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Annals of the New York Academy of Sciences

DOI:

[10.1111/nyas.13713](https://doi.org/10.1111/nyas.13713)

Published: 23/05/2018

Publisher's PDF, also known as Version of record

[Cyswllt i'r cyhoeddiad / Link to publication](#)

Dyfyniad o'r fersiwn a gyhoeddwyd / Citation for published version (APA):

Baker-Henningham, H. (2018). The Irie Classroom Toolbox: Developing a violence-prevention, preschool teacher-training program using evidence, theory and practice. *Annals of the New York Academy of Sciences*, 1419(1), 179-200. <https://doi.org/10.1111/nyas.13713>

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ANNALS OF THE NEW YORK ACADEMY OF SCIENCES

Special Issue: *Implementation Research and Practice for Early Childhood Development*

ORIGINAL ARTICLE

The Irie Classroom Toolbox: developing a violence prevention, preschool teacher training program using evidence, theory, and practice

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In this paper, I describe the development of the Irie Classroom Toolbox, a school-based violence prevention, teacher training program for use with children aged 3–6 years. In-depth interviews were conducted with Jamaican preschool teachers, who had participated in a trial of a classroom behavior management program, at posttest ($n = 35$) and 5 years later ($n = 20$). An on-going process evaluation was also conducted. Teachers' preferred behavior management strategies and training methods were documented, and enablers and barriers to implementation were identified. Teachers were most likely to adopt strategies that they liked, found easy to use, and were effective. These included paying attention to positive behavior and explicitly teaching children the expected behavior. Teachers preferred active, hands-on training strategies based on social-cognitive theories. Enablers to intervention implementation included positive teacher-facilitator relationships, choice, collaborative problem solving, teachers recognizing benefits of the intervention, group support, and provision of materials. Barriers to intervention implementation were also identified. These data were integrated with behavior change theory (i.e., the behavior change wheel and theoretical domains framework) to develop an intervention grounded in common core elements of evidence-based programs while also utilizing teachers' perspectives. The resulting program is a low cost, adaptable intervention that should be suitable for training preschool teachers in other low-resource settings.

Keywords: teacher training; preschool; low- and middle-income countries; intervention development; behavior change

Introduction

Early childhood is a particularly sensitive period as experiences in early childhood have long-term effects on brain function, cognition, and psychosocial functioning. A safe (free from physical and psychological harm), secure (consistent and predictable), and nurturing (sensitive and responsive) early childhood caregiving environment promotes child physical and mental health over the long term.¹ Training young children's caregivers in appropriate child behavior management strategies and in how to provide a secure and nurturing environment can reduce harsh caregiving and reduce violence against children.² There are a number of recent studies of violence prevention

programs implemented with parents of young children in low- and middle-income countries.^{3,4} However, less focus has been given to school-based violence prevention programs in low- and middle-income countries (LMICs), especially in the early childhood years.⁵ Evidence from high-income countries indicates that universal, school-based violence prevention programs implemented in the early primary grades, lead to significant reductions in children's aggressive and disruptive behavior and increases in child competencies with benefits sustained into adolescence and adulthood.^{6–9} In LMIC settings, school-based violence prevention programs have the potential to reduce the use of harsh punishment practices by teachers, including the use of corporal punishment.^{5,10,11}

doi: 10.1111/nyas.13713

Ann. N.Y. Acad. Sci. 1419 (2018) 179–200 © 2018 The Authors. *Annals of the New York Academy of Sciences* published by Wiley Periodicals, Inc. on behalf of The New York Academy of Sciences.

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The Jamaican context

Violence prevention is a leading public health problem in Jamaica and the wider Caribbean.¹² Integrating violence prevention programming into the Jamaican preschool network is an important component of the primary prevention of violence for several reasons. First, there is near universal enrolment of children aged 3–6 years in preschool education. Second, there is a prevalence of 12% of children aged 5–6 years with externalizing disorders and these children do not access appropriate services.¹³ Third, preschool classrooms have significant numbers of children with behavior problems; in a study in 24 inner-city schools, 364 of 1733 children (21%) had four or more symptoms of conduct problems as reported by teacher.¹⁴ Furthermore, three children in each class with highest levels of conduct problems were observed to display a median of 12 aggressive/destructive acts per hour indicating that these preschool classrooms are characterized by high levels of aggression. Finally, corporal punishment is widely used in preschools, despite the fact that it is banned by law.¹⁵

School-based violence prevention programs

School-based violence prevention programs developed in high-income countries include programs that make changes to the environmental context, train teachers in classroom behavior management, teach social and emotional skills to children using a specific curriculum, and train parents in appropriate child management skills.^{16–20} Comprehensive programs, such as the Seattle Social Development Project use a combination of training programs.^{21,22} Although packaged violence prevention programs are available, the costs of these programs include initial purchase, on-going training, and materials and are prohibitively high for use in wide scale dissemination in LMICs. In addition, the programs can be complex to deliver and have not been developed to match the context in early childhood classrooms in LMICs. These classrooms are often characterized by large class sizes, high child/staff ratios, few resources, and paraprofessional staff. We found that making substantial adaptations to the Incredible Years Teacher Training Program (IY-TT) led to benefits to teachers' behavior that were of a similar magnitude to those produced using a minimally adapted version that required significantly more on-going support and supervision for teachers.¹¹

The finding that substantial adaptations resulted in a more efficient intervention program, combined with the growing call for freely available programs,²³ indicated a need for program developed specifically for use in low-resource contexts. Available programs share many common core elements including core content and the use of behavioral/social learning and social cognitive theory. Hence, a more scalable and sustainable approach may be to transport evidence-based principles used in a range of effective programs rather than evidence-based programs. McLoed *et al.* identified common practice elements to improve children's social-emotional competence and behavior in early childhood classrooms.²⁴ Fourteen items were rated as essential (choices, emotion regulation, error correction, ignoring, instructive feedback, modeling, opportunities to respond, praise, prepack statements, problem solving, promoting behavioral competence, promoting teacher-child relationship, scaffolding, and social skills). Chorpita and Daleiden mapped the core components of evidence-based treatments for mental health problems in children and adolescents. The most common components of treatments for oppositional and aggressive behaviors were praise, time-out, rewards, commands, and problem solving.²⁵ Garland *et al.* identified common core elements of behavioral treatments for children's disruptive disorders and their parents including therapeutic content, treatment techniques, working alliance, and treatment parameters (e.g., duration).²⁶ For caregiver-mediated interventions, common treatment techniques included psychoeducation, assigning/reviewing homework, role playing/behavioral rehearsal, modeling, providing materials, and reviewing goals and progress.

This paper describes the development of the Irie Classroom Toolbox, a teacher training program with the following characteristics: it was developed specifically for use in early childhood classrooms in LMICs; it has in-built flexibility and guidelines for adaptation; it is available through a Creative Commons license (Attribution-NonCommercial-ShareAlike 4.0 International License); and it aims to facilitate widespread adoption of key child behavior management strategies. The primary aims of the Irie Classroom Toolbox are to (1) prevent violence against children by early childhood teachers and (2) prevent the early development of antisocial behavior in young children (See Box 1).²⁷ "Irie" is a Jamaican

BOX 1.**What is known**

- Early childhood is a critical period for cognitive, social, emotional, and physical development, and provides the foundation for future physical and mental health.
- To provide a safe, secure, and nurturing early childhood learning environment, educators need training in classroom behavior management and how to promote child social–emotional competence.
- However, there are no available programs that have been developed specifically for use in low- and middle-income country contexts.

What this study adds

- This paper describes the development of a teacher training program that aims to (i) prevent violence against children by early childhood practitioners and (ii) prevent the early development of antisocial behavior in young children.
- The intervention was developed by integrating qualitative research data with evidence-based theory and practice.
- The Irie Classroom Toolbox is a theory informed, evidence-based, adaptable, and feasible program for use in low-resource contexts.

word that describes feeling at peace and in harmony with oneself and with the world in general.

