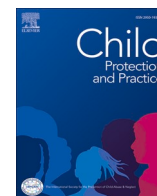




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Scaling a parenting program to reduce child maltreatment in Tanzania: The role of facilitator fidelity in adolescent and parent outcomes

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ABSTRACT

Background: There is limited and mixed evidence on the relationship between facilitator fidelity and the outcomes of parents/caregivers and children participating in parenting programs aiming to reduce violence against children. The evidence is particularly limited from program delivery in low- and middle-countries, at scale, and in community settings.

Participants and setting: The study used data collected by implementing partners during the 2020–2021 scale-up of Parenting for Lifelong Health for Parents and Adolescents (PLH-Teens) to 75,061 parents/caregivers and adolescents in rural and semi-urban Tanzania.

Methods: This study examined the predictive validity of an observational measure used to assess the fidelity of facilitators delivering PLH-Teens. To examine the relationship between facilitator fidelity and outcomes, multi-level Poisson regressions were conducted. A total of 24 facilitator assessments could be linked with pre-post surveys from 3057 families.

Findings: Analyses found mixed results, with fidelity having positive, negative, and insignificant associations with participant outcomes. The observational measure used in PLH-Teens was not found to demonstrate consistent predictive validity across multiple outcomes. As fidelity was positively associated with some participant outcomes, including the primary outcome (child maltreatment) according to adolescent- but not caregiver-reports, facilitator fidelity appears beneficial for participants to some extent.

Conclusion: There are a variety of potential explanations for the inconsistent results which suggest avenues for future research. Exploration of these avenues would benefit the ongoing dissemination of PLH and other parent programs as these communities strive to maximize the ability of families globally to benefit from evidence-based parenting programs.

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1. Background

Current thinking in the implementation science literature is that evidence-based interventions should be delivered with fidelity to the models tested via randomized trials in order to maintain their effectiveness (Allen et al., 2012). The role of implementation fidelity is theorized in several frameworks and models including those developed by Berkel et al. (2011) and Carroll et al. (2007), which conceptualize of participant outcomes as a function of the degree to which an intervention is delivered with fidelity. Although there are many types of fidelity (Proctor et al., 2011), two types thought to play a key role are facilitator adherence (the strictness of program delivery to intervention components) and facilitator competence (or quality of delivery, the skill and style of program delivery) (Breitenstein et al., 2010; Forgatch et al., 2005). Together, these two concepts are referred to as ‘facilitator fidelity’ or ‘facilitator competent adherence’. Facilitator fidelity, the focus of the present paper, is assumed to be directly associated with participant outcomes as facilitators are the vehicle through which participants receive, or do not receive, planned intervention components (Petersilia, 1990). Several reviews of the relationship between facilitator fidelity and outcomes in the broader intervention literature suggest that facilitators play a key role in the achievement of participant outcomes (e.g., Durlak & DuPre, 2008; Hill & Erickson, 2019; Naylor et al., 2015; Wilson et al., 2003).

Despite extensive randomized trial evidence that parenting programs are beneficial for the health and well-being of children and their parents/caregivers (parents), including reducing and preventing child maltreatment (Barlow & Coren, 2018; Buchanan-Pascall et al., 2018; Gardner et al., 2023; Jeong et al., 2021; Knerr et al., 2013; McCoy et al., 2020; WHO, 2023), there is limited and mixed evidence on the role facilitator fidelity plays in achieving participant outcomes. Several primary studies have found a positive relationship. For instance, a study on the Incredible Years parenting program found a significant and positive relationship between facilitator fidelity and positive parenting, which was also associated with improvements in child behavior (Eames et al., 2009). Similarly, several papers by Forgatch et al. on Parenting Management Training-Oregon Model found better facilitator fidelity to be associated with better parenting skills (Forgatch & DeGarmo, 2011; Forgatch et al., 2005). Further, a systematic review by Furlong et al. (2012) found that better facilitator fidelity was associated with more positive intervention effects. A synthesis without meta-analysis by Martin, Steele, et al. (2023) however, found that while most studies reported at least one positive association between observational measures of facilitator fidelity and outcomes, the literature was inconsistent with many studies finding no significant relationship and with some studies finding mixed results. To highlight one of the studies in this review, a study on Parenting for Lifelong Health for Parents and Adolescents program (PLH-Teens) in South Africa by Shenderovich et al. (2019) did not find significant associations between facilitator fidelity and outcomes, with one of 22 models finding a negative relationship ($N = 270$ families and 25 facilitators). To highlight another study in the Martin review, a study of the delivery of Parent-Child Interaction Therapy did not find that higher fidelity was associated with improved parenting or child behavior ($N = 32$ families and 17 facilitators) (Snider, 2019). As these examples exemplify, there is limited and mixed evidence on the relationship between facilitator fidelity and parenting program participant outcomes, with particularly scant evidence in the context of real-world delivery and low-resource settings. Potential explanations for the mixed evidence include small sample sizes, limited variability in facilitator fidelity, measures with poor reliability and validity, and poor study reporting (Martin et al., 2023a). Due to the limited and mixed evidence on the relationship between facilitator fidelity and outcomes, it is important that the parenting program field continues to test this relationship, investigates this relationship in a variety of study contexts, and considers potential reasons for study findings.

1.1. Current study

This study contributes to the inconsistent and limited literature by examining the role of facilitator fidelity on participant outcomes using data from the delivery of an evidence-based parenting program in community settings in a low-income country at scale. In investigating the scale-up of PLH-Teens by implementing organizations in Tanzania, this study is one of the first to examine the role of facilitator fidelity in a low- and middle-income country (LMIC) at scale via routine delivery with a large sample (Martin et al., 2021b, 2023b). Evaluating the impact of facilitator fidelity in a low-income context makes an important contribution to the parenting program literature as children in LMICs suffer greatly from the burden of violence against children (Hillis et al., 2016; Stoltenborgh et al., 2013; UNICEF, 2010). To investigate the role of fidelity in advancing child and family outcomes in LMIC contexts, we use data collected by implementing partners to examine the predictive validity of the observational measure of facilitator fidelity, the PLH-Teens Facilitator Assessment Tool or PLH-FAT-T, used to assess community facilitators delivering PLH-Teens. Versions of the PLH-FAT-T are used in multiple LMICs for purposes including certification, assessment of the quality of program delivery, and facilitator feedback on their delivery. As a result, the purpose of this study was to investigate the tool’s predictive validity to understand the role facilitator fidelity plays in achieving PLH-Teens participant outcomes. This information can then be used to enhance the tool and program outcomes for families. In the present study, we hypothesized that there would be a positive linear association between facilitator fidelity and outcomes wherein higher PLH-FAT-T Short Form scores would predict greater improvements in adolescent- and parent-reported outcomes.

