│ (24 community pre-schools, 73 classrooms)          │
└─────────────────────────────────────────────────┘
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Sep 2009

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┌───────────────────────────────────┐   ┌───────────────────────────────────┐
│ 12 pre-schools allocated to         │   │ 12 pre-schools allocated to control │
│ intervention                        │   │ (36 classrooms, 955 children;       │
│ (37 classrooms, 959 children;       │   │ mean of 76 children per school)     │
│ mean of 71 children per school)     │   │ 112 children enrolled in evaluation │
│ 113 children enrolled in evaluation │   │ (mean of 9 per cluster)             │
│ (mean of 9 per cluster)             │   │                                     │
└───────────────────────────────────┘   └───────────────────────────────────┘
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Oct–Nov 2009

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┌─────────────────────────────────────────────────┐
│             Baseline measurements                  │
└─────────────────────────────────────────────────┘
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Dec 2009 to
Apr 2010

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┌──────────────┐   ┌────────────────────────────┐   ┌────────────────────────────┐
│ Intervention │   │ 8 children lost to follow-up │   │ 7 children lost to follow-up │
│ implementation│   │ – all left school (mean loss │   │ – all left school (mean loss │
│              │   │ of 1 child per cluster,      │   │ of 0.75 child per cluster,   │
│              │   │ range 0–3)                   │   │ range 0–3)                   │
└──────────────┘   └────────────────────────────┘   └────────────────────────────┘
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May/Jun 2010

```
┌───────────────────────────────────┐   ┌───────────────────────────────────┐
│ Post-intervention measurements:     │   │ Post-intervention measurements:     │
│ 105 children                        │   │ 105 children                        │
│ (from 12 pre-schools, 73 classrooms)│   │ (from 12 pre-schools, 72 classrooms)│
└───────────────────────────────────┘   └───────────────────────────────────┘
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Oct–Dec 2010

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┌───────────────────────────────────┐   ┌───────────────────────────────────┐
│ 113 children (from 12 pre-schools,  │   │ 112 children (from 12 pre-schools,  │
│ 73 classrooms) included in analysis │   │ 72 classroms) included in analysis  │
└───────────────────────────────────┘   └───────────────────────────────────┘
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Fig. 1 Trial profile.

a. 24 high-scoring children excluded: 17 children with low attendance (<70%), 3 siblings of enrolled child, 1 child with autism, 3 living in an institution.

Children were excluded if school attendance was <70%, they had a developmental disability, lived in an institution or were a sibling of an enrolled child. Twenty-four high-scoring children were excluded (Fig. 1) and replaced by the next highest-scoring child in their class. A total of 225 children were recruited, 113 from intervention and 112 from control schools.

The trial was approved by the University of the West Indies ethics committee. Written informed consent was obtained from all teachers and from the parents of the selected children.

The study is registered in the International Standard Randomised Controlled Trial Number Register: ISRCTN35476268.

Sample size

To detect a difference of 0.5 standard deviations with 85% power at the 0.05 level of significance, 75 participants in each group would be sufficient for a parallel group design. To take account of the cluster design, we assumed an intracluster correlation coefficient (ICC) of 0.05[11] on the primary outcome of observed child behaviour. With nine children per school, the design effect was 1.4 (design effect: 1 + (cluster size) ICC) giving a required sample size of 105 children in each group.

Randomisation and masking

Schools were randomised to intervention or control using a computer-generated simple-randomisation sequence by an independent statistician who was masked to school identity. Schools comprised separate classes of 3-, 4- and 5-year-old children, with one class per age group. One school had an additional class. Children were recruited in the summer term prior to randomisation except for the 3-year-old children entering

school in September who were screened and recruited after randomisation by a researcher who was masked to group allocation. Parents of these children were unaware of the school's intervention status.

Intervention

Teacher training intervention

Intervention involved training all teachers and principals in the intervention schools using the Incredible Years Teacher Training Programme.[12] The training methods make the intervention inherently adaptable and culturally sensitive. Methods include the use of collaborative and experiential learning, individual goal setting and self-monitoring, building teachers' self-efficacy, a focus on teachers' cognitions, behaviour and emotions, and emphasis on teachers' ability to generalise the skills learned.[13] The intervention was tailored for the Jamaican pre-school context based on piloting work.[8,9,14] The following adaptations were made.

(a) Supplementary video vignettes showing Jamaican classrooms were used.

(b) The intervention was delivered over 8 days rather than 5–6 days.

(c) Additional role-plays, practical activities and small group exercises were designed based on the experiences and concerns of Jamaican teachers.

(d) Additional emphasis was placed on aspects of the intervention including building positive relationships with children and parents, which is the foundation of the training programme, and being proactive in managing children's behaviour, found in piloting to be a highly valued topic, but one which teachers found challenging to implement.

(e) Handouts were revised to include examples relevant to the Jamaican context.

