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The Irie Homes Toolbox: A Cluster Randomized Controlled Trial of an Early Childhood Parenting Program to Prevent Violence Against Children in Jamaica

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ABSTRACT

Background: We tested whether a universal, violence-prevention, early childhood, parenting program (The Irie Homes Toolbox) reduced parents' use of harsh punishment and increased parents' involvement with their child.

Methods: A cluster randomized trial was conducted in eighteen preschools situated in inner-city neighbourhoods in Kingston, Jamaica. Schools were randomized to intervention (n=9) or control (n=9) and a minimum of twelve parent/child dyads were recruited in each school (n=223, 115 intervention, 108 control). The Irie Homes Toolbox consists of eight, ninety-minute sessions with groups of six parents. The primary outcomes were parent-reported harsh punishment and involvement with their child. Secondary outcomes were parent and teacher-reported child behavior difficulties and prosocial behavior and child school readiness by direct testing.

Results: The attendance rate in the intervention group was 68.8%. Benefits of intervention included significant reductions in parents' use of harsh punishment (ES=-0.29, 95% CI: -0.52,-0.05, p=0.036) and increases in parents' involvement (ES=0.30, 95% CI: 0.03, 0.57, p=0.036). There was a dose-response relationship between number of sessions attended and reduction in harsh punishment with greater reductions as parent attendance increased. No main effects were found child behavior at home and at school and school readiness.

However, there was a significant interaction effect between baseline behavior difficulties and intervention group (p=0.002); significant reductions in behavior difficulties were found for children at or above the 50th percentile on initial behavior difficulties (ES= -0.36, p=0.031).

Conclusion: The Irie Homes Toolbox led to reduced harsh punishment by parents, increased parental involvement and decreased behavior difficulties for higher-risk children.

Key words: violence against children; parenting; early childhood; intervention; child behavior; low and middle- income countries.

1. INTRODUCTION

Globally, approximately 75% of children aged two to four experience violent discipline by their caregivers each month (UNICEF, 2017). Violent discipline includes both physical punishment (e.g. shaking, slapping, pinching, beating with an object) and psychological aggression (e.g. verbal threats, yelling, name-calling) (UNICEF, 2017). The prevalence of violence against children is greatest in low and middle income countries (LMIC) (Hillis, Mercy, Amobi, & Kress, 2016). Studies from high, middle- and low-income countries have demonstrated that exposure to violent discipline practices in childhood is associated with increased risk of injury, poor mental health, (including externalizing and internalizing behaviors), and poor cognitive functioning in the short-term, and with psychopathology (including mood, anxiety, behaviour, substance abuse, and suicidality), reproductive health problems, and poor physical health in adulthood (Hillis et al., 2015, Hillis, Mercy, & Saul, 2017, Kessler et al. 2010). Violence against children also results in substantial economic costs in the public health sector both presently and in the future (WHO, 2016).

The prevention of violence is of high priority with a worldwide call to end violence against children in all forms (UNICEF, 2014). Meta-analyses and systematic reviews have documented the effectiveness of parenting programs in the reduction of child maltreatment (Chen & Chan, 2015; van der Put, Assink, Gubbels, & Boekhout van Solinge, 2017). The majority of the evidence for parenting interventions to reduce violence against children comes from high-income countries with a more limited evidence-base from LMIC (Knerr, Gardner, & Cluver, 2013). However, there has been a recent increase in randomized trials of these parenting interventions in LMIC (for example, Ward et al., 2019; Rincon et al., 2018; Puffer et al., 2015; Ponguta et al., 2020).

In Jamaica, there is an identified need and national interest in implementing scalable violence-prevention parenting interventions driven by various factors. Firstly, harsh

punishment has a high prevalence in Jamaica. In the UNICEF Multiple Indicator Cluster Study, 84% of Jamaican caregivers of 2-4 year old children reported that they or someone in their household had used physical violence with their child in the past month while 71% had used psychological aggression (Lansford & Deater-Deckard, 2012). Secondly, evidence from qualitative work indicates that although Jamaican parents of young children report frequent use of corporal punishment, they find that it is undesirable and ineffective (Baker-Henningham, 2011). This suggests that they would be receptive to learning alternative discipline methods. Thirdly, Jamaica is a pathfinder country in the Global Partnership to End Violence against Children, and hence implementing effective violence prevention initiatives is a national governmental priority (<https://www.end-violence.org/impact/countries/jamaica>). To enhance scalability and sustainability, it is important to integrate violence-prevention programs into existing services. In Jamaica, over 98% of young children attend preschool and hence preschools offer a logical public health venue for implementing a parenting intervention. A universal, violence-prevention, teacher-training program, the Irie Classroom Toolbox, has been shown to reduce teachers' use of violence against children and increase teachers' use of positive practices in preschools and in grade one of primary schools (Baker-Henningham, Scott, Bowers, & Francis, 2019; Baker-Henningham, Bowers, Francis, Vera-Hernandez, & Walker, 2021). To promote an integrated approach to preventing violence against children across home and school settings, we have recently developed a complementary program, the Irie Homes Toolbox (Francis & Baker-Henningham, 2020). The Irie Homes Toolbox is a universal violence prevention program targeting parents of preschool children that was developed by integrating theory, with formative research and extensive piloting with Jamaican parents and teachers of preschool-age children. It is thus theory-informed, and uses empirically-derived content and behaviour change principles, operationalised for use in Jamaican preschool settings. The Irie Homes Toolbox was

specifically designed: 1) to be integrated into the services provided by preschools, 2) to be suitable for implementation by preschool teachers who are trained in the Irie Classroom Toolbox with parents of children in their preschool, and 3) to require few resources and equipment. Full details of the development of the Irie Homes Toolbox have been published previously (Francis & Baker-Henningham, 2020).