Methods

The Irie Classroom Toolbox was developed using guidance from the U.K. Medical Research Council framework for developing and evaluating complex interventions.^{28,29} The process of developing the toolbox involved integrating evidence, practice, and theory, including the data from the qualitative and process evaluation of an efficacy trial and implementation science principles on the development of theory-informed interventions. The study progressed through three phases. In phase 1, data from the qualitative and process evaluation of an efficacy trial were used to identify enablers and barriers to intervention implementation in the Jamaican context. In phase 2, the data from phase 1 were integrated with theory to design the core intervention and core implementation components. In phase 3, the information from phase 1 and 2 were used to develop a theory of change and to design the intervention materials and structure.

Phase 1: Qualitative and process evaluation of an adapted evidence-based program

Methods

Colleagues and I conducted a cluster-randomized trial of an adapted version of an evidence-

based intervention, the IY-TT in 24 community preschools situated in inner city areas of Kingston, Jamaica. Full details of the trial have been published previously and brief details are given here.^{11,14}

Community preschools cater to children aged 3–6 years and are provided through community organizations (often churches) with oversight from the government. Parents pay a small fee and provide the necessary school resources (e.g., crayons, books, pencils). Preschools were selected for inclusion in the trial based on the following inclusion criteria: (1) had three to four classes of children, (2) had at least 20 children in each class, (3) were situated in a specified geographical area, and (4) all teachers consented to participate in the trial. Fifty schools in three education zones were surveyed and twenty-four of these schools met all the inclusion criteria and were recruited into the trial. Twelve schools (with 37 teachers) were randomly assigned to receive the teacher training program. The training was delivered over a 6-month period (November to April) by two facilitators and involved eight full-day teacher training workshops and four 1-hour sessions of in-class support delivered once a month over 4 months. Teachers also received resources including educational materials (e.g., blocks, manipulatives, play doh), picture cards to assist with teaching core concepts, home-made bingo games, copies of positive notes home, stickers and stamps, behavior planning forms, and a small hand puppet.

Qualitative interviews

Individual, in-depth, semistructured interviews were conducted with teachers who had participated in the training program at the end of the intervention period and again 5 years later. Thirty-seven intervention teachers were included in the evaluation and at the end of the intervention period, two teachers were unavailable for interview. All remaining teachers ($n = 35$) were interviewed individually by a research assistant who was not involved in the study. Teachers had a mean age of 38 years, had been teaching for an average of 12 years, 33 (94%) of the teachers were female and only three were qualified teachers. Five years later, a purposive sample of 20 of these 33 teachers (one to two teachers per school) were interviewed (18 females and 2 males). Using the posttest quantitative data from the trial, we created a proxy measure of teacher competence in the intervention, which was the ratio of teacher positives to teacher negatives across 1 day of observation. Twenty teachers were selected: 10 who scored above the median on this measure and 10 who were scoring below the median, with at least one teacher from each of the 12 schools.

A semistructured interview guide was used at both time points and interviews were conducted in a quiet location within the community preschool and lasted between 45 minutes and 1 hour. At postintervention, the interview guide focused on what aspects of the training content and process teachers liked best and were most effective, and on barriers and enablers affecting teachers' implementation of the strategies. At the 5-year follow-up, the main focus of the interviews was on the extent to which teachers continued to use the strategies over time and what factors affected sustainability of teacher implementation. Teachers were asked to sort cards describing the strategies into three categories: used a lot, used sometimes, and not used. Teachers were then asked to explain the reasons for their sustained use or non-use of each individual strategy. All teachers gave signed informed consent to participate in the study at both time points and ethical approval for the research was given by the University of the West Indies Ethics Committee (approval numbers: ECP 222, 2008/2009 and ECP 148, 10/11).

Interviews were audiotaped and transcribed and transcriptions were checked for accuracy against the audiotape. Each teacher was allocated an ID number that was recorded on the audiotape prior to the

interview and used on the transcript. Audiotapes were deleted once transcription and checking were complete. The data were analyzed using the framework approach, which was designed for applied policy research and is particularly suitable for research with specific questions focused on *a priori* issues.³⁰ The framework approach involves a five step process: (1) reading and rereading the transcripts, (2) identifying themes and subthemes and constructing an index of codes grouped into categories, (3) applying the codes to the individual transcripts, (4) rearranging the data in charts of each theme and/or subtheme with entries for each respondent under each theme, and (5) examining the charts to identify the key characteristics of the data. One research assistant applied the codes to the data and prepared the thematic charts. Interrater reliability checks using percent agreement were conducted between the rater and the author on 15 transcripts from the first round of interviews and eight transcripts from the second round with high levels of agreement (>90%). Ongoing queries were discussed and resolved.

Process evaluation

The intervention was delivered by two facilitators: one facilitator conducted all the teacher training workshops and the second facilitator cofacilitated at the workshops and provided the in-class support. Throughout the intervention period, facilitators completed record forms after each workshop and after each in-class support session that documented: (1) teachers' challenges, questions, and suggestions for modifying the strategies to their context; (2) facilitator perspectives on the barriers and enablers to implementation at the level of the school, classroom, teacher, and children; and (3) descriptions of how barriers were overcome. Facilitators also kept an on-going log of their interactions with teachers and their reflections on the training. The data from the record forms and logbooks were analyzed by extracting information on the barriers and enablers to teachers' use of the strategies, and the common problems teachers face with each individual strategy and potential solutions.

Results

Qualitative interviews at posttest. Themes from the qualitative interviews at the end of the intervention were broadly categorized as enablers

Table 1. Interview themes with preschool teachers at the end of the intervention period

Enablers	Barriers
<p>Factors related to intervention content</p> <p><i>Strategies are effective:</i></p> <ul style="list-style-type: none"> ○ Better relationships among children ○ Children are motivated ○ Children have better self-esteem ○ Children have better behavior ○ Children start to use the strategies themselves ○ Children learn more/do better academically ○ Future benefit to children ○ Better classroom and school environment ○ Less noise <p><i>Enjoyment/positive affect/preference</i></p> <ul style="list-style-type: none"> ○ Children enjoy it ○ Teacher enjoys/likes using strategies ○ Principal likes teachers to use strategies ○ Parents like the strategies <p><i>Ease of use</i></p> <ul style="list-style-type: none"> ○ Strategies are easy to use ○ Using the strategies makes teaching easier ○ Strategies are flexible ○ Using the strategies reduces teacher stress 	<p>Difficulties with the intervention</p> <ul style="list-style-type: none"> ○ Strategies have unintended consequences ○ Need to practice a lot before they are proficient in using the strategies ○ Strategies do not always work ○ Strategies are difficult to use ○ Disagree with a strategy <p>Overcoming difficulties</p> <ul style="list-style-type: none"> ○ Problem solving ○ Choice ○ Practice <p>Prevent use of the strategies</p> <p><i>School factors</i></p> <ul style="list-style-type: none"> ○ Lack of resources ○ Too many children in each class ○ Lack of space/overcrowded <p><i>Factors related to self</i></p> <ul style="list-style-type: none"> ○ Difficult to change old habits (i.e., change behavior) ○ Difficult to adopt new mindset (i.e., previously equate good teaching with strong disciplinarian) ○ Poor emotional regulation ○ Lack of motivation ○ Personal problems <p><i>Factors related to children</i></p> <ul style="list-style-type: none"> ○ Defiant child behavior ○ Children's background means that they are not socialized to respond to positive discipline <p><i>Factors related to government policies</i></p> <ul style="list-style-type: none"> ○ Dress code is not conducive to working with young children ○ Demands of the curriculum
<p>Factors related to intervention implementation</p> <p><i>Training technique used promote teacher skills</i></p> <ul style="list-style-type: none"> ○ Repetition, rehearsal, and practice ○ Demonstration/live modeling ○ Facilitators modeling the strategies in their interactions with teachers ○ Group work ○ Role play/skits ○ Provision of in-class support ○ Doing homework <p><i>Training techniques used promote teacher motivation</i></p> <ul style="list-style-type: none"> ○ Program was fun ○ Collaborative nature of intervention ○ Positive relationships between teachers and facilitators ○ Praise/positive feedback from facilitators <p><i>Training techniques used promote opportunity</i></p> <ul style="list-style-type: none"> ○ Group support ○ Necessary resources were provided 	

and barriers to teachers' implementation of the intervention (Table 1; File S1, online only). Enablers included factors related to the intervention content and the intervention implementation.