(f) The module on teaching social–emotional skills to children was enhanced by training teachers in specific techniques and activities to teach and reinforce child social skills.

The additional training exercises and use of Jamaican examples were aimed at increasing teachers' self-confidence and their understanding and application of the skills introduced in the programme and enhancing their ability to generalise the skills to their classroom.

Intervention school staff attended eight full-day workshops from December 2009 to April 2010. Four days were routinely held in-service training days, and teachers attended in two groups of 25–30 participants. For the remaining 4 days, teachers attended in four groups with 12–16 teachers per group. To ensure fidelity, in-class assistance involving modelling, coaching, and support and feedback in the implementation of the strategies was provided to each teacher once a month for 4 months for 1 h. A small amount of educational materials was provided to facilitate use of the strategies. Teachers in control schools attended the regular in-service workshops focusing on curriculum delivery provided by the Ministry of Education, and were visited twice from January to April to record child attendance and received the same educational materials.

Personnel

Workshops were conducted by H.B.H. who had attended accredited training in the Incredible Years teacher, parent and child programmes, conducted the Incredible Years Teacher Training Programme for the pilot study in Jamaica, and co-led Incredible Years teacher and parent training groups with an Incredible Years mentor in Wales. In-class support was provided by a psychology graduate who had co-led the teacher training workshops and facilitated a series of child training workshops based on the Incredible Years child training programme in 15 Jamaican pre-school classrooms in the pilot study. She received additional training and continuing supervision from H.B.H.

Monitoring of intervention implementation

The workshop facilitator completed a training protocol and self-evaluation after each workshop and the teachers completed workshop evaluations. All content was covered and teachers rated the workshops (content, video vignettes, group leader skills and group discussion) as helpful or very helpful for all eight workshops. The strengths and needs of each teacher were documented following in-class consultations and used to inform the ongoing planning of the intervention.

Measures

The primary outcome was directly observed in-class child behaviour. Secondary outcomes were teacher and parent reports of child behaviour, child attendance and parents' attitude to school. All measures were completed at baseline (October–November 2009) and post-intervention (May–June 2010) except for parents' attitude to school, which was completed at post-intervention only.

Observations of child behaviour

Within each class, three children were observed for 5 min each on a rotational basis for a total of 15 min each day per child over 4 days, across different times of the school day giving a total of 1 h of observation. Event recording was used to count aggressive/destructive behaviours (e.g. hitting, pushing, throwing objects) and friendship skills (e.g. sharing, working together) and expressed as frequency per hour. Instantaneous sampling (i.e. recording whether or not the behaviour was present at each sample point) was used to code disruptive behaviours (e.g. shouting, out of seat) at 15 s intervals, with a maximum possible score of 240. The aggressive/destructive and disruptive behaviours chosen were based on the Dyadic Parent–Child Interaction Coding System (DPICS)[15] and Multi-Option Observation System for Experimental Studies (MOOSES)[16] behaviour categories, operationalised for the Jamaican pre-school context. All behaviours were defined in a manual. At the end of each 5 min observation period, observers rated the frequency of conduct problems, activity level, on-task behaviour and follows rules/expectations of the classroom using seven-point rating scales (with behavioural descriptors on each point of the scale). Higher scores indicate higher levels of the behaviours.

Teacher and parent reports of child behaviour

For teacher-reported child behaviour, we used the Sutter–Eyberg Student Behavior Inventory (SESBI)[17] to measure child conduct problems, Connor's Global Index[18] to measure hyperactivity and attention difficulties, the Strengths and Difficulties Questionnaire (SDQ)[19] to measure behaviour difficulties and prosocial skills, and the Preschool and Kindergarten Behavior Scales (PKBS): Social Skills Scale[20] to measure social skills. For parent-reported child behaviour, we used the Eyberg Child Behavior Inventory (ECBI)[21] to measure child conduct problems, and the SDQ[19] to measure behaviour difficulties and prosocial skills.

Other outcome measures

Child attendance was taken from school records. The parents' attitude to school was measured through a ten-item questionnaire that included items on the parents' relationship with the teacher and their opinion on teacher effectiveness and the teachers' relationship with their child (range 0–40). Higher scores represent a more positive attitude.

Quality of measures and masking

For the child observational data, intraclass correlation coefficients between the observers and trainer and between each pair of observers were calculated for 5 min observation periods prior to data collection at baseline and post-intervention and for 15% of observations during the study. The ICCs were: median 0.86 (range 0.74–0.96) during training and 0.83 (range 0.67–0.91) during the study (online Table DS1). All teacher and parent questionnaires were interviewer administered and inter-interviewer ICCs were >0.95. Internal reliabilities and test–retest over 2 weeks were adequate (online Table DS2). Measurements were conducted by researchers masked to study design, hypothesis and group allocation, who conducted equal numbers of measurements per group. Five researchers conducted child observations, three conducted teacher questionnaires and two conducted parent questionnaires. Teachers were aware of allocation status at baseline and post-intervention. To maintain masking of researchers: teachers were asked at initial contact and prior to each assessment not to reveal intervention status; observers and interviewers were not informed of the study design and were employed during the measurement phases of the study only; and intervention and control schools were provided with the same materials.