The aim of the study was to evaluate the effects of the Irie Homes Toolbox on parents' use of violence against their child and parent involvement with their child. We also investigated the effect of the Irie Homes Toolbox on child behavior difficulties and prosocial behavior at home and at school and on child school readiness.

2. METHODS

2.1. Study Design and Participants

The study was conducted in eighteen community preschools located in low-income, inner-city communities in Kingston and St. Andrew, Jamaica. The preschools had participated in a previous effectiveness trial of the Irie Classroom Toolbox, a universal, teacher-training, violence prevention program. The trial was a two-arm, single blind, cluster randomized trial with parallel assignment. Preschool was the unit of randomization to prevent contamination among parents in the same school. The inclusion criteria for the preschools were: 1) participated in the Irie Classroom Toolbox effectiveness trial, 2) had two or more teachers who were trained in the Irie Classroom Toolbox still working at the preschool, 3) interested in participating in the program, 4) situated in a community in which parents usually brought their children to preschool and picked them up (rather than children being transported by a driver), 5) had no other parenting program being undertaken by the preschool, and 6) the principal and all teachers in the preschool consented to participate in the study. We surveyed the seventy-six preschools that had participated in the previous trial of the Irie Classroom

Toolbox and invited eighteen preschools that fit these inclusion criteria, and that were situated within a specified geographical region, to participate in this study (**Figure 1**). No preschools refused participation.

The inclusion criteria for parents were: 1) interested in participating in the program, 2) able to participate in a ninety-minute parenting session one day a week, for eight weeks, either in the morning after dropping off their child or in the afternoon when they came for pick-up, 3) child has no obvious disability, and 4) parental consent. Preschool teachers and the principal identified parents that met these inclusion criteria to participate in the study and parents were recruited at the preschool by the research team. No parents who were referred to the research team refused to participate in the study. A minimum of six parents were recruited from each preschool in the Autumn term and an additional six recruited in the Spring term resulting in a minimum of twelve parents per preschool. One parent of a child with a disability participated in the intervention but was not included in the evaluation sample. The intervention was conducted over two rounds; the first round was conducted in the Autumn term from September to December 2018 and the second round in the Spring term from January to April 2019. For each round, parents were recruited from each preschool, baseline measures collected, the intervention delivered and then post-test measures collected. Ethical approval for the study was given by the University of the West Indies ethics committee, 01/06/2018, ref: ECP 144, 17/18 and School of Psychology, Bangor University ethics committee, 21/08/2018, ref: 2018-16364. Written and informed consent was obtained from the preschools' principals, all teachers present in the preschool, and all the parents selected to participate in the trial. The study is registered with ISRCTN, number ISRCTN35915964.

2.2. Randomization and Masking

Preschools were randomized to intervention or control group at the end of the summer school term after all preschools and teachers were recruited. Randomization was done using a computer-generated simple-randomization sequence by an independent researcher who was blind to preschool identity. Parents were recruited and baseline measurements were conducted after randomization. Data collectors were blind to group allocation and were not informed of the study design or hypothesis and mothers and teachers were asked not to reveal intervention status. However, it is possible that some mothers mentioned aspects of the intervention during the interview.

2.3. Measures

All parent-reported and teacher-reported measurements were conducted at baseline (September 2018 for round 1, January 2019 for round 2) and post-test (December 2018 for round 1, April 2019 for round 2) through interviewer-administered questionnaires. Interviews were usually conducted in a quiet area on the school compound; a minority of parent interviews were conducted in the parents' home or at their place of employment. Child school readiness was measured at post-test only by direct testing. All child tests were conducted individually with each child at the participating preschool in the summer term (May-June 2019). Parent questionnaires lasted between 30-45 minutes, teacher questionnaires lasted 10 minutes per child, child tests lasted between 20-40 minutes depending on the child's age.

2.3.1. Primary Outcomes

There were two primary outcomes: parents' use of violence and parent involvement.

2.3.1.1. Parents' use of violence was measured by parent report using questions from the corporal punishment and psychological aggression subscales of the Conflict Tactics Scale

Parent-Child (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998). The questionnaire included five questions on physically violent practices (1) hit on the bottom with your bare hand, 2) shake, 3) pinch, 4) slap on hand, arm or leg, and 5) hit on the bottom with something like a belt, hairbrush, stick or some other hard object) and five questions on psychologically aggressive practices (1) yell or scream at child, 2) threaten to hit, 3) swear at child, 4) call child names like idiot, stupid, dummy, and 5) threaten to send child away). Parents were asked to report on the past two weeks and questions were answered on a six-point scale: 0= no, 1= less than once a week, 2=once a week, 3= two- three times a week 4= four- six times a week, 5= every day and 6=more than once a day. The internal reliability of the scale (Cronbach α) was 0.69 and test–retest reliability over 2 weeks (Intraclass correlation coefficient (ICC)) was 0.88 (n=20).

2.3.1.2. Parent involvement with their child was measured using a questionnaire adapted from one previously used in Jamaica (Baker-Henningham & Francis, 2018). The questionnaire consisted of 12 questions (1) reading storybooks, 2) helping with homework, 3) playing games inside the home, 4) play outside with child, 5) play with toys, 6) sit with child as they write, colour or draw, 7) talking with child about school and/or friends, 8) involve child in chores, 9) chat with child during bath time or getting dressed, 10) teach child household rules, 11) praise child, and 12) spend 10-15 minutes or more doing something fun with the child. Parents reported on activities in the past two weeks and answered on a six-point scale: 0= no, 1= less than once a week, 2=once a week, 3= two- three times a week 4= four- six times a week, 5= every day and 6=more than once a day. The scale had an internal reliability (Cronbach α) of 0.71 and test–retest reliability over 2 weeks (ICC) of 0.96 (n=20).

2.3.2. *Secondary Outcomes*

Secondary outcomes included child behavior difficulties and prosocial skills at home and at school and child school readiness by direct testing.