2. Methods

2.1. Intervention

PLH-Teens is a low-cost, open-access parenting program developed by Parenting for Lifelong Health (PLH) to reduce violence against children and child behavioral and emotional problems among families in LMICs (Cluver et al., 2018). To date, PLH programs have been delivered to hundreds of thousands of participants in more than 35 LMICs (Shenderovich et al., 2020) and been the focus of over 15 randomized trials and dozens of mixed methods analyses (World Health Organization, n.d.). PLH programmes are targeted at parents with children across the development spectrum: PLH for Babies (prenatal-6 months), PLH for Toddlers (10–60 months), PLH for Young Children (2–9 years), and PLH-Teens (10–17 years). Based on behavior change principles and social learning theory, PLH-Teens is delivered to groups of parents and adolescents over 14 weekly sessions by trained facilitators from the local community, with each session being approximately three hours in length. Ten of the 14 sessions are delivered to groups of parent-adolescent dyads and four of the 14 sessions are delivered to groups of adolescents and parents separately. The program is delivered by facilitators using a participatory, non-didactic, and empowering approach. Program topics include spending time together, praising each other, communicating about emotions, dealing with conflict through problem-solving and positive discipline, family budgeting and saving, and responding to crisis situations such as sexual violence. A cluster-randomized trial ($N = 40$ clusters, 552 families, 25 facilitators) of PLH-Teens in South Africa found reductions in child maltreatment (e.g., corporal punishment, abuse) and improvements in positive parenting, involvement, and supervision (Cluver et al., 2018). As of writing, a trial of the PLH-Teens program is ongoing in the Philippines (Alampay et al., 2025). Since its initial testing in South Africa, PLH-Teens has been disseminated to 19 LMICs, mainly in sub-Saharan Africa.

2.2. Study setting and sample

We used data collected from the large-scale delivery of PLH-Teens by Pact Tanzania and five local implementing partner organizations in eight districts of rural and semi-urban Tanzania (Martin, Lachman, et al., 2021). In 2020 and 2021 during the COVID-19 pandemic, PLH-Teens was delivered in-person to 75,061 participants ($n = 36,259$ parents/primary caregivers and $n = 38,802$ adolescent girls aged 10–14 years old) in schools and community centres over three waves of implementation. Program sessions consisted of approximately 40 individuals, with 20 adolescent-caregiver pairs. The program was implemented as part of USAID's Kizazi Kipya initiative aiming to support the health and well-being of a million adolescent girls affected by HIV in sub-Saharan Africa. Program sessions were delivered by 444 community facilitators (community health workers and school teachers) who received five days of facilitator training from Clowns Without Borders South Africa (CWBSA), a non-profit organization that provides capacity-building for the delivery of PLH programs in Africa. Facilitators supported program delivery across all three waves of implementation.

2.3. Data collection procedures

Two types of secondary data collected by implementing partner organizations as part of routine monitoring and evaluation were used in this study: 3057 pre-post surveys from participant families and 24 facilitator assessments. Full data collection procedures are described in Lachman et al., 2024. All data were collected and anonymized by implementers before being shared with the research team. The pre-post surveys, collected at the first and last program session, measured a wide range of outcomes – child maltreatment, child conduct problems, child emotional problems, positive parental involvement, poor supervision, parenting stress, acceptability of corporal punishment, depression, financial insecurity, parental support of education, intimate partner violence (IPV) perpetration, IPV victimization, sexual health communication, and school violence. For the purposes of this analysis, the primary outcome of interest was child maltreatment as this is the main objective of PLH-Teens and all other outcomes were classified as secondary outcomes (Martin, Lachman, et al., 2021). The facilitator assessments were collected from a subsample of the 444 facilitators. Assessments were conducted in-person by program coaches, who were individuals selected by CWBSA to provide supportive supervision and feedback to facilitators. These coaches received two days of training (approximately 14 hours) in how to conduct observational assessments. Of the 31 coaches who provided facilitator assessments, demographic data were available from eight. These coaches were on average 35.9 years old, half were female, all were parents, and had education ranging from primary school to undergraduate degrees. The analyses conducted herein were approved by several ethics committees - in Tanzania and at Oxford.

2.4. Sample size

The secondary data used in this paper had limitations due to the difficulty of collecting and cleaning real-world data on such a large scale in a low-income setting during a global pandemic. As a result, this paper used the 'flawed, uncertain, proximate and sparse' data available (Wolpert & Rutter, 2018). A total of 67,456 parent/primary caregiver pre-post surveys and 73,358 adolescent pre-post surveys were collected by implementing partner organizations. However, only 24,863 surveys were useable due to a variety of issues which surfaced during data cleaning. Reasons for excluding data included substantial amounts of missing data; participants with more than one pre-test or post-test survey; parent and adolescent survey data which did not match; implausible survey responses; and survey answers wherein participants answered "0" to every question, which was interpreted as an error in data capturing. Many of the challenges with data collection were a

function of the difficulty of conducting such a large number of surveys in a low-income setting at scale, including issues with paper-based data collection, inadequate allocation of identification numbers, lost forms, and data entry errors. Of 24,863 surveys which were useable, data from 3057 families could be linked with the facilitator assessments collected by implementing partner organizations.

Regarding the facilitator assessments, only a small number of individual assessments were collected from a subsample of the facilitators involved in program delivery. A total of 95 facilitator assessments were collected by coaches during program delivery. Of these 95 assessments, facilitators received an average overall fidelity score of 82.3 %. However, only 24 of these assessments could be linked to pre-post surveys. Data from the 95 assessments were lost in three ways – 35 assessments did not have a facilitator identification number to link assessments to participant identification numbers; 27 did not have a facilitator identification number that matched participant identification numbers; and 14 facilitator identification numbers were duplicated. The loss of facilitator data is summarized in Fig. 1. As a result, assessments from a total of 24 facilitators are included in the present analyses.

Taking the family pre-post data and facilitator assessment together, each of these 24 facilitators reached approximately 127 families. This was possible as facilitators delivered the program across three waves of implementation, often facilitated more than one group per wave, and approximately 40 participants attended each program session.

2.5. Measures

2.5.1. Facilitator fidelity

PLH developed an observational assessment tool, the PLH-Teens-Facilitator Assessment Tool or PLH-FAT-T, for several reasons including to monitor facilitator fidelity as part of program dissemination of PLH-Teens across multiple settings. In this paper, PLH-FAT-T scores capturing facilitator fidelity were produced using the PLH-FAT-T Short Form which came to fruition as a result of a psychometric evaluation of the tool, which found that the shortened version had stronger psychometric properties (Martin et al., forthcoming) (see Supplementary File 1). Using the tool, facilitators are assessed on the delivery of one of two program activities. The two program activities, which assess facilitator adherence to program activities, are the home activity discussion (conversation led by the facilitator to review and discuss the assigned home practice activities; 7 items) and the role-play activity (facilitator-supported exercise to support participants in practicing key skills;

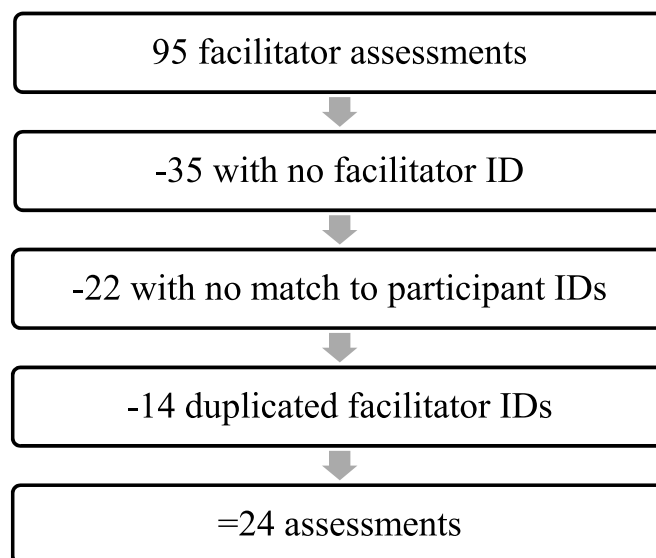


Fig. 1. Loss of facilitator assessment data during merging with pre-post surveys.