Statistical analysis

All analyses were pre-specified. The distributions of continuous dependent variables were examined for normality.[22] Normality was rejected for observed aggressive/destructive behaviour, friendship skills and disruptive behaviour, and for child attendance and parent attitude to school. The three behaviour variables were log transformed, whereas child attendance and parent attitude to school were normalised by squaring. Factor analyses, with varimax rotation, were used to reduce the number of outcome variables and identify underlying constructs with separate factor analyses conducted for the observational, teacher report and parent report variables. The numbers of children scoring above the clinical cut-off for conduct problems by teacher and parent report at baseline and post-intervention was also calculated.

The effect of intervention on continuous variables was examined using multilevel multiple regression models, which are the appropriate form of analysis for a clustered trial where outcomes are observed at level 1 (children), who are taught in classes (level 2) and the intervention is at level 3 (pre-school).[23] The dependent variables were the post-intervention scores for the summary variables created from the factor analyses. In all analyses, child age and gender, baseline score and intervention status were entered as fixed effects and school and classroom were entered as random effects. We analysed the binary outcomes using random-effects logistical-regression models with the same covariates. Models were estimated with Markov chain Monte-Carlo (MCMC) estimation methods, which are known to give better estimates when the number of units is relatively small.[24] Analyses were conducted on an intention-to-treat basis, using the baseline scores for missing data at post-intervention. Multilevel analyses were conducted with MlwiN (version 2.10, Centre for Multilevel Modelling, University of Bristol, UK)[25] for Windows.

Results

Uptake of intervention

Teachers attended a median of eight workshops (range 2–8), with 70% attending all eight and 95% attending at least six workshops; 89% of teachers received all four in-class consultations with four teachers (11%) receiving 0–3.

Sample characteristics

All 24 pre-schools were followed to the end of the trial (Fig. 1). Fifteen children were lost to follow-up (eight intervention and seven control) and these children did not differ from those retained.

There were no significant differences between the groups on child, family, classroom or school characteristics at baseline (Table 1).

Findings

Table 2 shows the raw scores of all outcomes by group at baseline and post-intervention; there were no significant baseline differences between the groups.

Factor analysis yielded similar results at baseline and post-intervention producing five factors: observed conduct problems, observed friendship skills, teacher-reported behaviour difficulties, teacher-reported social skills and parent-reported behaviour difficulties (Table 3). Summary variables were calculated by summing the standardised scores of the variables loading on each factor (Table 3).

Intervention led to significant benefits in observed child behaviour (Table 4), with reductions in conduct problems (effect size (ES) = 0.42) and increased friendship skills (ES = 0.74). Significant benefits were also found for teacher-reported child behaviour difficulties (ES = 0.47) and social skills (ES = 0.59), and parent-reported child behaviour difficulties (ES = 0.22). There were significant benefits for child attendance (ES = 0.30) but not for parents' attitude to school (ES = 0.16, $P = 0.26$). A similar proportion of children from both groups were rated as being in the clinical range for conduct problems by teachers and parents at baseline (Table 5). Children in the intervention group were less likely to be rated in the clinical range by teachers at post-test and were less likely to have pervasive conduct problems (Table 5). There was no significant change in the proportion of children scoring in the clinical range by parent report.