2.3.2.1. *Child behavior difficulties*: Child behavior difficulties at home was measured by parent report using the Eyberg Child Behavior Inventory (ECBI) intensity scale (Eyberg & Ross, 1978) (Cronbach $\alpha=0.84$, test–retest reliability over 2 weeks: ICC=0.99 (n=20)).

Behavior difficulties at school were measured by teacher report using the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1999) (Cronbach $\alpha=0.85$, test–retest reliability over 2 weeks: ICC= 0.80 (n=20)).

2.3.2.2. *Child pro-social skills* were measured by parent and teacher report using the SDQ prosocial subscale. Psychometric properties were moderate for parent-reported prosocial skills (Cronbach $\alpha=0.57$, test–retest reliability over 2 weeks: ICC= 0.70 (n=20)), and good for teacher-reported prosocial skills (Cronbach $\alpha= 0.81$, test-retest reliability over two weeks: ICC= 0.78 (n=20)).

2.3.2.3. *Child school readiness* was measured by direct testing using the Bracken School Readiness Assessment (BSRA-3) (Bracken, 2007) and six subscales from the Daberon Screening for School Readiness (Daberon-2) (Danzzer, 1991). The BSRA-3 consists of five subscales including: colours, letters, numbers, size/comparisons and shapes. The Daberon-2 consists of ten subscales. The subscales used in this study were: body parts, ordinal numbers, prepositions, following directions, general knowledge and categorization. We omitted four subscales: colours, numbers, plurals and drawing to reduce overlap with the BSRA-3 and to prevent the test being too long for these young children. Test retest over 2-weeks was ICC=0.96 for the BSRA-3 and ICC=0.95 for the six subscales used from the Daberon-2 (n=30). A total school readiness score was calculated for each child by summing the scores for all eleven subscales from the BSRA-3 and Daberon-2.

2.4. Sample Size

The study was a pilot study of a new intervention and as such it was conducted on a small scale. The study was powered to detect a change of 0.5 SD in parenting practices (parents' use of violence against children and parent involvement with child). For the sample size calculation, we used Tukey's method of correction (Braun, 1994), to correct for the two primary outcomes, thus requiring a significance level of 0.036 to keep a family wise error rate of 0.05. In a parallel trial design, 72 parents in each group are sufficient to detect an effect size of 0.5 SD with 81% power at 0.036 level of significance. To take into account the cluster design, assuming an intraclass correlation (ICC) of 0.04, and with a cluster size twelve (twelve parents/preschool), the design effect is 1.44 ($1 + (\text{cluster size} - 1) \times \text{ICC}$) giving a required sample size of 104 parents per group (72×1.44). Assuming the same ICC for the secondary outcomes of child behavior difficulties and pro-social behavior at school and at home and child school readiness we could also detect a difference of 0.5 SD with 81% power at the 0.05 significance level.

2.5. Quality Control of Measurements

All outcome measurements were collected by two female data collectors who were rotated across preschools. Data collectors were trained to conduct teacher and parent interviews over two weeks in September 2018, one week in the office followed by one week in the field. Inter-rater reliabilities were calculated, using intraclass correlation coefficients (ICC), after initial training and on a minimum of 5% of all measures during the study and an ICC >0.99 was maintained at both time points. Data collectors received a further two weeks training in how to conduct the school readiness tests in April 2019: one week in office, and one week in the field. Interrater reliabilities after initial training and on a minimum of 10% of all tests were maintained at ICC >0.95.

2.6. Intervention

The intervention involved training parents of pre-school children in the Irie Homes Toolbox, a universal violence prevention program (Francis & Baker-Henningham, 2020). The Irie Homes Toolbox was delivered at the child's preschool through ninety-minute sessions, held once a week, for eight weeks with groups of six parents. The Toolbox includes content on promoting positive child behaviors, preventing and managing child misbehaviors, managing emotions, and supporting children's schoolwork. Further details of the intervention are given in **Box 1**. At the end of each session, parents were given a small snack (a boxed drink and a sweet roll) and US\$0.75 in mobile phone credit. The total cost of these incentives was US\$2.50 per session for each participating parent. Parents allocated to the control condition did not receive the training. Preschools allocated to the control group were offered training in the Irie Homes Toolbox at the end of the intervention (August 2019). We provided a full kit of the resources required to conduct the parent training sessions to all participating preschools (intervention and control) and provided field supervision for eight preschools (five from the intervention group and three from the control group) who opted to implement the program in the September-December 2019 school term.

2.7. Statistical Analysis

All analyses were prespecified. Continuous outcome variables were assessed for normality. Normality was rejected for parents' use of violence, teacher-reported child behavior difficulties and parent-reported child prosocial skills. Parents' use of violence against children and teacher-reported child behavior difficulties were normalized by square root transformation and parents' report of child prosocial behavior was normalized by squaring. Multilevel linear multiple regression analysis was used to examine the effect of the intervention on parent and child outcomes to take into account the clustering of the data

where the outcomes are observed at level one (parents/children) and the interventions is delivered at level two (preschool). For all dependent variables, child age, child sex, baseline scores (where available), interviewer/tester, intervention group and any variables significantly different between the groups at baseline were entered into the model as fixed effects and preschool was entered as a random effect. The p-values for the two primary outcomes were adjusted using Holms step-down procedure to control for multiple hypothesis testing. Effect sizes were calculated by dividing the regression coefficient by the standard deviation of the control group at post-intervention for each independent variable. We conducted sensitivity analyses by repeating the above analyses using baseline scores for missing data for the parents lost at post-test.

To examine whether the effectiveness of the intervention varied by initial risk, we repeated the above multilevel linear regression analyses with the addition of an interaction term (baseline score x study group) for each outcome measure (except for school readiness for which there was no baseline score).

To examine the relationship between session attendance and the primary outcomes, we created seven dummy variables to represent parents who had attended one, two, three, four, five, six or seven sessions. We conducted separate multilevel regression analyses for each dummy variable on the dependent variables of parents' use of violence against their child and parent involvement using the full sample. The models included child age and sex, baseline score, interviewer, the relevant dummy variable and any variables significantly different between the groups at baseline as fixed effects and preschool as a random effect.