Intervention content. Teachers reported what characteristics of the individual strategies introduced through the program led to their adoption in the classroom. Three main characteristics of

preferred strategies were identified: the strategy was effective, the teacher liked using the strategy, and the strategy was easy to use.

The praise, the greetings and coaching are the ones I use most. They are effective and easy to implement and they don't cost anything. (Effective and easy to use)

I like the smile on their face and they are happy, they make me happy. (Teacher and children enjoy it)

The most common preferred strategies included paying attention to positive behavior (e.g., through praise, using rewards, narrating) and teaching children the required behavior (e.g., teaching classroom rules).

Intervention implementation. Teachers identified key characteristics of the training that led to change in their classroom behavior management practices. Teachers reported that the practical, hands-on aspects of the training were the most effective at helping them learn the strategies, (e.g., rehearsal and practice, group work, role plays) and these were preferred over the activities involving watching video vignettes followed by discussion.

When you watch the videos and talk, you're kinda getting it. When it comes to activity time and you're participating, the actual activities help us a lot to come back and teach it. (Rehearsal and Practice)

The skits that you do- me as a person has to do things before I can grasp it so doing that it help me to remember. (Skits/Role play)

When we don't grasp everything, they always come in to the classroom to help us to get it right. (In-class support)

Teachers also reported the effect of modeling by the facilitators on their learning and motivation.

When she do her praising, the way you look at her, you want to come and do the same thing. When you see that, you want to come and do the same man. You're the adult and when she do it, the way you feel, just imagine the children. (Facilitators modeling strategies)

The teachers also commented on other motivational aspects of the training including that the training methods used were fun, collaborative, supportive, and noncritical.

It was fun, it made you want to do it. (Fun)

You get praise even if you try, even if you're not excellent. (Positive support)

They made you feel that what you say and what you think matters. They don't come like no big boss over you. (Collaborative approach)

Provision of the necessary resources to use the strategies in the classroom and support from other teachers also helped teachers use the strategies:

I give the children a stamp or a sticker that I got from the program – so I now start giving them out more. (Necessary resources are provided)

You share with other teachers. You gain from their experiences and they gain from yours – the sharing of ideas. (Group support)

The barriers identified by teachers included difficulties with the intervention itself and external and internal factors that prevented their use of the strategies.

Difficulties with intervention. Teachers reported on their difficulties with the individual strategies and it was evident that many of these difficulties were overcome with problem solving on how to use the strategy and/or choosing a different strategy.

What I had to do was just think and if that didn't work you had to think about why you think (that it didn't work). (Problem solving)

I try it and if it doesn't work, I try another one. (Choice)

Teachers also reported that some difficulties were resolved over time with practice.

If it doesn't work then you go a step higher and it doesn't come over night and it's something that we have to practice, practice, practice. (Practice)

However, many teachers reported persistent difficulties using the strategies to manage children's misbehavior (e.g., ignoring misbehavior, giving consequences, and time-out).

Sometimes it hard to look beyond the bad things. It hard fi nuh see the bad and see the good. (Strategy is difficult to use)

No care how you put him close to you and say this is your time out. He finds time to give trouble same way. (Strategy does not work)

Factors that prevent teachers' use of the strategies. Other barriers to teachers' implementation of the strategies were factors relating to the school

Table 2. Preschool teachers’ reports of the extent to which they continue to use the training in the classroom 5 years after the end of the intervention

Frequency of use	Strategies	Reasons
Used a lot	<ul style="list-style-type: none"> ○ Praise ○ Rewards ○ Explicitly teaching the expected behavior ○ Interactive reading ○ Giving clear instructions 	<ul style="list-style-type: none"> ○ Children like the strategy ○ It is effective (e.g., benefits to children include: better behavior, increased learning, increased engagement, increased self-esteem, better peer relationships) ○ Teacher enjoys using the strategy (e.g., it is fun, makes teaching more enjoyable, less stressful, teacher develops positive relationships with children) ○ Teacher finds the strategy easy to use ○ The strategy is flexible and can be used in different situations
Used sometimes	<ul style="list-style-type: none"> ○ Coaching children as they work and play ○ Sharing positive news with parents ○ Giving children choices ○ Giving children responsibilities ○ Teaching children about emotions ○ Teaching children friendship skills ○ Being playful with children ○ Redirecting children ○ Ignoring negative behavior ○ Behavior planning 	<p><i>Reasons for use:</i></p> <ul style="list-style-type: none"> ○ Effective (benefits for children) ○ Children like the strategy ○ Teacher enjoys using the strategy <p><i>Reasons do not use so much:</i></p> <ul style="list-style-type: none"> ○ Strategy backfires/has unintended consequences ○ Requires resources and/or advanced planning to use the strategy ○ Insufficient time to use the strategy ○ Strategy is not effective ○ Strategy is difficult to use ○ Forgets to use strategy
Do not use	<ul style="list-style-type: none"> ○ Consequences ○ Time-out 	<ul style="list-style-type: none"> ○ Teachers does not need to use the strategy ○ Teacher prefers to use other strategies ○ Strategy is not effective ○ Strategy is very difficult to use ○ Strategy backfires ○ Teacher does not like using the strategy ○ Teacher disagrees with the strategy

(e.g., large class sizes), the teacher (e.g., difficult to change old habits), the children (e.g., children’s socialization at home), and government policies (e.g., demands of the curriculum and dress code; Table 2).

In here is clustered so I can’t get to circulate to everybody and the heat and the crowded classroom, if I get a smaller amount of kids next year it would be best. (School factors)

With me, it’s a self-thing. Don’t allow the self to get too upset and then you’ll be able to deal with it better. Don’t make it a personal issue or get upset easily when they behave bad. (Factors related to self)

Qualitative interviews at 5-year follow-up. Five years after the end of the intervention, teachers reported that the most commonly used strategies were praising children, giving rewards, explicitly teaching children the expected behavior, giving

clear instructions, and interactive reading (Table 2). Teachers’ rationale for using these strategies was similar to that reported in the earlier round of qualitative interviews: teachers reported that these strategies were effective, they and/or the children liked the strategy, and they were easy to use. Engaging in problem solving and having a choice of different strategies to manage children’s misbehavior continued to be strong themes. Strategies that were not used included consequences and time-out. The main reasons for not using these strategies included: the strategy had unintended consequences (e.g., would distract other children); they were difficult to use; they were ineffective: teacher and/or children did not like the strategy; they prefer to use alternative strategies/do not need to use that particular strategy; and they had forgotten about that strategy. Time-out was particularly problematic for

teachers and the majority of teachers found this strategy very difficult to use due to the lack of space in the classroom and because children would find other things to do in time-out and/or would distract other children:

He was in the time-out chair, doing all sort of things to disturb the class and everybody. The children were laughing as if it was something good.

There were no obvious differences in preferred strategies for teachers with different levels of competence at posttest; all teachers reported sustained use of praise and explicitly teaching the expected behavior and the majority did not use time-out.

Process evaluation

Through the process evaluation, facilitators' perceptions of the enablers and barriers to teachers' implementation of the strategies were documented.