Discussion

This study is the first in a middle-income country to show that training teachers in classroom behaviour management and social skill promotion can lead to significant and clinically important reductions in child conduct problems and increases in social skills among pre-school children with antisocial behaviour. Benefits were demonstrated by direct observation as well as by teacher and parent report; the mean effect size for child behaviour was 0.49. Meta-analyses of universal school-based violence prevention programmes have shown mean effect sizes of 0.21 for child aggressive behaviour[26] and 0.24 for child social skills.[27] The larger effect sizes found in this study could be because of the relatively poor initial level of training of the teachers thus widening the intervention–control gap, because we evaluated only children with high levels of conduct problems at baseline and because

Table 1 Child, family, classroom/teacher and school characteristics by study group

	Intervention	Control	P
Child characteristics			
n	113	112	
Child age, years: mean (s.d.)	4.2 (0.9)	4.2 (0.8)	0.86
Child gender, boys: n (%)	67 (59.3)	71 (63.4)	0.53
Family characteristics			
n	113	112	
Age of caregiver, years: mean (s.d.)	31.5 (10.6)	30.0 (8.7)	0.22
Number of possessions,[a] mean (s.d.)	8.9 (2.4)	8.9 (2.6)	0.98
Crowding,[b] mean (s.d.)	2.2 (1.3)	2.0 (1.0)	0.35
Mother lives with child, n (%)	90 (79.6)	96 (85.7)	0.36
Father lives with child, n (%)	47 (41.6)	45 (40.2)	0.87
Caregiver employed, yes: n (%)	59 (52.2)	72 (64.3)	0.07
Caregiver completed high school, n (%)	46 (40.7)	47 (42.0)	0.85
Classroom and teacher characteristics			
n	37	36	
Age of teacher, years: mean (s.d.)	38.2 (10.7)	42.8 (9.8)	0.20
Number of years teaching, mean (s.d.)	12.6 (9.0)	13.8 (8.1)	0.65
Number of years teaching at current school, mean (s.d.)	7.9 (7.1)	11.4 (6.1)	0.06
Number of children in class, mean (s.d.)	23.2 (6.9)	25.2 (6.4)	0.19
Trained teacher, n (%)	4 (10.8)	3 (8.3)	0.72
Currently attending teacher training college, n (%)	8 (21.6)	9 (25.0)	0.73
Gender of teacher, female: n (%)	34 (91.9)	35 (97.2)	0.32
School characteristics			
n	12	12	
Average school attendance in first term, mean % (s.d.)	80.5 (6.4)	77.9 (7.9)	0.39
Number of children enrolled, mean (s.d.)	71.2 (22.5)	75.7 (10.8)	0.54

a. Number of possessions from a list of 15 items: stove, fridge, washing machine, sofa or soft chair, mobile telephone, landline, radio, CD player, TV, Cable TV, DVD player, computer, bicycle, motorbike, motor car.
b. Number of people per room.

Table 2 Raw scores of child behaviour outcomes observed over a total of 1 h, child behaviour through teacher and parent report, child attendance and parents' attitude to school at baseline and post-intervention by group

	Intervention (n = 113)		Control (n = 112)	
	Baseline	Post-intervention	Baseline	Post-intervention
Structured observations of child behaviour, median (range)				
Aggressive/destructive behaviour[a]	12 (0–50)	9 (0–50)	13 (0–45)	13 (0–49)
Friendship skills[a]	4 (0–29)	9 (0–47)	5 (0–38)	4 (0–23)
Disruptive behaviour[b]	32 (3–89)	23 (2–127)	32 (6–98)	32 (3–164)
Rating scales of child behaviour,[c] mean (s.d.)				
Conduct problems	2.70 (0.85)	2.35 (0.79)	2.81 (0.85)	2.63 (0.88)
Activity level	3.32 (0.73)	3.27 (0.50)	3.19 (0.67)	3.32 (0.52)
Follows rules and expectations	4.75 (0.72)	5.09 (0.72)	4.63 (0.67)	4.79 (0.68)
On-task behaviour	4.95 (0.87)	5.52 (0.70)	4.85 (0.84)	5.14 (0.81)
Teacher reports of child behaviour, mean (s.d.)				
Conduct problems (SESBI)	154.29 (44.38)	123.99 (47.13)	152.45 (31.96)	145.07 (38.59)
ADHD symptoms (Connor's Global Index)	16.63 (6.05)	12.44 (6.68)	16.74 (5.90)	15.72 (6.36)
Child social skills (PKBS)	67.00 (13.86)	77.22 (14.25)	70.60 (12.58)	73.04 (11.41)
Total behaviour difficulties (SDQ)	17.27 (6.51)	14.73 (6.93)	16.54 (5.03)	16.48 (5.69)
Prosocial skills (SDQ)	5.30 (2.31)	7.09 (2.23)	5.49 (2.32)	5.87 (1.90)
Parent reports of child behaviour, mean (s.d.)				
Conduct problems (ECBI)	120.05 (22.66)	121.67 (23.91)	119.83 (24.26)	127.22 (23.97)
Total behaviour difficulties (SDQ)	15.73 (5.67)	16.33 (5.61)	15.54 (5.17)	16.34 (5.06)
Prosocial skills (SDQ)	7.33 (2.23)	7.83 (2.20)	7.82 (1.87)	7.65 (2.10)
Child attendance and parent involvement in school, median (range)				
School attendance	92 (31–100)	90 (48–100)	91 (45–100)	88 (30–100)
Parents' attitude to school[d]	–	28.0 (5–39)	–	27.5 (12–37)

SESBI, Sutter–Eyberg School Behavior Inventory; ADHD, attention-deficit hyperactivity disorder; PKBS, Preschool and Kindergarten Behavior Scales; SDQ, Strengths and Difficulties Questionnaire; ECBI, Eyberg Child Behavior Inventory.
a. Event sampling.
b. Instantaneous sampling at 15 s intervals (maximum possible score 240).
c. Mean of 12 ratings conducted every 5 min on a scale 0– 7, where 0 is low and 7 is high.
d. n = 210 (105 intervention, 105 control).