Multilevel analyses were conducted using MLWin (v 3.04) (Rasbash, Charlton, Browne, Healy, & Cameron, 2009). For all multilevel linear regression analyses, we used the restricted maximum likelihood (REML) estimator, (available in MLWin) to take into account the small number of clusters (Elff, Heisig, Schaeffer, & Shikano, 2020).

Finally, we examined the variables associated with parent attendance in the parenting sessions. Using data from the intervention group only, a Poisson multilevel regression analysis was conducted with number of sessions attended as the dependent variable. The independent variables were child age and sex, parent age, father figure present, parent completed high school, parent works, number of household possessions, household crowding, household sanitation, and baseline scores for parent' use of violence, parent involvement with their child, and parent- and teacher-reported child behavior difficulties and prosocial skills at baseline as fixed effects and preschool as a random effect.

3. RESULTS

3.1. Sample characteristics

Sample characteristics are shown in **Table 1**. There were no significant differences in caregiver and child characteristics between the groups. Children had a mean age of four years and 64 children (28.7%) were in the clinical range for conduct problems by parent report. A total of five parent/child dyads were lost to follow-up, all from the control group. Two parents had moved out of the parish, one parent died, one parent migrated and one parent declined to be interviewed. There were no statistically significant differences between those lost and those found on any child and caregiver characteristics or on any of the baseline outcome measures.

3.2. Baseline equivalence

Raw scores for the primary and secondary outcomes at baseline and post-test for both study groups are shown in **Table 2**. There were no significant difference between the groups at baseline on the primary outcomes of parents' use of violence and parent involvement. There was a significant difference in parent-reported child behavior difficulties ($p=0.002$) and

children of parents allocated to the intervention group had higher level of behavior problems than children in the control group. We therefore controlled for baseline child behavior difficulties in all analyses. There was no significant difference between the groups on the other secondary outcome measures at baseline.

3.3. Intervention Uptake

Parents recruited to participate in the intervention attended a mean (SD) of 5.5 (2.6) out of eight session giving a 68.8% attendance rate. Nine parents (7.8%) attended zero sessions. The number of sessions attended by parents who attended at least one session was mean (SD) 5.9 (2.1), an attendance rate of 73.8%. We documented reasons for parent non-attendance and 78% of absences were rated as due to factors such as sickness of parent or child, clinic/medical appointment, gaining new employment and being called into work unexpectedly. We examined whether parent attendance was independently associated with caregiver and child characteristics and baseline values of parent- and teacher-reported outcome measures. In multi-level Poisson regression analysis, independent predictors of parent attendance were: high school complete (regression coefficient (B) =1.16, 95% confidence interval (CI): 0.27, 2.05, $p=0.01$), father figure present (B=1.56, 95% CI: 0.28, 2.84, $p=0.02$), and good sanitation (B=1.79, 95% CI: 0.56, 3.02, $p=0.004$).

3.4. Effect of Intervention

Significant benefits of the intervention were found for parent's use of violence (ES=-0.29), and parent's involvement with their child (ES=0.30) (**Table 3**). For the secondary outcomes, no significant benefits of the intervention were found for parent-reported child behavior problems (ES=-0.06) and prosocial behavior (ES=-0.21), teacher-reported child behavior difficulties (ES=-0.16) and prosocial behavior (ES=0.02) and child school readiness (ES=-

0.06). There was a dose-response relationship between parent attendance and parent's use of violence with increased reductions in violence as the number of sessions attended increased (**Table 4**). No dose-response was observed between session attendance and parent involvement with their child (**Table 4**).

Although there was no main effect for child behavior problems, there was a significant interaction between parent-reported behavior problems at baseline and intervention group ($p=0.002$). We examined the effect of the intervention for children at or above the 50th percentile at baseline (ECBI score ≥ 115 , $n=66$ intervention, $n=47$ control). In this subsample, intervention children scored a mean (SD) on the ECBI of 138.42 (15.81) at baseline and 127.76 (19.73) at post-test. Children in the control group scored a mean (SD) of 132.89 (13.42) at baseline and 131.60 (20.48) at post-test. In multilevel regression analysis controlling for child age and sex, baseline score, and interviewer as fixed effects and school as a random effect, a significant reduction in child behavior problems was found for children with scores at or above the 50th percentile (ES= -0.36, 95% CI: -0.68, -0.03, $p=0.031$).

Interactions between intervention group and parents' use of violence, and parent involvement, parent-reported prosocial skills and teacher-reported behavior difficulties and prosocial skills were not significant.

In the sensitivity analyses, using baseline scores for missing values at post-test for the five parent/child dyads lost at post-test, the magnitude and statistical significance of the effects of the intervention were similar to the main analyses.

4. DISCUSSION

Parents of preschool children who participated in The Irie Homes Toolbox parenting program reported reduced use of violence against their child (ES=-0.29 SD) and increased involvement with their child in everyday activities (ES=0.30 SD). There was a dose-response

relationship between the number of sessions attended and reduction in parents' use of violence with parents attending more sessions benefiting more from the program. No benefits were found for child behavior difficulties and prosocial behavior at home and at school or to child school readiness. However, the effect of the parent-training program on child behavior difficulties at home was moderated by initial behavior problems with significant benefits for children at or above the 50th percentile for behavior difficulties at baseline ($ES=-0.36$ SD). These benefits to parenting practices and child behavior from this relatively brief and low-cost program are encouraging. Although the program was implemented as a universal intervention, 29% of children recruited into the study were in the clinical range for conduct problems by parent report, suggesting that the sample may have been at slightly heightened risk. However, this is similar to the 21% prevalence of child conduct problems by teacher report found in a previous study in inner-city Jamaican preschools (Baker-Henningham, Scott, Jones, & Walker, 2012; Baker-Henningham, 2018).