8 items). In addition to being assessed on either the home activity discussion or the role-play activity, facilitators are assessed on an additional 16 skills items related to their ability to model key parenting skills (3 items), use PLH's 'Accept-Explore-Connect-Practice' technique (5 items), and demonstrate collaborative leadership skills (8 items). Together, the skills items assess facilitator competence in their delivery of program activities. Each of the PLH-FAT-T Short Form items are rated using a three-point Likert scale ranging from zero to two (0 = *inadequate*, 1 = *good*, 2 = *excellent*). An overall facilitator fidelity score, represented as a percentage, are calculated out of a total possible score of 46 for facilitators assessed on the skills and home activity discussion (23 items × 2 points per item) or out of a total possible score of 48 for facilitators assessed on the skills and role-play items (24 items × 2 points per item).

2.5.2. Pre-post surveys

Implementing partner organizations administered pre-post surveys to parents who provided consent as well as to adolescents who provided assent and received parental consent. The pre-test survey was administered during program registration, and the post-test survey during the final program session. As a result, pre-post surveys were implemented over approximately 14 weeks, with some known variability based on adaptations made by implementers. A summary of the pre-post instruments used to assess the primary (child maltreatment) and secondary outcomes (child conduct problems, child emotional problems, positive parental involvement, poor supervision, parenting stress, acceptability of corporal punishment, depression, financial insecurity, parental support of education, sexual health communication, IPV perpetration, IPV victimization, and school violence) incorporated in the present analyses are included in Table 1. As outlined in a pre-published study protocol (Martin et al., 2021a), all primary and secondary program outcomes were explored due to the mixed evidence on the relationship between fidelity and participant outcomes in the literature. Implementing partners selected the instruments used to measure outcomes based on advice from CWBSA and PLH, and have been used in PLH studies around the world with similar samples and in similar

settings. The instruments were recommended as they are open-access and psychometrically validated. As the delivery of PLH-Teens was delivered to so many participants, implementers chose to shorten the instruments using item response theory to make data collection more feasible (Lachman et al., 2024). The choice to abbreviate the instruments may have limitations for the conclusions that can be drawn herein. However, the psychometric properties of the measures were investigated, and most scales were found to have high reliability (see Lachman et al., 2024). More information on the measures can be found in Supplementary File 2.

2.6. Data analyses

To investigate the predictive validity of the PLH-FAT-T Short Form on the change in pre-post outcomes, analyses used multi-level Poisson regressions with an interaction term between pre-post outcomes and facilitator fidelity. First, the data were inspected in preparation for the analyses. The distribution of each outcome was examined using Anderson-Darling Normality Tests. As outcomes were not normally distributed and measured frequencies, Poisson models were used except for one outcome (Fahrmeir et al., 2013). As acceptability of corporal punishment was binary, it was examined using logistic regression. Although some outcomes could have been run using negative binomial models, Poisson models were used to better address convergence and therefore model fit (Fahrmeir et al., 2013). Second, model composition was specified. The predicted variable was the adolescent- or parent-reported outcome; the fixed effect was time (interpreted as the intervention effect) interacting with fidelity; covariates were wave of delivery and district (region) of delivery; and the random effects were participants and facilitators with the former nested within the latter to address clustering. Clustering at the family level was addressed by running separate models for adolescent- and parent-reported outcomes. Wave of delivery was included as a covariate because each of the three rounds of implementation could have unique characteristics that influenced the ability of facilitators to deliver the program, especially during

Table 1
Primary and secondary outcomes administered using pre-post surveys.

Outcome	Type	Measure	Items	Unit Measure	Report
Child Maltreatment	Primary	ISPCAN Child Abuse Screening Tools-Trial Version (Meinck et al., 2018)	4	0 to 7 and 8 for more than or equal to 8 in the past 4 weeks	Parent and adolescent
Child Conduct Problems	Secondary	Strengths and Difficulties Questionnaire (Goodman, 1997)	5	0 = Not true, 1 = Somewhat true, 2 = Very true	Parent and adolescent
Child Emotional Problems	Secondary	Strengths and Difficulties Questionnaire (Goodman, 1997)	4	0 = Not true, 1 = Somewhat true, 2 = Very true	Adolescent
Positive Parental Involvement	Secondary	Alabama Parenting Questionnaire (Frick, 1991)	3	0 = Never, 1 = Almost never, 2 = Sometimes, 3 = Often, 4 = Always	Parent and adolescent
Poor Parental Supervision	Secondary	Alabama Parenting Questionnaire (Frick, 1991)	3	0 = Never, 1 = Almost never, 2 = Sometimes, 3 = Often, 4 = Always	Parent and adolescent
Parenting Stress	Secondary	Parental Stress Scale (Berry & Jones, 1995)	2	0 = Strongly disagree, 1 = Disagree, 2 = Neutral, 3 = Agree, 4 = Strongly agree	Parent
Parent and Adolescent Acceptability of Corporal Punishment	Secondary	Multiple Indicator Cluster Survey (UNICEF, 2022)	1	0 = Strongly disagree, Disagree, and Not sure; 1 = Agree and Strongly agree	Parent and adolescent
Parent and Adolescent Depression	Secondary	Centre for Epidemiologic Studies Depression Scale (CES-D 10) (Irwin et al., 1999)	3	0 = Rarely or none of the time, 1 = Some or a little of the time, 2 = Occasionally or a moderate amount of time, 3 = Most of the time	Parent and adolescent (assessing the
Family financial insecurity	Secondary	Family Financial Coping Scale (Shenderovich et al., 2020)	2	0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Often	Parent and adolescent
Parental Support of Education	Secondary	Parental Support for School Scale (Ceballos et al., 2014)	2	1 = Never, 2 = Hardly ever, 3 = Sometimes, 4 = Most of the time, 5 = Almost every day	Parent and adolescent
Parental Intimate Partner Violence Perpetration and Victimization	Secondary	Revised Conflict Tactics Scale Short Form (Straus et al., 1996)	4	0 to 7 and 8 for more than or equal to 8 in the past 4 weeks	Parent
Parent-Child Sexual Health Communication	Secondary	Risk Avoidance Planning Scale (Cluver et al., 2018)	3	0 = No, I find it too hard to talk about this, 1 = We have not made plans yet but I would like to talk about it, 2 = We have discussed this together	Parent and adolescent
School Violence	Secondary	Created based on ISPCAN Child Abuse Screening Tools-Trial Version	3	0 to 7 and 8 for more than or equal to 8 in the past 4 weeks	Adolescent