Enablers. The key enablers identified by facilitators were: (1) positive facilitator–teacher relationships; (2) the provision of choice and autonomy; (3) teachers recognizing the effects of their behavior on the children; and (4) engaging teachers in collaborative problem solving. These factors were considered to be instrumental in overcoming teachers' resistance to the intervention. Teachers were willing to try the strategies partly because of the confidence and skills they had gained from attending workshop and partly because they liked the facilitators and did not want to disappoint them, demonstrating the importance of positive relationships. Providing teachers with the option of choosing strategies that fit their teaching style and personal preferences also helped to overcome resistance to individual strategies. In the early stages of implementation, teachers often disagreed with individual strategies, found them difficult to use in their context, and/or felt awkward and uncomfortable using them. Provision of autonomy and choice helped to overcome teachers' reluctance to try aspects of the intervention and had the added advantage of modeling this behavior for teachers so that they could see the value of using it with the children. When teachers used the strategies, they were motivated to continue when they recognized the benefits to the children and to themselves. Teachers were supported to recognize these benefits by the facilitator during the in-class support sessions and through self-monitoring when completing homework assignments. The importance

of engaging the teachers in collaborative problem solving to ensure that they gained confidence and competence in using the strategies in a range of contexts, with different children and for different child behaviors was also a recurring theme in the process evaluation.

Barriers. Examples of barriers identified through the process evaluation included (1) teachers have inappropriate expectations of young children (e.g., teachers think that once children have been taught a behavior, they should perform it consistently without further reminders); (2) norms supporting the use of harsh punishment (e.g., a belief that some children can only be managed through using corporal punishment and/or that some behaviors deserve to be punished using corporal punishment); (3) high child/staff ratios and insufficient resources, combined with teachers' inappropriate expectations and/or poor planning skills can lead to extended periods of time when children are not engaged from learning activities; (4) many teachers are not reflective about their own teaching practices and tend to be reactive rather than proactive; (5) teachers need support to help them to generalize their use of the strategies to different contexts and for different behaviors across the school day; and (6) many teachers lack confidence in and commitment to using the strategies, especially when they are newly learned and the teacher has had insufficient practice in the classroom. The process evaluation also highlighted the persistent difficulties teachers faced implementing time-out for misbehavior. In some instances, time-out was over-used and teachers resorted to time-out for even minor misbehaviors. In other instances, time-out was ineffective as the teachers were unable to manage the child in time-out while continuing to monitor and teach the other children in the class.

Throughout the process evaluation, common problems faced by teachers when implementing the individual strategies were documented. These common problems were used to create a list of common problems and potential solutions list for each of the main strategies to be included in the Irie Classroom Toolbox (see File S2, online only).

Summary of qualitative and process evaluation

The qualitative and process evaluation produced some comparable findings related to enablers and

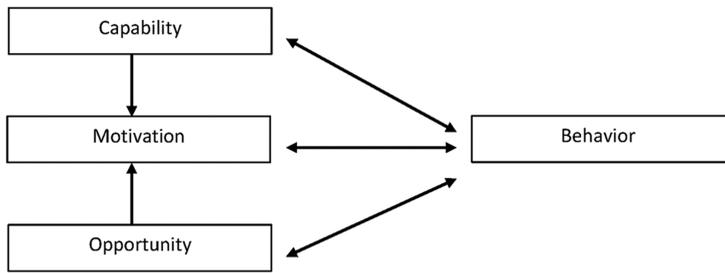


Figure 1. The COM-B system for understanding behavior.

barriers to teacher implementation of the intervention and to teachers' preferred and less preferred strategies. Teachers and facilitators reported that the strategies related to managing misbehavior were most difficult to implement and recognized the importance of problem solving, choice, and positive and supportive relationships in motivating teachers to start using, and encouraging teachers' sustained use of the strategies. Some unique information was also gained from each set of informants. Teachers provided information on the reasons they adopted aspects of the content of the intervention in the classroom (strategies that are easy to use, that are perceived as effective and that the teacher and children enjoy) and also stated their preferred training methods and the underlying rationale for their preferences. Facilitators identified barriers at the level of the teachers whereas the teachers primarily identified barriers related to external factors (e.g., school, government policies, and children).

Phase 2: Combining evidence, theory, and practice to inform the development of the Irie Classroom Toolbox

Methods

Intervention content: identifying the core intervention components. The content of the Irie Classroom Toolbox was informed by the work of Embry who advocates for the use of "evidence-based kernels" in prevention programs targeting behavior change.^{31,32} Evidence-based kernels are described as "irreducible units of behavior change technology" that have been shown through experimental evaluation to affect behavior and they are appropriate for use across contexts, that is, at school and at home.^{31,33} Examples include verbal praise, nonverbal transition cues, positive notes home, and time-out. These evidence-based kernels can be com-

bined to form "behavioral vaccines," which are daily practices to promote longer term behavior change. Key characteristics of evidence-based kernels and behavior vaccines are that they are low cost, have easily discernible positive effects, and are easy to use. Evidence-based, behavioral interventions for use in early childhood classrooms, including school-wide, teacher training, and child-training programs were reviewed to identify the evidence-based kernels used. Content was informed mainly through Peacebuilders school-wide program, the IY-TT program, the PATHS child training program.^{16–19} The Irie Classroom Toolbox was developed to include evidence-based kernels that are (1) used across a range of evidence-based child behavior modification interventions and (2) acceptable, feasible, and effective in the Jamaican preschool setting based on the data from the in-depth interviews and process evaluation.

Intervention process: identifying the core implementation components. The theoretical frameworks used to categorize the implementation components included the Behavior Change Wheel³⁴ and the Theoretical Domains Framework.^{35,36} The Behavior Change Wheel is based on a systematic review of existing frameworks of behavior change interventions. The core of the model is represented by the COM-B system, which states that three factors: capability, opportunity, and motivation are required for a behavior to occur and to be sustained (Fig. 1). This model can be used to design interventions by determining what behavior change is required and what aspect of the system needs to be targeted. Hence, once the barriers and enablers to performing the behaviors have been identified, a decision can be made as to whether the individual needs to gain skills, increase motivation, and/or be provided with opportunity to use the

behavior. The Theoretical Domains Framework consists of a set of 14 domains to describe the factors influencing behavior change: knowledge, skills, social/professional role and identity, beliefs about capabilities, optimism, beliefs about consequence, reinforcement, intentions, goals, memory, attention and decision processes, environmental context and resources, social influences, emotion, and behavioral regulation.³⁵ This framework provides a comprehensive coverage of factors influencing behavior and a theory-informed approach to identify appropriate evidence-based behavior change techniques to target specified behaviors.^{36,37} By combining the COM-B system of the Behavior Change Wheel with the Theoretical Domains Framework, it is possible to identify what factors influencing an individual's capability, motivation, and opportunity need to be targeted to affect behavior change. Once these factors have been identified, behavior change techniques can be mapped onto these key determinants of behavior change.³⁶ In the development of the Irie Classroom Toolbox, the barriers to teachers' implementation of the strategies and teachers' preferred behavior change techniques were identified through the qualitative and process evaluation. These barriers were linked through the COM-B system to the domains from the Theoretical Domains Framework. Behavior change techniques were then chosen to address each barrier, prioritizing teachers' preferred techniques where possible.