The magnitude of the benefits to parenting behavior in this study were comparable to other parenting programs targeting violence prevention. For example, in a meta-analysis of parenting interventions to prevent child maltreatment, the mean effect size for reductions in parents' use of violence was -0.20 SD and the mean effect size for benefits to positive parenting behaviors was 0.34 SD (Chen & Chan, 2015). In another meta-analysis, the effect size for reductions in parents' use of violence from preventative child maltreatment interventions was -0.26 SD (van der Put, Assink, Gubbels, & Boekhout van Solinge, 2017). There are few rigorous trials of early childhood, violence prevention, parenting programs in LMIC. The most rigorous trials include: 1) a randomized control trial (RCT) in South Africa, with parents of children aged 2-7 years with clinical levels of conduct problems and involving twelve three-hour sessions plus an introductory home visit (Ward et al., 2019), 2) a RCT in Liberia, in a rural, post-conflict setting with parents of children aged 3-7 years

delivered through ten two-hour group sessions and one home visit (Puffer et al., 2015), 3) a RCT in Lebanon, with refugee and marginalised communities targeting parents of children aged 2-7 years and delivered through twenty-five group sessions and home visits (Ponguta et al., 2020) and 4) a cluster RCT in Chile, offered as a universal intervention in preschools with parents of children aged 3-6 years and delivered through six two-hour group sessions (Rincon et al., 2018). Results from these studies are mixed but all report benefits to parents' use of violence and/or to positive parenting practices indicating that parenting interventions can lead to benefits across contexts. However, differences in the target populations and the duration of intervention make detailed comparisons across studies difficult. This study of the Irie Homes Toolbox has most similarity to the study conducted in Chile. The target group (low risk), setting (preschool) and duration of intervention (twelve hours) were similar and comparable outcomes were measured. The results from the Chilean study were also similar to those reported here with small effect sizes for use of harsh physical punishment ($ES=-0.37$ SD) and parental involvement ($ES=0.23$ SD) (Rincon et al., 2018).

The attendance rate of parents assigned to the intervention group was 68.8%, rising to 73.8% for parents who attended at least one session. Parent-reported reasons for absence were largely due to work and family commitments and ill health and this has also been reported in previous studies (Martins et al., 2020). Parent attendance was not predicted by baseline measures of parent and child behavior indicating that the program was acceptable to all parents, regardless of initial risk in terms of parents' use of violence and child behavior difficulties. However, parent education, household sanitation and presence of a father figure were independently associated with session attendance, suggesting that more disadvantaged parents faced more barriers to attendance. Meta-analyses and systematic reviews of predictors of parent attendance in behavioral parenting programs give mixed results (Chacko et al., 2016; Finan, Swierzbiolek, Priest, Warren, & Yap, 2018; Reyno & McGrath, 2006);

however, single parent household, low education, and low income were associated with small effects on dropout in one meta-analysis (Reyno & McGrath, 2006).

We found a dose-response relationship between the number of parenting sessions attended and the reductions in parent's use of violence against their child with an effect size of -0.42 SD for parents that attended a minimum of four out of the eight sessions and an effect size of -0.64 SD for parents who attended at least seven sessions. This result may indicate that greater benefits are possible from the intervention if measures are put in place to ensure parents are able to participate in the full program. For example, providing catch-up sessions and/or extending the length of the intervention to accommodate parents who are unavoidably absent could lead to enhanced benefits. However, these results of increased benefits with increased attendance do need to be interpreted with caution and experimental manipulation of dosage would be required to identify the optimum duration of the program. We found no relationship between dosage and parent involvement with their child. Few studies have reported on the relationship between parent participation and parenting behaviors and the results are mixed. In a study in Head Start in the US, the number of sessions attended by parents was associated with improvements in negative and positive parenting practices (Hulburt, Nguyen, Reid, Webster-Stratton, & Zhang, 2013), while in a study with disadvantaged and ethnic minority families in the Netherlands there was no relationship between session attendance and parenting behavior (Leijten, Raaijmakers, Orobio de Castro, van den Ban, & Matthys, 2015).

We found no direct benefits to child behavior difficulties, pro-social skills or school readiness. In the theory of change for the Irie Homes Toolbox, parent participation in the program leads to changes in parents' behavior including increased positive and reduced negative parenting practices. These changes in parenting behavior in turn lead to changes in child outcomes (Francis & Baker-Henningham, 2020). Child behavior was measured

immediately after the end of the intervention and school readiness was measured in the summer term of the same school year. It may be that benefits to child outcome may accrue over time if parents continue to use the strategies taught through the program. In addition, evidence from meta-analyses shows that children with higher levels of initial behavior problems benefit more from parenting interventions (Leijten et al., 2020; Menting, Orobio de Castro, & Matthys, 2013). In this study, the intervention was not targeted at children or parents deemed to be at higher risk which may explain the lack of a main effect to child behavior difficulties. Benefits to parent-reported child behavior difficulties were found for children with behavior difficulties at or above the 50th percentile, with an effect size of -0.36 SD, indicating that children at elevated risk for conduct problems benefited from the intervention.