the COVID-19 pandemic. Wave of delivery could have also impacted the ability of participants to benefit from the program. The district of delivery was included as a covariate as the implementing partner organization coordinating program delivery in each district could have created an environment that was more or less conducive to facilitator delivery as well as participant outcomes. Third, as facilitators were assessed on either the home activity discussion (7 items) or role-play (8 items), PLH-FAT-T Short Form scores were adjusted to ensure the scores were comparable. To produce an equally weighted index measure of facilitator fidelity, a standard deviation score was created by subtracting the mean of each subscale and dividing by the standard deviation of each subscale. This approach made the scores comparable by weighting scores by the distribution from which they were derived. Fourth, the multi-level Poisson regression models were run incorporating an interaction term to examine the relationship between facilitator fidelity and time (pre to post). To aid with convergence issues, the optimizer “bobyqa” was used (Bates et al., 2015). Fifth, to account for the potential increase in Type I error resulting from running multiple comparisons, the Benjamini-Hochberg adjustment was applied to the resulting p-values. This adjustment was selected because this method does not reduce power as much as other methods and produces a less conservative estimate (Benjamini & Hochberg, 1995; Chen et al., 2017; Lee & Lee, 2018). Finally, the results were interpreted using an incidence rate ratio (IRR) and 95 % confidence interval if the interaction term was significant ($p < 0.05$). The analyses were conducted in R v4.2.2 using the “iccCounts”, “lme4”, “dplyr”, “tidyverse”, and “nortest” packages (Bates et al., 2015; Carrasco, 2022; Gross & Ligges, 2015; R Core Team, 2021; Wickham et al., 2019; Wickham et al., 2023).

3. Results

3.1. Participant and facilitator characteristics

Of the 3057 families at baseline, 59.7 % of parents identified as women. Parents and primary caregivers ranged from 18 to 95 years with a mean age of 45.4 years. Adolescent girls ranged from nine to 16 years with a mean age of 11.9 years. Families reported experiencing a range of vulnerabilities – 63.0 % of parents were unemployed, 56.2 % reported running out of money for food or essentials in the last month, 12.6 % were affected by the drug abuse of a family member, 11.0 % indicated that the family had an unwell caregiver, 7.2 % shared that the family had at least one child who was sick, and 4.9 % had experienced the death of a family member due to TB or HIV.

Among the facilitators who reported demographic data, the mean

age was 33.6 years with a range from 25 to 54 years. Ten facilitators identified as male (41.7 %), eight facilitators identified as female (33.3 %), and six did not provide data on their gender (25.0 %). Out of the 13 facilitators who reported their caregiving status, most facilitators were parents themselves (92.3 %). Facilitators reported being assessed on sessions 1 through 9 with the median response being session 3. Only one facilitator reported being assessed on a prior occasion. On the three subscales, facilitators received a mean score of 8.91 out of 14 (63.6 %, SD: 4.81, range: 0–14) on the home activities items, 11.86 out of 16 (74.1 %, SD: 2.57, range: 8–16) on the role-play items, and 26.21 out of 32 (81.9 %, SD: 4.65, range: 10–32) on the skills items.

3.2. Pre-post intervention outcomes

The pre-post outcomes for the participants whose data were linked with facilitator data are shown in Table 2 ($N = 3057$ parent-adolescent dyads). Intra-class correlations between each covariate and participant outcome is displayed in Supplementary File 3. The pre-post outcomes of the 3057 families aligns with the results of the larger sample of families, with all outcomes improving from pre-to post-test with the exception of parental support of education and positive parental involvement (Lachman et al., 2024).

3.3. Associations between facilitator fidelity and outcomes

Table 3 shows the results of the models testing associations between facilitator fidelity scores and family outcomes. Results are displayed using adjusted p-values. The results of associations between each subscale (home activities, role-play, and skills) and outcomes are included in supplementary file 4.

3.3.1. Main PLH-Teens outcomes

Increased fidelity was not significantly associated with parent-reported child maltreatment or child conduct problems. As it relates to adolescent-reported outcomes, increased fidelity was associated with a 14 % decrease in child maltreatment (IRR = 0.86 [95 % CI = 0.82–0.90, $p < 0.001$]), a 27 % decrease in child conduct problems (IRR = 0.73 [95 % CI = 0.70–0.77, $p < 0.001$]), and a 23 % decrease in child emotional problems (IRR = 0.77 [95 % CI = 0.69–0.86, $p < 0.001$]).

3.3.2. Secondary outcomes - parenting

Increased fidelity had mixed associations with poor supervision as better delivery was associated with an 8 % increase in parent-reported poor supervision (IRR = 1.08 [95 % CI = 1.03–1.15, $p < 0.01$]) yet a

Table 2
Primary and secondary outcomes at pre- and post-test of subset of 3057 families.

Outcome	Parent-Reported Pre-Test	Parent-Reported Post-Test	Adolescent-Reported Pre-Test	Adolescent-Reported Post-Test
Child Maltreatment	2.74 (3.19)	1.23 (1.73)	2.92 (3.21)	1.14 (1.73)
Conduct Problems	1.44 (1.75)	1.25 (1.81)	1.61 (1.80)	1.14 (1.63)
Positive Involvement	6.75 (4.02)	1.45 (2.14)	6.23 (3.90)	2.49 (2.05)
Poor Supervision	1.12 (1.77)	0.84 (1.38)	1.17 (1.76)	0.99 (1.58)
Parenting Stress	3.45 (2.62)	2.48 (2.38)	Not reported	Not reported
Acceptability of Corporal Punishment ^a	860 (or 28.13 % of parents) ^a	242 (or 7.92 % of parents) ^a	498 (or 16.29 % of adolescents) ^a	101 (or 3.30 % of adolescents) ^a
Depression	3.91 (1.63)	3.20 (1.64)	3.04 (2.10)	2.34 (2.03)
Financial Insecurity	3.03 (2.16)	2.46 (2.10)	Not reported	Not reported
Sexual Health Communication	2.77 (2.05)	4.16 (2.27)	2.71 (2.15)	4.11 (2.25)
Parental Support for Education	6.47 (2.80)	3.61 (1.41)	3.94 (2.63)	0.62 (1.24)
Intimate Partner Violence Perpetration	1.16 (2.21)	1.11 (1.49)	Not reported	Not reported
Intimate Partner Violence Victimization	1.28 (2.36)	1.19 (1.58)	Not reported	Not reported
Emotional Problems	Not reported	Not reported	1.80 (2.12)	2.06 (1.91)
School Violence	Not reported	Not reported	3.52 (4.64)	1.47 (2.09)

Notes: Standard deviations are in brackets after means. Depending on the outcome, increases or decreases from pre-to post-test are representative of either a positive or negative outcome for families.