Results

Intervention content: identifying the core intervention components. Table 3 shows the strategies or "evidence-based kernels" that are included in the Irie Classroom Toolbox. The strategies were divided into four modules: (1) creating an emotionally supportive classroom environment, (2) preventing and managing child behavior problems, (3) teaching social and emotional skills, and (4) individual and class-wide behavior planning. Teachers are thus provided with a menu, or toolbox, of strategies that they can use to manage children's classroom behavior and teachers choose strategies according to the needs of the children, their classroom context, and their own preferences. Each strategy can be used alone or in conjunction with other strategies. A particular emphasis is placed on the strategies that were preferred by teachers in the qualitative and process evaluation giving four key components:

paying attention to positive behavior, explicitly teaching children the required behaviors, telling children what to do and not what not to do (clear instructions), and interactive reading. The nonpreferred strategies were the strategies to manage child misbehavior. Given the importance of equipping teachers with skills to manage child misbehavior, training teachers in the use of a discipline hierarchy to manage child misbehavior was incorporated as a fifth key component. The discipline hierarchy integrated preferred (e.g., paying attention to positive behavior, clear instructions, explicitly teaching skills) with nonpreferred (e.g., withdraw attention, consequences) strategies. Teachers are trained how to choose appropriate strategies when faced with a variety of child behavior problems and how to move up or down the discipline hierarchy depending on the effect of the strategy on the child's behavior. Time-out was omitted due to the significant amount of time required to train teachers to use it, its lack of acceptability and feasibility, and its perceived ineffectiveness in the Jamaican preschool context.

Intervention process: identifying the core implementation components. Table 4 shows how the barriers to implementation identified through the qualitative and process evaluation were linked through the COM-B system to the domains from the Theoretical Domains Framework and then the behavior change techniques mapped to address each barrier. For example, one barrier was that teachers believe that harsh punishment is necessary to control child behavior and do not believe that positive disciplinary practices are effective for certain behaviors and/or certain children. This barrier affects teachers' motivation and was mapped to the theoretical domain *beliefs about consequences*. Suggested behavior change techniques include providing feedback on the effect of the teachers' behavior on the child(ren) and assigning homework for teachers to record the effect of using the strategies on individual and class-wide child behavior. Evidence, theory, and practice were integrated throughout; although the behavior techniques used were underpinned by theory, teacher preferences and practical considerations relating to feasibility were used to inform the development of the toolbox. For example, (1) the intervention components were chosen to be feasible in the context; (2) some barriers are not

Table 3. Content of the Irie Classroom Toolbox

Module	Content
Creating an emotionally supportive classroom environment	Promoting positive teacher–child relationships Use of verbal praise Using children’s names Using rituals and routines Giving choices Meaningful roles/jobs: giving children responsibilities in the classroom Narrating/coaching: talking about what child is doing as they work and play Special play: spending individual time with children while they play Tangible reinforcement: providing tangible rewards (e.g., stickers) Scaffolding: supporting children to complete a task Pleasant greeting Positive notes home Interactive reading
Preventing child behavior problems	Explicitly teaching behavioral expectations Rehearsal of skills/behaviors: children practice the expected behaviors Providing specific feedback on children’s correct response/behavior Modeling behaviors and tasks: teacher performs the behavior or task while thinking aloud Keeping children engaged in learning activities Getting and keeping children’s attention Monitoring: working the room Giving clear instructions Nonverbal cues: to prompt appropriate behavior Redirecting: redirecting children’s attention using subtle cues Premack statements: “when–then” statements Play games to promote children’s executive function skills
Managing child behavior problems	Differential reinforcement: pay attention to positive behavior while withdrawing attention from negative behavior Redirecting children’s behavior Providing specific feedback after a child’s incorrect response/behavior Warnings Consequences: giving appropriate consequences for misbehavior Explicitly teaching the required skills
Teaching social and emotional skills	Cooperative, structured peer play Turtle technique: anger management Explicitly teaching social skills Practice and rehearsal of social skills Emotion regulation: labeling and understanding emotions Problem solving: how to solve social problems in the classroom (e.g., two children want to use the same toy)
Behavior planning	Identifying why problem behaviors occur Designing, implementing, and evaluating individual behavior plans Designing, implementing, and evaluating class-wide behavior plans

amenable to intervention (e.g., school factors (e.g., lack of resources, class size)) and hence collaborative problem solving on how to use appropriate behavior management strategies is a key aspect of the intervention; (3) teachers’ preferred methods of training

were prioritized when possible (e.g., rehearsal and practice, group work, role plays, positive feedback), and the training workshops were designed to be fun and engaging; (4) facilitators’ modeling the use of the strategies in their interactions with teachers was

Table 4. Using COM-B and the Theoretical Domains Framework to map behavior change techniques to barriers to implementation

What needs to be addressed	Theoretical domain	Mode	Behavior change techniques
Skills			
Teachers have inappropriate expectations of young children	Knowledge	<ul style="list-style-type: none"> Facilitated workshop Teacher manuals 	<p><i>Techniques:</i> Modeling, information provision</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> Use role plays and skits followed by discussion to lead teachers to understand about developmentally appropriate practices for young children (e.g., to help teachers have appropriate expectations of child behavior, understand the reasons for child behavior and the theoretical principles underlying evidence based behavior management practices) Providing information on behavior management strategies through written manuals/guidelines
Teachers lack skills in classroom behavior management	Skills	<ul style="list-style-type: none"> Facilitated workshop In-class support Assignments 	<p><i>Techniques:</i> Demonstration, role play, rehearsal, homework</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> Demonstration of the required behavior (through role plays and demonstrations) Rehearsal and practice to learn new skills Supervised practice in using the strategies in the classroom Classroom assignments to encourage teachers to practice using the skills in different contexts
Teachers forget to use the strategies	Memory	<ul style="list-style-type: none"> Text messages Teacher manuals Provide materials 	<p><i>Techniques:</i> Text-messages, provision of resources</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> Fortnightly text messages to remind teachers to use the strategies Provision of intervention manuals, picture cards and story books and an “I am an Irie Classroom Teacher” for affirmation for teachers to display in their classroom at the end of the intervention period
Teachers find it difficult to generalize the use of the strategies to new situations	Skills	<ul style="list-style-type: none"> Facilitated workshop In-class support Assignments 	<p><i>Techniques:</i> Demonstration, role play, rehearsal, homework</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> Demonstrations of how to use the strategies across different situations and in different contexts Rehearsal and practice involving using the strategies in different situations and for different child behaviors to aid in generalization of recently learned skills Supervised practice in using the strategies in the classroom Classroom assignments to encourage teachers to practice using the skills in different contexts
Motivation			
Teachers lack confidence in their ability to manage child behavior	Beliefs about capabilities	<ul style="list-style-type: none"> Facilitated workshop In-class support Assignments 	<p><i>Techniques:</i> Feedback on behavior, self-evaluation/self-monitoring, homework</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> Positive, supportive feedback from facilitator and peers in workshop after demonstrating use of the strategies

Continued

Table 4. Continued

What needs to be addressed	Theoretical domain	Mode	Behavior change techniques
Teachers believe that use of harsh punishment techniques is necessary to control child behavior/do not believe that more positive disciplinary practices are effective	Beliefs about consequences	<ul style="list-style-type: none"> • In-class support • Assignments • Facilitated workshop 	<ul style="list-style-type: none"> • Positive, supportive feedback from coach during in-class support sessions • Prompting teacher to identify what she/he did well after performing the skills • Positive, supportive feedback on classroom assignments <p><i>Techniques:</i> Feedback on outcome of behavior, self-monitoring of outcome of behavior, homework, modeling</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • Pointing out the effects of the teachers' behavior on the children during in-class support sessions • Prompting teachers to identify the effects of their behavior on themselves • Classroom assignments: teachers record the effects of using the strategies on children • Facilitators model the strategies in their interactions with teachers so that teachers have direct experience of how the strategies lead to changes in behavior and motivation
Teachers are frustrated by child misbehavior	Emotion	<ul style="list-style-type: none"> • Facilitated workshop • In-class support 	<p><i>Techniques:</i> Coping skills, cognitive restructuring/reframing</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • Assist teachers in reframing child behaviors to change their emotions when faced with perceived misbehavior • Help teachers to develop individual strategies to manage frustration/negative emotions in the classroom • Promoting fun: activities are designed to promote teacher and child enjoyment
Teachers believe that an effective teacher is a strong disciplinarian	Professional role	<ul style="list-style-type: none"> • Facilitated workshop • In-class support 	<p><i>Techniques:</i> Feedback on behavior and outcome of behavior, cognitive restructuring/reframing, identification of self as a role model</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • Positive, supportive feedback to enhance self-efficacy in their use of the strategies • Encourage teachers to view use of the strategies as integral to being an “effective early childhood teacher” • Encourage teachers to view themselves as a role model for the children • Assist teachers in reframing child behaviors and teachers' responses to those behaviors to change their cognitions
Lack of reflective practice: reactive rather than proactive	Goals	<ul style="list-style-type: none"> • Assignments • In-class support 	<p><i>Techniques:</i> Self-monitoring, action planning, goal setting, homework</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • Self-monitoring of use of strategies through classroom assignments • Help teachers to make a detailed plan when, how, and how often they will use the strategies