the intervention was implemented with high levels of fidelity. All these factors have been shown to predict greater effectiveness.[26,27]

Significantly more children attending intervention schools moved into the non-clinical range on teacher-reported conduct problems than in control schools, although the difference by parent report was not significant. Intervention also reduced the proportion of children with pervasive conduct problems who were at highest risk for long-term negative outcomes.[2] Although the

Table 3 Factor analyses of observations of child behaviour and teacher and parent reports of child behaviour at baseline and post-intervention[a]

	Baseline		Post-intervention	
	Factor 1	Factor 2	Factor 1	Factor 2
Child observations[b]				
Follows rules and expectations	−0.92		−0.93	
Conduct problems	0.83		0.81	
Activity level	0.79		0.79	
Aggressive/destructive behaviour	0.78		0.79	
On-task behaviour	−0.68	0.43[e]	−0.71	
Disruptive behaviour	0.66		0.79	
Friendship skills		0.86		0.96
Variance explained, %	52.42	16.35	55.59	15.59
Teacher report[c]				
ADHD symptoms (Connor's Global Index)	0.92		0.91	
Conduct problems (SESBI frequency scale)	0.90		0.89	
Total behaviour difficulties (SDQ)	0.79	−0.48[e]	0.87	
Prosocial skills (SDQ)		0.93		0.94
Social skills (PKBS)		0.85	−0.43[e]	0.83
Variance explained, %	48.01	37.37	51.68	35.93
Parent report[d]				
Conduct problems (ECBI)	0.84		0.87	
Total behaviour difficulties (SDQ)	0.83		0.86	
Prosocial skills (SDQ)	−0.67		−0.62	
Variance explained, %	61.94		62.61	

ADHD, attention-deficit hyperactivity disorder; SESBI, Sutter–Eyberg School Behavior Inventory; SDQ, Strengths and Difficulties Questionnaire; PKBS, Preschool and Kindergarten Behavior Scales; ECBI, Eyberg Child Behavior Inventory.
a. Only factor loadings ⩾0.40 are shown.
b. Conduct problems (factor 1) = conduct problems + activity + aggressive/destructive behaviour + disruptive behaviour – follows rules and expectations – on-task behaviour; friendship skills (factor 2) = friendship skills only.
c. Behaviour difficulties (factor 1) = ADHD (Connor's Global Index) + conduct problems (SESBI) + total behaviour difficulties (SDQ); social skills (factor 2) = prosocial skills (SDQ) + social skills (PKBS social skills scale).
d. Behaviour difficulties (factor 1) = conduct problems (ECBI) + total behaviour difficulties (SDQ) – prosocial skills (SDQ).
e. Not used in calculation: variables were used in the calculation of the summary variable if the loading was >0.40 at both baseline and post-test.

Table 4 Effect of intervention on child behaviour through independent observations and teacher and parent report and on child attendance and parent attitude to school[a]

Measure	Regression coefficient B (95% CI)	Intracluster correlation coefficient	Effect size[b] (95% CI)	P
Observations of child behaviour				
Conduct problems[c]	−1.95 (−3.33 to −0.57)	0.05	0.42 (0.12 to 0.71)	0.006
Friendship skills[c]	0.74 (0.41 to 1.40)	0.10	0.74 (0.41 to 1.40)	<0.0001
Teacher reports of child behaviour				
Behaviour difficulties[c]	−1.29 (−2.09 to –0.48)	0.06	0.47 (0.18 to 0.76)	0.001
Social skills[c]	1.09 (0.64 to 1.54)	0.00	0.59 (0.35 to 0.84)	<0.0001
Parent reports of child behaviour				
Behaviour difficulties[c]	−0.52 (−0.98 to −0.06)	0.00	0.22 (0.03 to 0.42)	0.03
Child attendance[d]	586.96 (102.79 to 1071.13)	0.02	0.30 (0.05 to 0.55)	0.02
Parents' attitude to school[d]	42.31 (−31.59 to 116.21)	0.00	0.16 (−0.12 to 0.43)	0.26

a. Analysis adjusting for baseline score, child age and gender as fixed effects and school and classroom as random effects. Intervention group = 1, control group = 0.
b. Effect size = regression coefficient/pooled standard deviation at baseline.
c. Sum of standardised scores of variables loading on each factor (see Table 3 for details).
d. Transformed scores (square) used in the analyses.

Table 5 Effect of intervention on clinical significance of conduct problems by teacher and parent report[a]

	Intervention, n (%) (n = 113)		Control, n (%) (n = 112)			
	Baseline	Post-intervention	Baseline	Post-intervention	Adjusted OR (95% CI)	P
Clinical range for conduct problems by teacher report[b]	60 (53.1)	30 (26.5)	63 (56.3)	50 (44.6)	0.31 (0.11–0.92)	0.02
Clinical range for conduct problems by parent report[c]	42 (37.2)	42 (37.2)	35 (31.3)	49 (43.8)	0.56 (0.27–1.16)	0.11
Clinical range for conduct problems at school and at home[d]	25 (22.1)	9 (8.0)	20 (17.9)	23 (20.5)	0.24 (0.08–0.73)	0.01

a. Models were estimated with Markov chain Monte Carlo estimation methods with an initial burning of 500 followed by 50 000 monitoring simulations; initial values were provided using maximum likelihood methods.
b. Above cut-off (>150) on Sutter–Eyberg Student Behaviour Inventory (SESBI) intensity scale.
c. Above cut-off (>130) on Eyberg Child Behaviour Inventory (ECBI) intensity scale.
d. Above cut-off on SESBI and ECBI intensity scales.