^a As acceptability of corporal punishment is a binary variable, the data presented is the number of participants who agreed with the statement supporting the use of corporal punishment with the percentage of participants in brackets.

Table 3

Associations between parent- and adolescent-reported outcomes and facilitator fidelity.

Outcome	Parent-Report	Adolescent-Report
Child Maltreatment, <i>N</i> = 24 facilitators, <i>N</i> = 3057 families	IRR = 1.05, SE = 0.02, 95 % CI = 1.00–1.10, <i>p</i> = 0.10	IRR = 0.86, SE = 0.02, 95 % CI = 0.82–0.90, <i>p</i> < 0.001***
Child Conduct Problems, <i>N</i> = 24 facilitators, <i>N</i> = 3057 families	IRR = 1.01, SE = 0.02, 95 % CI = 1.07–1.15, <i>p</i> = 0.73	IRR = 0.73, SE = 0.02, 95 % CI = 0.70–0.77, <i>p</i> < 0.001***
Child Emotional Problems ^, <i>N</i> = 24 facilitators, <i>N</i> = 3057 adolescents	Not reported	IRR = 0.77, SE = 0.06, 95 % CI = 0.69–0.86, <i>p</i> < 0.001***
Poor Supervision, <i>N</i> = 24 facilitators, <i>N</i> = 3057 families	IRR = 1.08, SE = 0.03, 95 % CI = 1.03–1.15, <i>p</i> < 0.01**	IRR = 0.93, SE = 0.02, 95 % CI = 0.89–0.97, <i>p</i> < 0.01**
Positive Parental Involvement ^, <i>N</i> = 22 facilitators, <i>N</i> = 1654 families	IRR = 1.52, SE = 0.05, 95 % CI = 1.37–1.69, <i>p</i> < 0.001***	IRR = 1.00, SE = 0.04, 95 % CI = 0.92–1.08, <i>p</i> = 0.90
Parental Support of Education ^, <i>N</i> = 22 facilitators, <i>N</i> = 1654 families	IRR = 1.04, SE = 0.03, 95 % CI = 0.97–1.11, <i>p</i> = 0.50	IRR = 2.22, SE = 0.08, 95 % CI = 1.90–2.58, <i>p</i> < 0.001***
Parenting Stress, <i>N</i> = 24 facilitators, <i>N</i> = 3057 parents	IRR = 1.11, SE = 0.02, 95 % CI = 1.07–1.15, <i>p</i> < 0.001***	Not reported
Acceptability of Corporal Punishment ◇, <i>N</i> = 24 facilitators, <i>N</i> = 3057 families	IRR = 1.28, SE = 0.07, 95 % CI = 1.11–1.49, <i>p</i> < 0.01**	IRR = 0.94, SE = 0.08, 95 % CI = 0.80–1.11, <i>p</i> = 0.57
Sexual Health Communication, <i>N</i> = 24 facilitators, <i>N</i> = 3057 families	IRR = 1.01, SE = 0.01, 95 % CI = 0.99–1.04, <i>p</i> = 0.59	IRR = 1.10, SE = 0.01, 95 % CI = 1.07–1.12, <i>p</i> < 0.001***
Depression, <i>N</i> = 24 facilitators, <i>N</i> = 3057 families	IRR = 0.96, SE = 0.01, 95 % CI = 0.94–0.99, <i>p</i> < 0.01**	IRR = 0.99, SE = 0.01, 95 % CI = 1.07–1.12, <i>p</i> = 0.33
Financial Insecurity, <i>N</i> = 24 facilitators, <i>N</i> = 3057 parents	IRR = 1.05, SE = 0.01, 95 % CI = 1.03–1.08, <i>p</i> < 0.001***	Not reported
School Violence ^, <i>N</i> = 22 facilitators, <i>N</i> = 1684 adolescents	Not reported	IRR = 0.69, SE = 0.07, 95 % CI = 1.49–1.92, <i>p</i> < 0.001***
IPV Victimization ^, <i>N</i> = 22 facilitators, <i>N</i> = 1654 parents	IRR = 1.61, SE = 0.09, 95 % CI = 1.36–1.90, <i>p</i> = 0.83	Not reported
IPV Perpetration ^, <i>N</i> = 22 facilitators, <i>N</i> = 1654 parents	IRR = 1.81, SE = 0.09, 95 % CI = 1.52–2.16, <i>p</i> < 0.001***	Not reported

Note: Significance codes: ****p* < 0.001, ***p* < 0.01, **p* < 0.05. The outcomes with the “^” symbol were run without wave as a fixed effect due to rank deficiency. The outcome with the “◇” was run as a logistic regression as it is binary. IRR is the incidence rate ratio. LL is the lower bound and UL is the upper bound of the 95 % confidence interval.

7 % decrease in adolescent-reported poor supervision (IRR = 0.93 [95 % CI = 0.89–0.97, *p* < 0.01]). Increased fidelity was associated with a 52 % increase in parent-reported positive parental involvement (IRR = 1.52 [95 % CI = 1.37–1.69, *p* < 0.001]) but was not significantly associated with adolescent-reported positive parental involvement. Increased fidelity was not significantly associated with parent-reported parental support of education but was associated with a 122 % increase in adolescent-reported parental support of education (IRR = 2.22 [95 % CI = 1.90–2.58, *p* < 0.001]). Increased fidelity was associated with a 28 % increase in parent-reported acceptability of corporal punishment (IRR = 1.28 [95 % CI = 1.11–1.49, *p* < 0.01]) but was not significantly associated with adolescent-reported acceptability of corporal punishment. Increased fidelity was not significantly associated with parent-reported sexual health communication but was associated with a 10 % increase in adolescent-reported sexual health communication (IRR = 1.10 [95 % CI = 1.07–1.12, *p* < 0.001]).

3.3.3. Secondary outcomes – family well-being and other violence

Increased fidelity was associated with a 4 % decrease in parent-reported depression (IRR = 0.96 [95 % CI = 0.94–0.99, *p* < 0.01])

but was not significantly associated with adolescent-reported depression. Increased fidelity was associated with a 5 % increase in parent-reported financial insecurity (IRR = 1.05 [95 % CI = 1.03–1.08, *p* < 0.001]). Increased fidelity was associated with 11 % increase in parenting stress (IRR = 1.11 [95 % CI = 1.07–1.15, *p* < 0.001]). Increased fidelity was also associated with a 31 % decrease in adolescent-reported school violence (IRR = 0.69 [95 % CI = 1.49–1.92, *p* < 0.001]). Increased fidelity was not significantly associated with parent-reported IPV victimization but was associated with an 81 % increase in parent-reported IPV perpetration (IRR = 1.81 [95 % CI = 1.52–2.16, *p* < 0.001]).