Continued

Table 4. *Continued*

What needs to be addressed	Theoretical domain	Mode	Behavior change techniques
Strategies do not always work and/or strategies sometimes have unintended consequences and teachers become discouraged	(1) Emotion (2) Beliefs about consequences	<ul style="list-style-type: none"> • In-class support • Assignments 	<ul style="list-style-type: none"> • Help teachers to observe children's responses to judge the effectiveness of their behavior • Engage teachers in collaborative goal setting <p><i>Techniques:</i> Self-monitoring, homework, therapeutic alliance, reframing, coping skills, problem solving</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • Help teachers to observe children's responses to judge the effectiveness of their behavior • Classroom assignments: teachers record the effects of using the strategies on children • Assist teachers in reframing child behaviors to change their emotions when faced with perceived misbehavior • Help teachers to develop individual strategies to manage their own frustration/negative emotions • Engage teachers in problem solving
Teachers have personal problems with interfere with their use of the strategies	Emotion	<ul style="list-style-type: none"> • Assignments • In-class support 	<p><i>Techniques:</i> Positive relationships/therapeutic alliance</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • Develop positive, supportive relationships with each teacher • Use reflective listening/empathy
Opportunity Norms reinforce use of harsh punishment practices	Social influences	<ul style="list-style-type: none"> • Facilitated workshop • In-class support 	<p><i>Techniques:</i> Social processes of encouragement, pressure, and support</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • Group support: teachers share experiences, successes, and challenges • Group activities: teachers work together in small groups to practice using the strategies and to engage in joint problem solving • School support: all teachers within a school are trained to promote changes to school norms
Teachers have insufficient resources and the classroom context does not support the use of the strategies	Environmental context and resources	<ul style="list-style-type: none"> • Provide materials • In-class support • Teacher manuals 	<p><i>Techniques:</i> Resource provision, problem solving</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • Provision of necessary resources: linoleum, educational materials, picture cards, puppet • Engage teachers in collaborative problem solving to overcome barriers to implementing the strategies • Activities provided for teachers can be integrated into on-going teaching and learning activities
Teachers lack time to use strategies that require teaching and rehearsing skills and playing games	Environmental context and resources	<ul style="list-style-type: none"> • Teacher manuals • In-class support 	<p><i>Techniques:</i> Action planning, goal setting, provision of activities</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • Provide lesson plans and activity guides to help teachers integrate the use of the strategies into their everyday teaching and learning activities • Help teachers to make a detailed plan when, how, and how often they will use the strategies • Engage teachers in collaborative goal setting

Continued

Table 4. *Continued*

What needs to be addressed	Theoretical domain	Mode	Behavior change techniques
Children are often not engaged in learning activities (e.g., teacher asks them to put their heads on the desk until lunchtime)	Environmental context and resources	<ul style="list-style-type: none"> • Teacher manuals • In-class support 	<p><i>Techniques:</i> Action planning, provision of activities</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • Provide games, story books, and songs that teachers can use during transition times (e.g., waiting for lunch) • Help teachers to make a detailed plan for how they will ensure that children are engaged in learning activities

found to be a very powerful training method and this became a core feature of the training program; (5) teachers are trained in how to choose strategies that fit their own preferences, needs, and teaching styles through the use of role plays, rehearsal, practice, and collaborative problem solving; and (6) the toolbox includes games, songs, activities, and short pictorial story books that require no additional resources and that teachers can use effectively with relatively large classes of young children.

Phase 3: Intervention development

In the final phase, two further steps were conducted: the core intervention content and core implementation components identified through phase 2 were integrated to develop the Irie Classroom Toolbox and the information from phase 1 and phase 2 were used to design the theory of change.

The five key intervention components are emphasized throughout the program (see Fig. 2). Although a full menu (toolbox) of strategies is introduced, these strategies and their underpinning rationale are reinforced the most. Each key component represents a package of related strategies; for example, “paying attention to positive behavior” incorporates verbal and nonverbal praise, specific feedback on children’s correct response/behavior, rewards, narrating, and positive notes home. The intervention also includes a “menu” of other tools or strategies that teachers can use to provide an emotionally supportive classroom environment and to manage young children’s behavior. This combination of choice and prescribed content ensures that teachers have the opportunity to choose their own strategies and tailor the intervention to their own context, while ensuring that all teachers use a small number of key components that have evidence of effectiveness in the Jamaican preschool setting. This is designed

to maximize teacher engagement, reduce resistance, and to promote continued use of appropriate strategies and its inherent flexibility makes it suitable for wide-scale implementation.

The core implementation components include behavior change techniques to promote teacher skills (e.g., rehearsal and practice), motivation (e.g., use of specific positive feedback), and opportunity (e.g., provision of necessary resources). The training is delivered through facilitated teacher training workshops, individual in-class support sessions, and text messages. Teachers are given practical classroom assignments after each in-class support session and receive intervention manuals and materials (picture cards and story books) to use with the children (Table 5; Files S3–S6, online only). Intervention facilitators are trained to deliver the training using the same behavior change techniques that they will in turn use to train teachers. Facilitators are also trained in how to form a therapeutic alliance with teachers and manage resistance. Two training manuals are available: a fully scripted training manual to deliver the facilitated workshops and a manual with protocols for the in-class support sessions.

The theory of change is shown in Figure 2. Teachers are trained in the core intervention components using the core implementation components. Through participation in the program, teachers gain skills and motivation and are afforded the opportunity to use the strategies. As teachers begin to use the strategies, with support and feedback during in-class support sessions, they perceive benefits to the children and attribute these benefits to their use of the strategies. Strategies that are easy to use and strategies that are liked by teachers and children are integrated into teachers’ daily practices. As teachers gain in competence, they learn to generalize their