cut-offs for clinical conduct problems have not been validated for Jamaica, the cut-offs likely identify children at elevated risk of continuing conduct problems.

The intervention focused on training teachers and it was encouraging that small benefits were also found for parent reports of their child's behaviour difficulties. Evidence of benefits from classroom-based interventions for child behaviour at home are inconsistent,[28–30] and for children with elevated conduct problems at home, adding a parenting component may be necessary. There were no significant benefits for parents' attitude to school; however, attitudes were generally positive in this population. The intervention benefited child attendance, indicating that parents sent their children to school more regularly. School-based violence prevention programmes have been shown to reduce school drop-out and truancy in older children.[31]

Meaning and implications of study

The Incredible Years Parenting Programme has been shown to be culturally transferable across ethnic groups in the USA,[32] but to our knowledge this is the first trial of an Incredible Years programme in a low- or middle-income country. The community pre-schools in this study had high child–staff ratios, few resources and poor physical conditions including overcrowding and high noise levels. Most teachers were paraprofessionals without formal teacher training and schools were situated in disadvantaged, inner-city communities with high levels of community violence.[33] Uptake by teachers was high and the benefits to child behaviour substantial, demonstrating that with careful piloting and adaptation, and attention to fidelity to the original model, this programme can be effective in a middle-income country setting.

The evidence base for psychosocial interventions to prevent behaviour problems in low- and middle-income countries is extremely limited.[1,4,5] The finding that teacher training leads to widespread benefits in child behaviour is extremely important for child mental health prevention and promotion in low- and middle-income countries where services are few; it is also relevant for high-income countries. The intervention is integrated into existing services, and is relatively low cost, requiring few specialist resources. In addition, teachers can reach a number of high-risk children and can continue benefiting new cohorts of children over time. As the intervention is integrated into the pre-school system, this should be a cost-effective approach and has potential for expansion and sustainability.

Strengths and weaknesses

The trial had high response and follow-up rates, assessments were conducted by trained researchers masked to study design, hypothesis and group allocation, and analysis was by intention to treat. The primary outcome involved gold-standard direct observations of child behaviour in school. Teachers were aware of group allocation and it is possible that intervention teachers rated children more favourably post-intervention. However, effect sizes by teacher report were similar to those by independent observations. The control schools did not receive an alternate intervention and hence the benefits may be as a result of the additional attention received by intervention schools. However, teachers in control schools attended their regular training workshops hosted through the Ministry of Education and similar materials were provided to all schools. Furthermore, high-quality intervention implementation has been shown to be essential for the effectiveness of school-based violence prevention programmes.[26] Although cluster randomised trials are susceptible to bias, there were no significant differences between the groups at baseline. Contamination between groups was minimised through the cluster design. Approximately 23% of teachers in both intervention and control schools were attending teacher training colleges where some sharing of strategies may have occurred. If this led to implementation of strategies by some teachers in control schools, this would reduce the size of the benefits detected. There were exclusions to participation at the level of the school and the child that may limit the generalisability of the results. Schools with less than 20 children per class were excluded to maximise the likelihood that children with the highest scores on the conduct disorder screen had behaviour problems; we anticipate that the intervention would benefit antisocial children attending schools with smaller class sizes. We excluded schools with fewer than three or more than four classes. However, as the intervention is provided for all class teachers, we would hypothesise that children attending smaller and larger schools would also benefit. Children with low attendance were excluded to ensure timely data collection; it is likely poor attendance would also reduce the benefits of intervention. The benefits reported are post-intervention only and we do not know whether these benefits will be sustained when children transition into new classrooms or schools with untrained teachers.

Questions and future research

The workshops comprised new concepts and skills for the teachers that were modelled and rehearsed. Teachers also received in-class consultations to assist them in the application of these skills. The study design does not allow us to identify the relative importance of these components, which is important for planning wider dissemination of the programme.

Although we implemented a universal intervention, only children with elevated levels of conduct problems at school were evaluated, and hence we do not know whether the intervention benefited children with low-to-moderate levels of conduct problems. It is possible that the intervention benefited the mental health of all children. Furthermore, previous studies have found benefits to academic achievement from school-based violence prevention[26] and social skills training programmes[27] and school readiness should be measured in future studies. It will also be important to determine whether the benefits to child behaviour are sustained, especially as children transition to primary school.