There are several strengths to the study. The preschools were randomized to intervention and control and there was low attrition with 97.5% of the sample followed up. Randomization led to reasonably well-balanced groups - the only significant difference between the groups was for parent-reported child behavior difficulties and this was controlled for in the analyses. Psychometric properties of the outcome measures were good, except for parent-reported prosocial behaviors which had moderate internal reliability. All measures were administered by data collectors masked to study design, hypothesis and group allocation; however it is possible that parents may have discussed aspects of the training program during the interview. The study has some limitations. We did not have the resources to include independent observations of parent and child behavior and parenting behavior was measured through parent report only, while child behavior at home and at school was measured through parent and teacher-report. This may have resulted in reporting bias due to social desirability. However, in studies of child maltreatment, parent report is the most commonly used outcome measure (Chen & Chan, 2015). Observational measures are not

suitable when events are relatively rare and official reports of child maltreatment are not appropriate for preventative intervention and in contexts where reporting is uncommon and inconsistent. Although preschools were randomized after recruitment, parents were recruited and baseline measures collected after randomization. Children in the intervention group had higher parent-reported behavior difficulties than children in the control group. As parents were recruited after randomization and preschool staff were aware of their preschools' group allocation, it may be that teachers in intervention preschools steered parents who they perceived needed the program more to participate in the study, leading to a higher risk sample in the intervention group. Another limitation is that the parents included in the sample were those interested and available to participate, and although no parents refused participation at the point of recruitment by the research team, we were unable to collect data on the number of parents approached by teachers and principals. Hence the sample is not representative of the wider population. In this study, as this was a preliminary test of a new program, the intervention was delivered by the research team to investigate if the program was effective when implemented with fidelity. In future studies, it is important to investigate the extent to which fidelity is maintained and the intervention is effective when the intervention is delivered by preschool teachers.

The Irie Homes Toolbox was designed to be integrated into the services provided by community preschools in Jamaica and delivered by existing staff. It requires no specialist equipment and is relatively brief, (eight, ninety-minute sessions), so that it can be delivered to groups of parents within one school term. As the intervention is conducted at school, there is also no need for childcare or transportation services. The program capitalises on the easy availability of the children as parents are given the opportunity to practice the newly introduced child-led play or book activity with their child for ten to fifteen minutes during each session. For most of the session, the children are in the classroom and the activities are

conducted with the parents alone. The Irie Homes Toolbox has also been designed to be suitable for delivery by paraprofessionals and hence differs from many parenting programs developed in high-income countries that require high levels of facilitator skill. The Irie Homes Toolbox is a complementary program to the teacher-training program, the Irie Classroom Toolbox. The ultimate aim is for preschool teachers, who have been trained in the Irie Classroom Toolbox, and who are using positive discipline strategies on a daily basis with children in their classroom, to deliver the program to parents. These features of the program should facilitate its use at scale.

Conclusion

Training Jamaican parents in the Irie Homes Toolbox led to a reduction in parents' use of violence against their child and an increase in parent involvement with their child. The intervention also led to a reduction in child behavior difficulties for children with heightened levels of initial behavior problems. The Irie Homes Toolbox shows promise as a universal violence prevention program designed for implementation within the existing early childhood education system in Jamaica. Further research is needed to investigate the effectiveness of the program with a larger, more generalizable sample and to examine its integration into the early childhood education network.

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Conflict of Interest: The Irie Homes Toolbox is available under a Creative Commons Attribution-NonCommercial-ShareAlike license.

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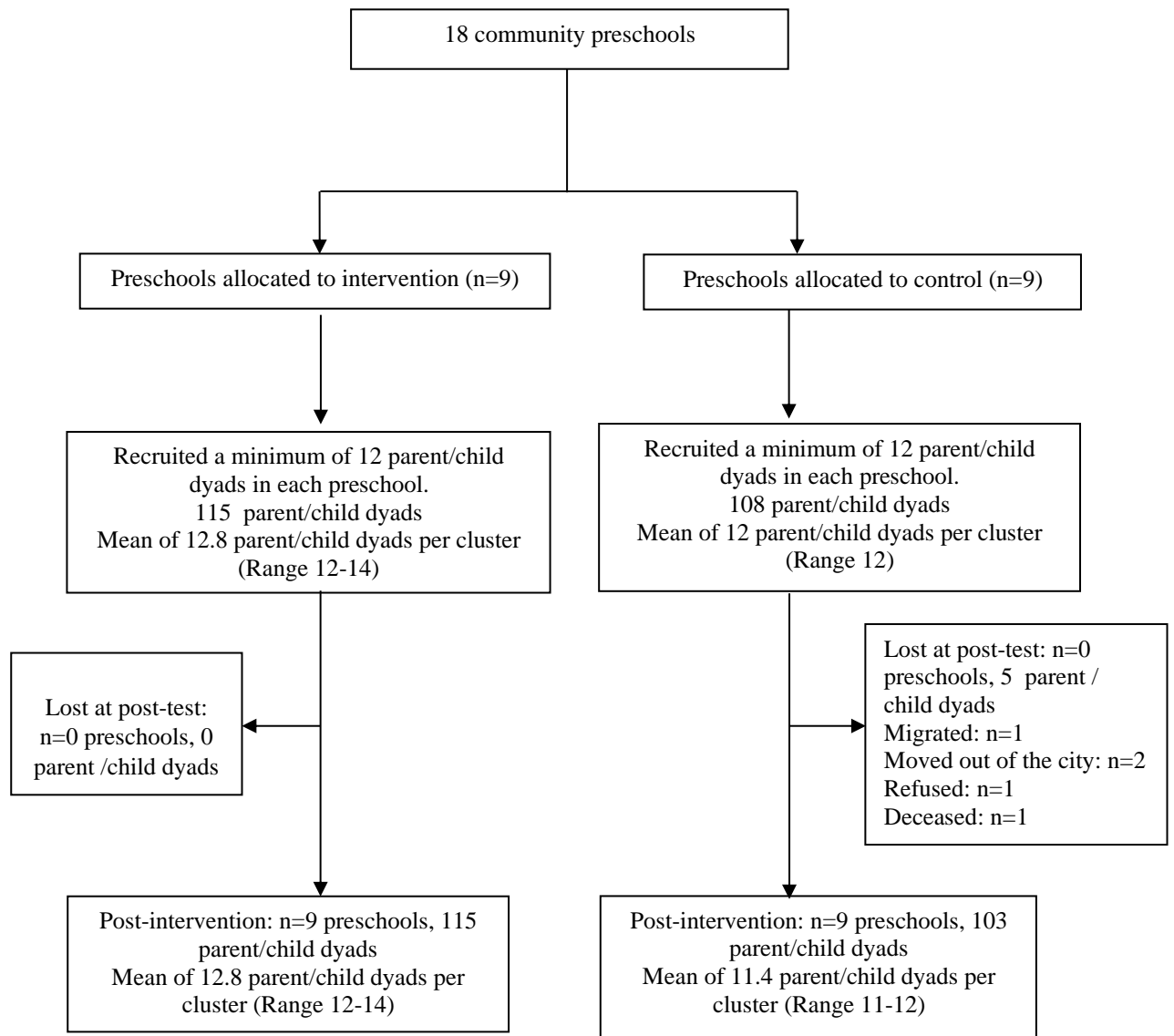
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Figure 1. Trial Profile