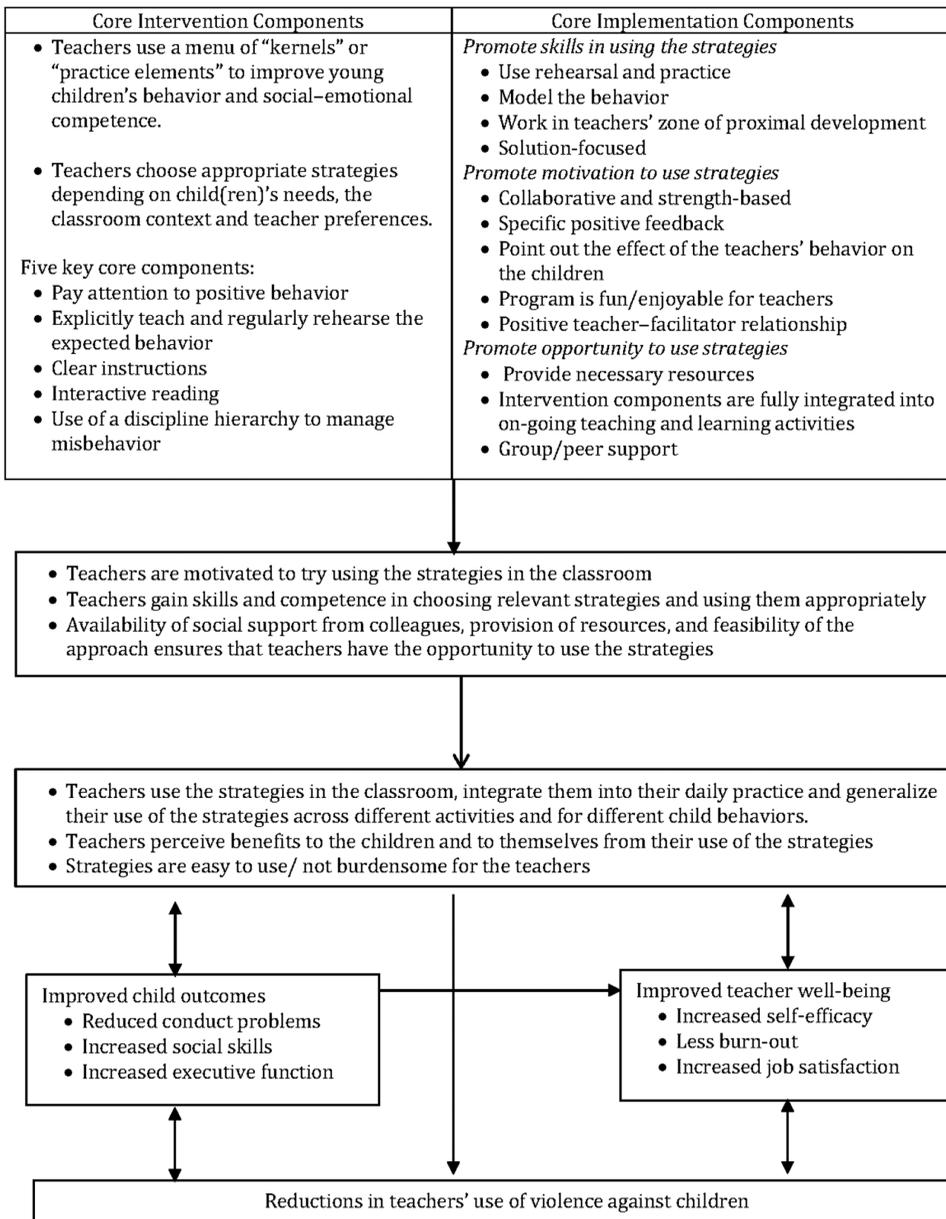


Figure 2. Theory of change.

use of the strategies to other situations and contexts. This leads to improved child outcomes and improved teacher well-being, which in turn acts as a feedback loop to sustain teachers’ use of the strategies in the classroom. Teachers’ use of violence is reduced as teachers use alternative strategies to manage child behavior, child behavior has improved, and teachers have increased well-being.

Discussion

This paper describes how evidence, theory, and practice were used to inform the development of a violence prevention, teacher training program for use with early childhood teachers in Jamaica. The key features of the intervention are: (1) it was developed with close participation of Jamaican preschool teachers and incorporates teachers’ preferred

behavior management strategies and preferred training methodologies; (2) it is theory-informed with a clear theory of change; and (3) it was designed to be feasible in low-resource contexts. As the toolbox was developed by integrating teacher and facilitator perspectives with theory, it is grounded in the common core elements of evidence-based behavior management programs and uses evidence-based behavior change techniques in training.^{24–26}

Although the toolbox includes a wide range of strategies, a selection of core behavior management practices is packaged into chunks to form five key components, which are repeated and reinforced throughout the intervention. This is aligned to the “seven, plus or minus two” rule of psychology and helps prevent teachers from being overloaded with information. A similar approach has been recommended for parenting interventions to improve child development in LMICs.³⁸ Four of these five key components are based on teachers’ preferences. Research in Chile has shown that training teachers to incorporate novel practices into their existing skill repertoire is more difficult than training teachers to use skills and activities that are “native” or common in the setting.³⁹ Incorporating teachers’ preferences into the intervention is designed to increase its acceptability and effectiveness. Teachers most preferred strategies postintervention were explicitly teaching the required behaviors and use of praise and rewards; these strategies were also used frequently at 5-year follow-up. These preferred strategies correspond to the key principles underpinning the Seattle Social Development Program (SSDP), a comprehensive intervention designed to prevent antisocial behaviors and promote child competencies, with evidence for long-term gains in the U.S. context.^{8,40} The SSDP strategy suggests that to promote healthy behaviors children need to be: taught the required skills, provided with the opportunities to use the skills, and provided with positive feedback and recognition.⁴¹ Other preferred strategies were interactive reading and clear instructions. In addition to building on teachers’ preferences and strengths, the toolbox includes core content fundamental to child behavior management programs that was less preferred by teachers. These were strategies to manage child misbehavior such as ignoring and use of consequences. To enhance the acceptability of these less preferred practices, a discipline hierarchy that integrates preferred and

nonpreferred strategies was incorporated as a fifth key component. This discipline hierarchy also incorporates teachers’ use of choice and problem-solving skills that were identified as enablers to intervention implementation through the process evaluation. Problem-solving skills have been reported to be an important implementation strategy in integrated nutrition and stimulation interventions in LMICs and for effective scaling of evidence-based perinatal interventions in South Africa.^{42,43}

The enablers to intervention implementation included factors that promoted teachers’ skills, motivation, and opportunity. Teachers valued interactive training methods, including rehearsal, practice and feedback, over more passive methods such as watching videos and discussion; this preference for hands-on training activities has also been reported for early childhood parenting interventions in LMICs and is a key characteristic of effective programs.^{42,44–46} Teachers’ motivation was enhanced when they recognized the benefits of the intervention to the children and to themselves; the importance of ensuring the benefits of intervention are made tangible to program recipients and staff is an emerging theme in the implementation of early child development (ECD) programs in LMICs.^{44–47} Other aspects of implementation that have been found to be important in ECD implementation research include group support from peers and provision of intervention materials and these were also recognized as enablers to intervention implementation by Jamaican preschool teachers in this study.^{44,45} These common enablers across several studies of implementation of ECD programs correspond to the following domains in the Theoretical Domains Framework: skills, beliefs about consequences, social influences, and environmental context and resources. This suggests that these four domains may be particularly relevant for LMIC contexts.

The processes used to train teachers include all six categories of behavior change communication that have been shown to be effective in health programs in LMICs: informational techniques, performance-based techniques, problem solving, social support, materials, and media.⁴⁸ The most effective programs were found to use three or four of these categories and the authors conclude that this is because participants are engaged at the behavioral level (e.g., performance techniques), the social level (e.g., social