4. Discussion

4.1. Overall findings

In this paper, we examined the predictive validity of an observational measure of facilitator fidelity using secondary data collected during the large-scale routine delivery of a parenting program in a low-income country. Results show that across the 12 parent-reported and 10 adolescent-reported outcomes examined, the relationship between the PLH-FAT-T Short Form assessment results and outcomes was mixed with higher fidelity scores associated with improved outcomes (positive relationship), some not statistically significant associations (insignificant relationship), and a few wherein higher fidelity scores were associated with worsened outcomes (negative relationship). For the primary outcome of interest, fidelity was not significantly associated with parent-reported child maltreatment but was associated with reductions in adolescent-reported child maltreatment.

Of the 12 parent-reported outcomes, higher fidelity was associated with improvements in two outcomes (positive parental involvement, parental depression), insignificant for five outcomes (child maltreatment, child conduct problems, parental support of education, sexual health communication, IPV victimization), and associated with worse outcomes for five outcomes (poor supervision, acceptability of corporal punishment, parenting stress, financial insecurity, IPV perpetration).

Amongst the 10 adolescent-reported outcomes, higher fidelity was associated with improvements for seven outcomes (child maltreatment, child conduct problems, child emotional problems, poor supervision, parental support of education, sexual health communication, school violence) and insignificant for three outcomes (positive parental involvement, acceptability of corporal punishment, adolescent depression).

Taken together, the results are not as hypothesized as higher PLH-FAT-T Short Form scores do not consistently predict better participant outcomes. In the context of routine program delivery at scale, the PLH-FAT-T Short Form has not been found to demonstrate predictive validity across multiple outcomes. Although higher levels of fidelity were positively associated with the primary outcome based on adolescent-reports, the PLH-FAT-T Short Form's overall predictive validity is not consistent. As a result, facilitator fidelity may be beneficial for participants to some extent.

4.2. Findings in the context of the broader literature

Although the insignificant and negative associations found are in contrast to the commonly theorized relationship between facilitator fidelity and participant outcomes (Berkel et al., 2011; Carroll et al., 2007), the findings regarding insignificant and mixed associations are not unlike those found in the broader parenting program literature. A systematic review of papers reporting on the relationship between facilitator fidelity and outcomes in the parenting literature also found insignificant, positive, and mixed associations with outcomes (Martin, Steele, et al., 2023). Yet, unlike the broader literature, we found that in some cases better fidelity was associated with negative associations between facilitator fidelity and some outcomes. Insignificant and

negative associations were also found in the study of PLH-Teens in South Africa by Shenderovich et al. (2019), which did not use the PLH-FAT-T Short Form. In that study, while nearly all outcomes had an insignificant relationship, higher facilitator fidelity was associated with higher levels of adolescent-reported child maltreatment.

4.3. Potential explanations and clinical implications

While there may be more, eight potential explanations for the inconsistent findings with potential clinical implications are explored herein. First, the results may indicate that the PLH-FAT-T Short Form has poor predictive validity as the tool is not associated with outcomes in the manner hypothesized. While positive linear associations between facilitator fidelity and family outcomes were found in some cases, negative and insignificant associations were also found.

Second, the degree to which PLH-FAT-T Short Form assessments can be relied upon may be limited due to poor to moderate assessor reliability found in a psychometric evaluation of the tool by Martin et al. (forthcoming). The poor to moderate reliability may mean that the assessments did not consistently capture facilitator delivery. If the facilitator fidelity was not consistently captured, the results of the present study may be over or underestimating facilitator delivery. As a result, further testing and refining of the PLH-FAT-T Short Form is needed in future research and practice.

Third, the true nature of the relationship between facilitator fidelity and outcomes may be difficult to detect due to a range of methodological challenges when studying implementation fidelity during routine service delivery. Detecting the true nature of the relationship between facilitator fidelity and outcomes may have been limited because of the sample size. As a systematic review found that the average sample size in randomized trials to be 38 facilitators and 159 families (Martin, Steele, et al., 2023), the present study (with data from 24 facilitators and 3057 families) was larger than many studies. Future studies should prioritize collecting data from more facilitators, and assess facilitators more than once.

Fourth, it is possible that fidelity does not relate to outcomes as hypothesized. For instance, there may not be a linear relationship between facilitator fidelity and family outcomes. Some studies have found that fidelity plays an indirect role in achieving participant outcomes. Smith et al. (2013) found that participant engagement had an intervening effect on the relationship between facilitator fidelity and outcomes. Further studies may need to examine a variety of implementation fidelity components (e.g., participant engagement and responsiveness, therapeutic alliance) or examine the role of multiple implementation fidelity components simultaneously to capture the complex relationships that could be at play in achieving participant outcomes (Berkel et al., 2011). In particular, in future research and practice, the combined role that participant attendance, engagement, and facilitator fidelity play should be investigated simultaneously.

Fifth, the interaction between facilitator fidelity and real-time program adaptations may explain why facilitator fidelity does not always relate to outcomes as expected. It may be that 'fidelity-consistent' adaptations that maintain intended intervention 'functions' produce similar program effects (Skivington et al., 2021; Stirman et al., 2015). For example, facilitators may make planned or responsive adaptations which achieve positive outcomes without implementing the model exactly as intended (Miller et al., 2021). Qualitative data collected as part of a larger study of the implementation of PLH-Teens in Tanzania (Martin, Lachman, et al., 2021) indicated that facilitators made responsive adaptations to the program by translating it from Kiswahili into local languages since some participants did not speak the national language (Shenderovich et al., forthcoming). While this responsive adaptation may have prevented facilitators from delivering all program components, it allowed many more families to engage and therefore benefit from the program. While such adaptations may be extremely beneficial in achieving outcomes, there is no consensus on how best to

capture adaptations and then quantitatively examine their impact on participant outcomes (McHugh et al., 2009). Future research may benefit from testing novel approaches for taking adaptations into account to determine whether, and how, the interaction of fidelity and adaptations play a role in participant outcomes. As an example, a paper by Owen and Hilsenroth (2014) examined within-case variabilities in therapist delivery of adult psychotherapy, which was associated with better patient outcomes and explained 10 % of the variance. The dynamic relationship between responsive adaptation and facilitator fidelity may find support in a paper by Hogue et al. (2008). This paper found a curvilinear relationship wherein higher levels of facilitator adherence were associated with less improvement in participant outcomes and mediocre levels of facilitator adherence were associated with the best outcomes. This finding may indicate that facilitators who less strictly adhered to the intervention made meaningful adjustments that helped participants to achieve better results. Future studies on the PLH-FAT-T Short Form should examine curvilinear relationships by testing whether 'medium' levels of facilitator fidelity relate to better participant outcomes.

Sixth, facilitator fidelity may play a less significant role in achieving desired outcomes than anticipated or, at some point, may even play a negative role. Although negative associations are infrequently observed in the literature, it is difficult to know the extent to which publication bias and selective reporting have prevented negative associations from being reported and published (Breitenstein et al., 2010; Martin, Steele, et al., 2023). It is possible that facilitator fidelity could play a negative role in that too closely adhering to intervention components does not allow for facilitators to make responsive adaptations.