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References

1 Kieling C, Baker-Henningham H, Belfer M, Conti G, Ertem I, Omigbodun O, et al. Global child and adolescent mental health: evidence for action. *Lancet* 2011; **378**: 1515–25.

2 Moffitt T, Scott S. Conduct disorders in childhood and adolescence. In *Rutter's Child and Adolescent Psychiatry (5th edn)* (ed M Rutter, D Bishop, D Pine, S Scott, J Stevenson, E Taylor, et al): 543–64. Blackwell Publishing, 2008.

3 Fergusson DM, Horwood LJ, Ridder EM. Show me the child at seven: the consequences of conduct problems in childhood for psychosocial functioning in adulthood. *J Child Psychol Psychiatry* 2005; **46**: 837–49.

4 Patel V, Aroya R, Chatterjee S, Chisholm D, Cohen A, De Silva M, et al. Global Mental Health 3 – treatment and prevention of mental disorders in low-income and middle-income countries. *Lancet* 2007; **370**: 991–1005.

5 Belfer ML. Child and adolescent mental disorders: the magnitude of the problem across the globe. *J Child Psychol Psychiatry* 2008; **49**: 226–36.

6 Offord DR. Selection of levels of prevention. *Addict Behav* 2000; **25**: 833–42.

7 Le Franc E, Samms-Vaughan M, Hambleton I, Fox K, Brown D. Interpersonal violence in three Caribbean countries: Barbados, Jamaica, and Trinidad and Tobago. *Rev Panam Salud Publica* 2008; **24**: 409–21.

8 Baker-Henningham H, Walker S, Powell C, Gardner JM. A pilot study of the Incredible Years Teacher Training programme and a curriculum unit on social and emotional skills in community pre-schools in Jamaica. *Child Care Health Dev* 2009; **35**: 624–31.

9 Baker-Henningham H, Walker S. A qualitative study of teacher's perceptions of an intervention to prevent conduct problems in Jamaican pre-schools. *Child Care Health Dev* 2009; **35**: 632–42.

10 World Health Organization. *The ICD-10 Classification of Mental and Behavioural Disorders. Diagnostic Criteria for Research*. WHO, 1993.

11 Campbell M, Grimshaw J, Steen N. Sample size calcuation for cluster randomised trials. Changing professional practice in Europe group. *J Health Serv Res Policy* 2000; **5**: 12–6.

12 Webster-Stratton C. *The Incredible Years Training Series*. Office of Juvenile Justice and Delinquency Prevention, Juvenile Justice Bulletin, 2000.

13 Webster-Stratton C, Reinke WM, Herman KC. *The Incredible Years Teacher Training: The Methods and Principles that Support Adaptation and Dissemination with High Fidelity*. Incredible Years Corporation, no date (http://www.incredibleyears.com/Library/items/the-incredible-years-teacher-training-methods_11.pdf).

14 Baker-Henningham H. Transporting evidence-based interventions across cultures: using focus groups with teachers and parents of preschool children to inform the implementation of the Incredible Years Teacher Training Programme in Jamaica. *Child Care Health Dev* 2011; **37**: 649–61.

15 Eyberg S, Robinson EA. *Dyadic Parent–Child Interaction Coding System*. Parenting Clinic, University of Washington, 1981.

16 Tapp J, Wehby JH, Ellis D. A multiple observation system for experimental studies: MOOSES. *Behav Res Methods Instrum Comput* 1995; **27**: 25–31.

17 Rayfield A, Eyberg SM, Foote R. Revision of the Sutter-Eyberg Student Behavior Inventory: teacher ratings of conduct problem behavior. *Educ Psychol Meas* 1998; **58**: 88–98.

18 Kollins SH, Epstein JN, Conners KC. Conners' Rating Scales – Revised. In *The Use of Psychological Testing for Treatment Planning and Outcomes Assessment (3rd edn)* (ed. ME Maruish): 215–32. Lawrence Erlbaum Associates, 2004.

19 Goodman R. The extended version of the Strengths and Difficulties Questionnaire as a guide to child psychiatric caseness and consequent burden. *J Child Psychol Psychiatry* 1999; **40**: 791–9.

20 Merrell KW. Assessment of social skills and behavior problems in early childhood: the Preschool and Kindergarten Behavior Scales. *J Early Interv* 1996; **20**: 132–45.

21 Eyberg SM, Ross AW. Assessment of child behavior problems: the validation of a new inventory. *J Clin Child Adolesc Psychol* 1978; **7**: 113–6.

22 Shaprio SS, Wilk MB. An analysis of variance test for normality (complete samples). *Biometrika* 1965; **52**: 591–611.

23 Hayes HJ, Moulton LH. *Cluster Randomised Trials*. CRC, 2009.

24 Browne WJ. *MCMC Estimation in MLWin Version 2.13*. Centre for Multilevel Modelling, University of Bristol, 2009 (http://seis.bris.ac.uk/~frwjb/esrc/mcmc.pdf).