Table 5. The Irie Classroom Toolbox: content, structure, and process of training

Item	Content	Structure	Process
Teacher training workshops	<ol style="list-style-type: none"> (1) Building a positive foundation (2) Paying attention to positive behavior (3) Preventing misbehavior (4) Teaching social and emotional skills (5) Managing misbehavior 	<p>Five full-day workshops during school holidays.</p> <p>20–30 teachers per group</p> <p>Materials for teachers:</p> <ol style="list-style-type: none"> (1) Irie Classroom tools book: includes a description of each strategy, examples of how it is used and the underpinning rationale. (2) Irie Classroom activities book: includes ideas for games, songs, activities and lesson plans to support teachers' use of the strategies, behavior planning forms and IRIE notes (positive notes to send home). 	<p>Modeling</p> <p>Role plays</p> <p>Demonstration</p> <p>Rehearsal and practice with supportive feedback</p> <p>Discussion</p> <p>Songs and games</p> <p>Problem-solving activities</p> <p>Positive teacher–facilitator relationships</p> <p>Fun</p>
In-class support sessions	<ol style="list-style-type: none"> (1) Paying attention to positive behavior (2) Explicitly teaching and reinforcing classroom rules (3) Coaching children as they work and play (4) Interactive reading (5) Explicitly teaching and reinforcing friendship skills (6) Reading problem-solving stories (integrating emotions and social skills) (7) Getting and keeping children's attention/keeping children engaged (8) Review <p>Engage teacher in behavior planning as required.</p>	<p>Eight 1-hour sessions conducted once a month for 8 months.</p> <p>Materials for teachers continued:</p> <ol style="list-style-type: none"> (3) Three sets of picture cards to teach children the classroom rules, friendship skills, and emotions. (4) Fourteen pictorial problem-solving stories showing problems children may face at school (e.g., being left out of a game, feeling jealous, wanting a toy that someone else has). Each story has a one-page guide for teachers. 	<p>Three main components:</p> <ol style="list-style-type: none"> (1) Planning session (2) Coaching the teacher involving <ul style="list-style-type: none"> - modeling the behavior - prompting the teacher to use the behavior - praising the teacher - pointing out the effect of the teachers' behavior on the children (3) Debriefing session involving: <ul style="list-style-type: none"> - helping teacher evaluate the session - collaborative problem solving - collaborative goal setting - giving classroom assignments
Text messages	Content is related to the current coaching session.	Fortnightly over 1 school year.	
Training Workshop Facilitators	<p>Trained to deliver each of the 5-day workshops.</p> <p>Also trained in:</p> <ul style="list-style-type: none"> - group process - reflective listening - reframing - giving supportive feedback - problem-solving skills - recognizing/highlighting core principles - reflective practice - time management 	<p>Three days training for each day of workshop.</p> <p>One facilitator and one cofacilitator for each workshop.</p> <p>Materials: Training manual with:</p> <ul style="list-style-type: none"> - fully scripted training guide - examples of all charts and materials required - guide for facilitators on how to conduct the training 	<ul style="list-style-type: none"> - Demonstration - Modeling - Rehearsal and practice with supportive feedback - Discussing and role playing common problems - Positive trainer–facilitator relationships

Continued

Table 5. *Continued*

Item	Content	Structure	Process
Training coaches for in-class support	Trained to conduct each of the eight coaching sessions. Also trained in the skills listed above for training facilitators.	One coach is responsible for up to 30 teachers. Weekly group meetings with supervisor. Materials: Coaching manual with guidelines for each session including: - coaching protocol - record sheet - common problems and solutions - suggested goals for teachers - classroom assignments - behavior planning guide	- Role play and rehearsal - Collaborative problem solving - Discussion - Positive supervisor-coach relationship

support), the sensory level (e.g., materials), and the cognitive level (e.g., problem solving, informational techniques). The toolbox also includes what Han and Weiss⁴⁹ describe as the “essential ingredients” of a sustainable teacher-implemented mental health program in that the intervention is acceptable to teachers, effective, feasible to implement with minimal resources, and flexible.⁴⁹ Finally, the training is designed to be entertaining, engaging, and fun, which is important for maintaining teachers interest.⁵⁰ The importance of interventions being acceptable, feasible, and fun was also highlighted in the evaluations of an early childhood parenting program implemented in Brazil and Zimbabwe.⁴⁴

There are several advantages to using theory-informed behavior change interventions. First, by linking the behavior change techniques through theory to the problems that need to be addressed through the intervention, the hypothesized mechanisms of change are made explicit and this allows for an exploration of the mediators of intervention effectiveness with further refinement of theory.⁵¹

Second, mapping behavior change techniques onto barriers to intervention implementation through theory provides a framework for adapting interventions to other contexts by making changes to the content, context and/or to the training of facilitators.⁵² For example, researchers can adapt the intervention based on barriers that are relevant in their context; the intervention can be delivered through alternative means, for example, a different configuration of workshops and in-class support

can be used and/or the intervention can be delivered through a different modality, provided the core intervention and implementation components are intact; and, as multiple behavior change techniques can be used to address each barrier to intervention implementation, if a shorter or less intensive intervention is required, it may be possible to select a subset of intervention components and retain effectiveness on teacher and child outcomes.

Third, the transparent nature of the intervention facilitates staff training. For example, mapping intervention components to the COM-B framework for behavior change helps facilitators identify what intervention components need to be prioritized to enhance teachers’ skills, motivation, and/or opportunity (depending on teacher need), thus providing a concrete framework for facilitators to use. Also facilitators can use the framework to identify barriers that individual teachers are facing and prioritize the appropriate behavior change techniques to address that barrier in their interaction with the teacher. Finally, utilizing a theoretical framework makes the intervention more transparent and facilitates communication with policy makers.

Formative research to inform intervention development and/or adaptation is commonly used in LMICs.^{15,44–47,53} Combining formative research with the literature on common core components of effective interventions has been used to develop a parent program to prevent child abuse in South Africa.⁵⁴ The unique factor in the development of the Irie Classroom Toolbox is the integration

of three sources of information: (1) formative research, (2) the literature on common core components, and (3) behavior change theory, to create an implementation intervention for use with early childhood teachers in Jamaica. This process of integrating qualitative data with evidence-based theory and practice is appropriate to develop, adapt, and refine ECD interventions in LMICs. The process would also be relevant for other public health and education programs.

One of the primary aims of the Irie Classroom Toolbox is to prevent violence against children by teachers. Corporal punishment at school is prohibited in 131 and permitted in 68 countries.⁵⁵ However, even in countries with a legal prohibition, corporal punishment in schools continues to be widespread. Gershoff reported the prevalence of school corporal punishment in 29 countries with a legal ban and the prevalence estimates ranged from 13% to 97%.⁵⁶ Thus, while legislative reform is necessary, additional actions are required including advocacy and public education campaigns and training for teachers in positive discipline practices. Although the Irie Classroom Toolbox was developed for the Jamaican preschool context, the content and process of training is likely to have wide applicability to other LMIC with an established preschool network. The toolbox can also be adapted for use in the early grades of primary school and we have used an adapted version with grade one teachers in Jamaican primary schools. The toolbox is being made available through a Creative Commons license to the international community and has potential to make a strong contribution to the global agenda on violence prevention.

Acknowledgments

This paper was invited to be published individually and as one of several others as a special issue of *Ann. N.Y. Acad. Sci.* (1419: 1–271, 2018). The special issue was developed and coordinated by Aisha K. Yousafzai, Frances Aboud, Milagros Nores, and Pia Britto with the aim of presenting current evidence and evaluations on implementation processes, and to identify gaps and future research directions to advance effectiveness and scale-up of interventions that promote young children's development. A workshop was held on December 4 and 5, 2017 and sponsored by the New York Academy of Sciences to discuss and develop the content of

this paper and the other papers of the special issue. Funding for open access of the special issue is gratefully acknowledged from UNICEF and the New Venture Fund.

The author thanks Yakeisha Townsend for assisting with the intervention and for coding the qualitative interviews and the participating teachers from the community preschools in Kingston and St. Andrew. This work was supported by The Wellcome Trust (Grant numbers 080534/Z/06/Z and 094307/Z/10/Z) and by the Medical Research Council/The Wellcome Trust/UK Aid (Grant number MR/M007553/1).

Supporting information

Additional supporting information may be found in the online version of this article.

File S1. Preschool teachers' perceptions of the enablers and barriers to intervention implementation (webpage).

File S2. Samples of materials from the Irie Classroom Toolbox: typical problems and solutions—coaching session 3.

File S3. Examples of tools from the Irie Classroom Toolbox tools book: strategic praise and modeling a task.

File S4. The discipline hierarchy.

File S5. Problem-solving story guide: the special book.

File S6. Oath: I am an IRIE Classroom Toolbox teacher.

Competing interests

The author declares no competing interests.

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