Box 1. Description of the Irie Homes Toolbox

Content: The Irie Homes Toolbox consists of five modules: 1) promoting positive behavior (e.g. praise, involving child in everyday activities, modelling appropriate behavior, labelling children's emotions, child-led play, and picture book-reading, 2) preventing misbehavior (e.g. giving clear instructions, understanding why children misbehave, giving children independence and choice, and teaching children skills), 3) understanding emotions (e.g. regulating own emotions, labelling child's emotions), 4) managing misbehavior (e.g. redirecting children's attention and behavior, withdrawing attention, chillax (time-out), and giving appropriate consequences), and 5) supporting homework.

Materials: Intervention materials for facilitators include: 1) a scripted training manual, 2) visual aids (e.g. pictures of parents and children engaged in everyday activities, pictures of parents using the strategies taught and pictures of child misbehaviors), 3) hand-held charts with key points of the concepts introduced, and 4) the Irie Tower: a tower made of cardboard blocks labelled with the strategies introduced to act as a concrete representation of the program. Intervention materials for parents include: 1) a take home card after each session with a summary of the main points covered in the session, how to use the strategies, and why it is important, 2) an Irie Activity Planner, a homework assignment record sheet, given at the end of each session, 3) selected toys (e.g. wooden blocks, toy animal, toy car, pretend play kit) and picture books: one toy or book is given to the parent after each session to use during child-led play at home (Irie Time), and 5) an Irie Parent Oath that parents sign on completion of the program. Each of the nine preschools implementing the intervention received a facilitator kit of reusable resources (i.e. manuals, visual aids, charts, storage container) that cost US\$180 per kit. The cost of all parent materials (e.g. toys, books, homework record sheets, take-home cards) was US\$20 per parent.

Procedures: Parents are introduced to the content via demonstrations, role-plays and group discussions. Facilitators use visual aids to prompt discussions, and charts with main points for reinforcement. In addition, parents practice the strategies in pairs within the group and practice the child-led play activity for 10-15 minutes with their child, guided and supported by the facilitator. Home assignments are given to encourage the use of the strategies at home and parents record their progress with the homework assignment on a record sheet. There is a strong focus on providing positive, supportive feedback to parents,

making the sessions fun, and collaborative problem-solving. Each session includes the following activities: 1) a game or song, 2) feedback from the previous session and discussion of homework assignment, 3) new topic: demonstration, discussion, and practice, 4) introduction of a child-led play or book activity, 5) practicing the child-led play or book activity with their child, and 6) review and allocating homework assignment.

Who provided: Two female research staff delivered the intervention and the sessions were co-facilitated by a teacher from each intervention preschool. Both facilitators have experience in training teachers in the Irie Classroom Toolbox. Initials (anonymized) (first author) delivered the intervention in five schools and a female research assistant delivered the intervention in four schools. Initials (anonymized) trained and supervised the other facilitator, and held weekly meetings to review the new session to be delivered in the upcoming week, and to discuss the progress of the parents and resolve any problems. Initials (anonymized) also provided field supervision by attending one parenting session conducted by the second facilitator every week. Both facilitators were trained and supported by initials (anonymized).

Where: The parent training sessions were held on the preschool compound, usually in the school yard.

When and How Much: The parenting sessions were held either in the mornings when parents came to drop off their children or in the afternoons when they came to pick up their children depending on parent and teacher availability. The sessions were held once a week, for eight weeks, and each session lasted approximately ninety minutes.

Fidelity: The facilitators delivered the intervention as intended and all of the prescribed content was covered. Prior to the start of the intervention teachers were trained to co-facilitate sessions in two full day workshops. Teacher attendance was 87.5% over the two days. The mean number sessions attended by parents was 5.5 (SD 2.6) out of eight sessions and the median number of sessions was six. Nine parents (7.8%) did not attend any sessions, ninety-one (79.0%) attended four or more sessions, seventy-one (61.7%) attended six or more sessions, and thirty-three (28.7%) attended all the sessions. Teachers co-facilitated a mean of 10.6 (SD 2.9) out of a possible sixteen sessions over the two rounds of implementation.

Table 1. Child and Caregiver Characteristics by Study Group

	Intervention (n= 115)	Control (n= 108)	p value
Child characteristics			
Age (in years) mean (SD)	4.05 (1.04)	4.03 (0.96)	0.51
Number (% boys)	60 (52.2)	53 (49.1)	0.64
Clinical range for conduct problems by parent report n (%) ¹	39 (33.9)	25 (23.1)	0.08
Caregiver characteristics			
Age (in years) mean (SD)	31.32 (10.00)	32.47 (8.47)	0.61
Caregiver type n (%)			0.12
Mother	104 (90.4)	91 (84.3)	
Father	2 (1.7)	8 (7.4)	
Other	9 (7.8)	9 (8.3)	
High school completed n (%)	66 (57.4)	58 (53.7)	0.58
Currently employed n (%)	62 (53.9)	67 (62)	0.22
Mother lives with child n (%)	107 (93.0)	96 (88.9)	0.28
Father present n (%)			0.41
Lives with child	37 (32.2)	44 (40.7)	
Sees once per week	32 (27.8)	31 (28.7)	
Sees rarely	32 (27.8)	25 (23.1)	
Not present	14 (12.2)	8 (7.4)	
Possessions mean (SD) ²	9.10 (2.70)	9.53 (2.71)	0.24
Sanitation n (%) ³			0.43
Good	76 (66.1)	65 (60.2)	
Medium	21 (18.3)	29 (26.7)	
Poor	18 (15.7)	14 (13.0)	
Crowding median (range) ⁴	1.33 (0-5)	1.50 (0-8)	0.64