25 Rasbash J, Charlton C, Browne WJ, Healy M, Cameron B. *A User's Guide to MLwiN V2.1*. Centre for Multilevel Modelling, University of Bristol, 2009 (http://www.bristol.ac.uk/cmm/software/mlwin/download/mlwin-userman-0-9.pdf).

26 Wilson SJ, Lipsey MW. School-based interventions for aggressive and disruptive behavior – update of a meta-analysis. *Am J Prev Med* 2007; **33**: S130–43.

27 Durlak JA, Weissberg RP, Dymnicki AB, Taylor RD, Schellinger KB. The impact of enhancing students' social and emotional learning: a meta-analysis of school-based universal interventions. *Child Dev* 2011; **82**: 405–32.

28 Grossman DC, Neckerman HJ, Koepsell TD, Liu PY, Asher KN, Beland K, et al. Effectiveness of a violence prevention curriculum among children in elementary school. A randomized controlled trial. *JAMA* 1997; **277**: 1605–11.

29 Ialongo NS, Werthamer L, Kellam SG, Brown CH, Wang S, Lin Y. Proximal impact of two first-grade preventive interventions on the early risk behaviors for later substance abuse, depression, and antisocial behavior. *Am J Community Psychol* 1999; **27**: 599–641.

30 Webster-Stratton C, Jamila RM, Stoolmiller M. Preventing conduct problems and improving school readiness: evaluation of the Incredible Years Teacher and Child Training Programs in high-risk schools. *J Child Psychol Psychiatry* 2008; **49**: 471–88.

31 Wilson DB, Gottfredson DC, Najaka SS. School-based prevention of problem behaviors: a meta-analysis. *J Quant Criminol* 2001; **17**: 247–72.

32 Reid MJ, Webster-Stratton C, Beauchaine TP. Parent training in head start: a comparison of program response among African American, Asian American, Caucasian, and Hispanic mothers. *Prev Sci* 2001; **2**: 209–27.

33 Baker-Henningham H, Meeks-Gardner J, Chang S, Walker S. Experiences of violence and deficits in academic achievement among urban primary school children in Jamaica. *Child Abuse Negl* 2009; **33**: 296–306.

Data supplement

Table DS1 Interobserver reliabilities for child and teacher observations over 5 min intervals

	Interobserver reliabilities (ICC)		
	Baseline training reliabilities[a] Median (range)	Ongoing reliabilities[b] Median (range)	Post-intervention training reliabilities,[a] median (range)
Structured observations of child behaviour			
Aggressive/destructive behaviour	0.87 (0.79–0.94)	0.91 (0.78–0.95)	0.86 (0.80–0.95)
Friendship skills	0.83 (0.79–0.94)	0.86 (0.70–1.00)	0.93 (0.80–0.98)
Disruptive behaviour	0.89 (0.87–0.91)	0.80 (0.79–0.97)	0.96 (0.90–0.98)
Rating scales of child behaviour			
Conduct problems	0.95 (0.90–0.97)	0.90 (0.84–0.99)	0.87 (0.79–0.93)
Activity	0.86 (0.82–0.92)	0.67 (0.50–0.91)	0.74 (0.70–0.90)
Task	0.89 (0.80–0.97)	0.87 (0.66–0.99)	0.93 (0.82–0.99)
Rules	0.88 (0.82–0.92)	0.77 (0.60–0.92)	0.89 (0.80–0.92)

ICC, intraclass correlation coefficient
a. $n = 20$ observations between trainer and each observer and minimum of 15 between each observer and other observers.
b. 15% of all observations between senior research assistant and each observer and minimum of 15 between each observer and other observers during baseline assessments and minimum of 10 during post-test assessments.

Table DS2 Internal reliability and test–retest of parent and teacher report measures

	Cronbach's alpha		
	Baseline	Post-intervention	Test–retest[a] (ICC)
Teacher report measures			
Sutter–Eyberg Student Behaviour Inventory	0.96	0.97	0.92
Connor's Global Index	0.86	0.90	0.84
Preschool and Kindergarten Behaviour Scales (Social Skills Scale)	0.92	0.93	0.85
Total behaviour difficulties (Strengths and Difficulties Questionnaire)	0.78	0.80	0.80
Prosocial skills (Strengths and Difficulties Questionnaire)	0.80	0.81	0.78
Parent report measures			
Eyberg Child Behaviour Inventory	0.80	0.83	0.90
Prosocial skills (Strengths and Difficulties Questionnaire)	0.65	0.74	0.70
Total behaviour difficulties (Strengths and Difficulties Questionnaire)	0.67	0.67	0.85
Parent attitude to school	–	0.74	0.78

ICC, intraclass correlation coefficient
a. Over 2 weeks: $n = 20$ for teacher report measures, $n = 18$ for parent report measures.