A seventh potential explanation for the findings is that only certain components of PLH-Teens are working to achieve positive participant outcomes. It is possible that the PLH-FAT-T Short Form is not capturing the important aspects of facilitator delivery when measuring facilitator fidelity to delivery on the subscales (skills and home activity or role-play). As parenting programs have complex theories of change, there are a variety of potential mechanisms that may be working individually or in combination to produce participant outcomes (Leijten et al., 2022; Melendez-Torres et al., 2019). Future research might consider pairing an investigation of facilitator fidelity with a component analysis as well as analyses of whether adherence and competence play differing roles in participant outcomes.

An eighth potential explanation is that the use of shortened family outcome measures did not provide a full picture of participant outcomes. Due to the constraints of data collection in real-world, low-resource context, shortened measures were used. As a result, the sensitivity of the outcomes measured could be attenuated thereby providing an incomplete picture of the potential relationship between facilitator fidelity and participant outcomes. Studies utilizing the long-form of parent and adolescent outcome measures is therefore recommended in future research and practice.

4.4. Limitations

This paper has several limitations. The data used were not collected as part of a randomized trial. Instead, the pre-post surveys and facilitator assessments were collected during program scale-up via routine service delivery in low-income, rural and semi-urban settings in Tanzania throughout the height of the COVID-19 pandemic. This context presented challenges to implementing partners which meant that the data collected were 'flawed, uncertain, proximate, and sparse' (Wolpert & Rutter, 2018). As a result, assumptions and compromises were required when cleaning and merging facilitator data with pre-post surveys. One such compromise was that pre-post assessments were only conducted over a short, 14-week time frame rather than over a longer-term period, with a longer assessment window potentially being more appropriate for observing participant outcomes (e.g., reductions in maltreatment might improve over time as parents incorporate learned strategies into their

daily parenting). As a result, utilizing longer-term measurements could have provided a different picture of the role of facilitator fidelity on participant outcomes. However, the pre-post results showed reductions in child maltreatment (see Table 2; Lachman et al., 2024), which is in alignment with other studies which have found reductions in child maltreatment within a short assessment window (Chen & Chan, 2016; World Health Organization, 2022). The findings suggest that this study provides some indication of the role of facilitator fidelity in participant outcomes. Regarding facilitator assessments, although 95 assessments were conducted, only 24 could be merged with 3057 pre-post surveys. This small sample of facilitator assessments limited the predictive power of the analyses by providing little variability in PLH-FAT-T Short Form scores. There were also several limitations with the PLH-FAT-T Short Form assessment procedure. As assessments were conducted in-person, facilitators may have been affected by reactivity bias (Girard & Cohn, 2016). Furthermore, since it was logistically challenging to assess each facilitator during program scale-up in the pandemic, the assessments conducted only captured one participant group at one timepoint. The analysis assumed that the PLH-FAT-T Short Form assessments captured were reflective of each facilitator's overall delivery. This assumption is supported by the findings of Shenderovich's paper of PLH-Teens in South Africa, which found that facilitator fidelity did not systematically change over time (2019). However, facilitator delivery may improve (e.g., Forgatch & DeGarmo, 2011) or decline (e.g., Chiapa et al., 2015) over time. Additionally, assessments only allowed for the observation of facilitators in delivering either the home activity discussion or the role-play activity. As these two activities could play different roles in participant outcomes, it is possible that the analyses described herein do not adequately capture the role of facilitator fidelity of program activities on participant outcomes. Finally, this research was conducted on a program delivered to families during a global pandemic. As a result, the influence of this context on the family outcomes and relationships investigated herein is unknown (see Lachman et al., 2024).

While this study has limitations, we made the best of the data available to examine the potential role that facilitator fidelity had on the outcomes of the parents and adolescents who participated in PLH-Teens at scale in Tanzania.

5. Conclusion

Our study is the first investigation of its kind and contributes to the literature by examining the role of facilitator fidelity on parenting program participant outcomes using data collected from in a LMIC during routine delivery at scale in a low-income community setting. Implementation science has an important role to play in determining how to implement and maximize the effectiveness of parenting interventions in practice for the benefit of vulnerable children, youth, and families. An important consideration is the degree to which interventions should be delivered with fidelity to their theory of change, particularly by those who implement interventions in practice. The value of knowing the role that facilitator fidelity plays in participant outcomes is only heightened as more parenting programs and other behavioral interventions are delivered at scale in low-income settings (Martin, Shenderovich, et al., 2023).

To contribute to this literature, we investigated the predictive validity of an observational measure of facilitator fidelity, the PLH-FAT-T Short Form, used in PLH-Teens – a program aiming to reduce violence against children and child behavioral and emotional problems. Similar to the findings of some other studies on facilitator fidelity and its association with program outcomes, our findings do not provide a clear answer on whether, and to what extent, facilitator fidelity is associated with participant outcomes. There are a variety of potential explanations for the inconsistent results which suggest avenues for future research. Exploration of these avenues would benefit the ongoing delivery and dissemination of PLH programs as well as the broader parenting program literature as these communities strive to maximize the ability of

vulnerable children and families globally to benefit from evidence-based parenting programs.

CRedit authorship contribution statement

Mackenzie Martin: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Jamie M. Lachman:** Writing – review & editing, Supervision, Data curation, Conceptualization. **Francisco Calderon:** Writing – review & editing, Formal analysis, Data curation. **Qing Han:** Writing – review & editing, Formal analysis. **Yulia Shenderovich:** Writing – review & editing, Conceptualization. **Esther Nydetabura:** Writing – review & editing, Data curation, Conceptualization. **Nyasha Manjenguja:** Writing – review & editing, Data curation, Conceptualization. **Joyce Wamoyi:** Writing – review & editing, Supervision, Funding acquisition, Conceptualization. **Frances Gardner:** Writing – review & editing, Supervision, Conceptualization.

Ethical approval

The analyses conducted herein were approved by several ethics committees - in Tanzania (NIMR/HQ/R.8a/Vol.IX/3459 and NIMR/HQ/R.8a/Vol.IX/2902) and at Oxford (RE002 HEY BABY; R64777/RE001; SPR_DREC_2021_026).

Data availability

The secondary datasets analyzed during the current study are not available under the research agreements made between study partners. Information and study materials are available on our Open Science Framework page: <https://osf.io/m5fu2/>. Intervention materials can be found on the World Health Organization website: <https://www.who.int/teams/social-determinants-of-health/parenting-for-lifelong-health>.