¹Above cut-off (>130) on Eyberg Child Behavior Inventory (ECBI) intensity scale. ²Number of possessions from a list of 16 items: Gas or electric stove, refrigerator, washing machine, living room set, cellular/telephone, radio, CD player, television, cable TV, CD or DVD player, internet, computer/laptop, tablet, adult bicycle, motor bike and motor car. ³Water supply and toilet. ⁴Number of people per room.

Table 2. Raw Scores of Parent and Child Outcomes at Pre and Post Intervention of the Irie Homes Toolbox by Intervention Group^{1,2}

	Baseline		Post-test	
	Intervention n=115	Control n=108	Intervention n=115	Control n=103 ²
Parents' use of violence (median, range) ³	14.00 (3-48)	13.00 (2-40)	11.00 (0-36)	13.00 (2-38)
Parent involvement ⁴	40.85 (9.35)	39.67 (10.07)	41.86 (10.96)	38.10 (10.83)
Child behavior difficulties by parent report ⁵	120.93 (25.09)	110.77 (23.88)	116.45 (23.15)	110.55 (26.43)
Child pro-social skills by parent report (median, range) ⁶	8.00 (1-10)	8.00 (2-10)	8.00 (1-10)	9.00 (4-10)
Child behavior difficulties by teacher report (median, range) ⁷	11.00 (0-30)	10.00 (0-28)	10.00 (0-29)	9.50 (0-29)
Child pro-social skills by teacher report ⁶	5.98 (2.230)	6.56 (2.39)	6.60 (2.32)	6.93 (2.30)
School readiness ⁸	-	-	72.87 (31.24)	74.79 (34.14)

¹Values are mean (SD) unless stated otherwise. ²n=108 for teacher-reported outcomes. ³Parents' use of violence: min =0, max= 84. ⁴Parent Involvement: min=0, max= 72.

⁵Eyberg Child Behavior Inventory-intensity scale: min= 36, max=252. ⁶Strengths and Difficulties Questionnaire-Pro-social subscale: min = 0, max =10. ⁷Strengths and Difficulties Questionnaire-Behavior Difficulties: min = 0, max = 40. ⁸School readiness = Bracken School Readiness Assessment + 6 subscales from the Daberon Screening for School Readiness: n=212 (110 intervention, 102 control)

Table 3. Effect of Intervention on Primary and Secondary Outcomes^{1,2}

Measure	Regression coefficient B (95% CI)	ICC ³	Effect Size ⁴ (95% CI)	p- Value
Primary Outcomes				
Parents' use of violence ⁵	-0.29 (-0.52, -0.05)	0.02	-0.29 (-0.52, -0.05)	0.04 ⁶
Parents' Involvement	3.25 (0.29, 6.21)	0.07	0.30 (0.03, 0.57)	0.04 ⁶
Secondary Outcomes				
Parent-reported child behavior difficulties	-1.57 (-6.02, 2.87)	0.00	-0.06 (-0.23, 0.11)	0.49
Parent-reported child pro-social skills ⁷	-5.86 (-11.77, 0.05)	0.00	-0.21 (-0.43, 0.00)	0.08
Teacher-reported child behavior difficulties ⁵	-0.15 (-0.41, 0.10)	0.07	-0.15 (-0.42, 0.11)	0.24
Teacher-reported child pro-social skills	0.05 (-0.58, 0.67)	0.05	0.02 (-0.25, 0.29)	0.89
School readiness ⁸	-1.88 (-10.18, 6.43)	0.10	-0.06 (-0.30, 0.19)	0.66

¹Analyses adjusting for child age and sex, interviewer/ tester, baseline scores (where available), and parent-reported child behavior difficulties at baseline as fixed effects and school as random effects. ²Intervention group= 1, control =0. ³Intra-cluster correlation coefficient. ⁴Effect size is the regression coefficient divided by the standard deviation of the control group at post-test. ⁵Transformed using square root transformation, ⁶P-values for primary outcomes were adjusted for multiple outcomes using Holms step-down procedure. ⁷Transformed by squaring. ⁸Measured at post-test only.

Table 4. Dose-Response Effect of Intervention on Primary Outcomes^{1,2}

Attendance	Parents' use of violence		Parent involvement	
	Effect Size (95% CI)	p-value	Effect Size (95% CI)	p-Value
7 or more sessions	-0.64 (-0.88, -0.40)	<0.0001	0.33 (0.08, 0.59)	0.01
6 or more sessions	-0.50 (-0.73, -0.28)	<0.0001	0.27 (0.03, 0.51)	0.03
5 or more sessions	-0.48 (-0.71, -0.25)	<0.0001	0.32 (0.08, 0.55)	0.01
4 or more sessions	-0.42 (-0.64, -0.19)	<0.0001	0.33 (0.09, 0.57)	0.01
3 or more sessions	-0.42 (-0.64, -0.19)	<0.0001	0.32 (0.08, 0.56)	0.0
2 or more sessions	-0.33 (-0.56, -0.11)	0.004	0.26 (0.02, 0.51)	0.04
1 or more sessions	-0.30 (-0.53, -0.07)	0.01	0.26 (0.01, 0.52)	0.04

¹Analyses adjusting for child age and sex, interviewer/ tester, baseline scores, and parent-reported child behavior difficulties at baseline as fixed effects and school as random effects. ²Attended X sessions or more= 1, attended < X sessions =0.