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Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Jamie Lachman and Mackenzie Martin receive occasional fees for facilitator and coach assessment training for Parenting for Lifelong Health. All authors are involved in the evaluation of Parenting for Lifelong Health programs globally. The other authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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References

- Alampay, L. P., Reyes, J., Mamaug, B., Reyes, D., & Lachman, J. M. (2025). *Randomized controlled trial of the Masayng Pamilya para sa Batang Pilipino Program for families with teens program*. <https://doi.org/10.17605/OSF.IO/QDTYV> (in press).
- Allen, J. D., Linnan, L. A., & Emmons, K. M. (2012). Fidelity and its relationship to implementation effectiveness, adaptation, and dissemination. In R. C. Brownson, G. A. Colditz, & E. K. Proctor (Eds.), *Dissemination and implementation research in health: Translating science to practice*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199751877.003.0014>.
- Barlow, J., & Coren, E. (2018). The effectiveness of parenting programs: A review of campbell reviews. *Research on Social Work Practice*, 28(1), 99–102.
- Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, 67(1), 1–48. <https://doi.org/10.18637/jss.v067.i01>
- Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society: Series B*, 57(1), 289–300.
- Berkel, C., Mauricio, A. M., Schoenfelder, E., & Sandler, I. N. (2011). Putting the pieces together: An integrated model of program implementation. *Prevention Science*, 12(1), 23–33.
- Breitenstein, S. M., Gross, D., Garvey, C. A., Hill, C., Fogg, L., & Resnick, B. (2010). Implementation fidelity in community-based interventions. *Research in Nursing & Health*, 33(2), 164–173. <https://doi.org/10.1002/nur.20373>
- Buchanan-Pascall, S., Gray, K. M., Gordon, M., & Melvin, G. A. (2018). Systematic review and meta-analysis of parent group interventions for primary school children aged 4–12 years with externalizing and/or internalizing problems. *Child Psychiatry and Human Development*, 49(2), 244–267.
- Carrasco, J. (2022). Iccounts: Intraclass correlation coefficient for count data. <https://CRAN.R-project.org/package=iccCounts>.
- Carroll, C., Patterson, M., Wood, S., Booth, A., Rick, J., & Balain, S. (2007). A conceptual framework for implementation fidelity. *Implementation Science*, 2(1), 40.
- Chen, M., & Chan, K. L. (2016). Effects of parenting programs on child maltreatment prevention: A meta-analysis. *Trauma, Violence, & Abuse*, 17(1), 88–104.
- Chen, S. Y., Feng, Z., & Yi, X. (2017). A general introduction to adjustment for multiple comparisons. *Journal of Thoracic Disease*, 9(6), 1725–1729. <https://doi.org/10.21037/jtd.2017.05.34>
- Chiapa, A., Smith, J. D., Kim, H., Dishion, T. J., Shaw, D. S., & Wilson, M. N. (2015). The trajectory of fidelity in a multiyear trial of the family check-up predicts change in child problem behavior. *Journal of Consulting and Clinical Psychology*, 83(5), 1006.
- Cluver, L. D., Meinck, F., Steinert, J. I., Shenderovich, Y., Doubt, J., Romero, R. H., Lombard, C. J., Redfern, A., Ward, C. L., & Tsoanyane, S. (2018). Parenting for lifelong health: A pragmatic cluster randomised controlled trial of a non-commercialised parenting programme for adolescents and their families in South Africa. *BMJ Global Health*, 3(1), Article e000539. <https://doi.org/10.1136/bmjgh-2017-000539>
- Durlak, J. A., & DuPre, E. P. (2008). Implementation matters: A review of research on the influence of implementation on program outcomes and the factors affecting implementation. *American Journal of Community Psychology*, 41(3–4), 327–350.
- Eames, C., Daley, D., Hutchings, J., Whitaker, C., Jones, K., Hughes, J., & Bywater, T. (2009). Treatment fidelity as a predictor of behaviour change in parents attending group-based parent training. *Child: Care, Health and Development*, 35(5), 603–612.
- Fahrmeir, L., Kneib, T., Lang, S., & Marx, B. (2013). Regression: Models, methods, and applications. In *Regression*. Springer.
- Forgatch, M. S., & DeGarmo, D. S. (2011). Sustaining fidelity following the nationwide pmtmTM implementation in Norway. *Prevention Science*, 12(3), 235–246.
- Forgatch, M. S., Patterson, G. R., & DeGarmo, D. S. (2005). Evaluating fidelity: Predictive validity for a measure of competent adherence to the oregon model of parent management training. *Behavior Therapy*, 36(1), 3–13.
- Furlong, M., McGilloway, S., Bywater, T., Hutchings, J., Smith, S. M., & Donnelly, M. (2012). Behavioural and cognitive-behavioural group-based parenting programmes for early-onset conduct problems in children aged 3 to 12 years. *Campbell Systematic Reviews*, 8(1), 1–239. <https://doi.org/10.4073/csr.2012.12>
- Gardner, F., Shenderovich, Y., McCoy, A., Schafer, M., Martin, M., Janowski, R., Varadun, S., Backhaus, S., Barlow, J., & Ward, C. (2023). World health organization guidelines on parenting to prevent child maltreatment and promote positive development in children aged 0-17 years—report of the reviews for the integrate framework. <https://orca.cardiff.ac.uk/id/eprint/157322/1/who-integrate-reviews-for-who-parenting-guideline-jan-27th-2023.pdf>.
- Girard, J. M., & Cohn, J. F. (2016). A primer on observational measurement. *Assessment*, 23(4), 404–413. <https://doi.org/10.1177/1073191116635807>
- Gross, J., & Ligges, U. (2015). Norstest: Tests for normality. *R package version, 1.0–4*. <https://CRAN.R-project.org/package=norstest>.
- Hill, H. C., & Erickson, A. (2019). Using implementation fidelity to aid in interpreting program impacts: A brief review. *Educational Researcher*, 48(9), 590–598.
- Hillis, S., Mercy, J., Amobi, A., & Kress, H. (2016). Global prevalence of past-year violence against children: A systematic review and minimum estimates. *Pediatrics*, 137(3), Article e20154079.
- Hogue, A., Henderson, C., Dauber, S., Barajas, P., Fried, A., & Liddle, H. (2008). Treatment adherence, competence, and outcome in individual and family therapy for adolescent behavior problems. *Journal of Consulting and Clinical Psychology*, 76(4), 544.
- Jeong, J., Franchett, E. E., Ramos de Oliveira, C. V., Rehmani, K., & Yousafzai, A. K. (2021). Parenting interventions to promote early child development in the first three years of life: A global systematic review and meta-analysis. *PLoS Medicine*, 18(5), Article e1003602.
- Knerr, W., Gardner, F., & Cluver, L. (2013). Improving positive parenting skills and reducing harsh and abusive parenting in low- and middle-income countries: A systematic review. *Prevention Science*, 14(4), 352–363.
- Lachman, J., Wamoyi, J., Martin, M., Han, Q., Alfaro, F. A. C., Munga, S., Nydetabura, E., Manjengenja, N., Wambura, M., & Shenderovich, Y. (2024). Reducing family and school-based violence at scale: A large-scale pre-post study of a parenting programme delivered to families with adolescent girls in Tanzania. *BMJ Global Health*, 9(11), Article e015472.
- Lee, S., & Lee, D. K. (2018). What is the proper way to apply the multiple comparison test? *Korean Journal of Anesthesiology*, 71(5), 353–360. <https://doi.org/10.4097/kja.d.18.00242>
- Leijten, P., Melendez-Torres, G., & Gardner, F. (2022). Research review: The most effective parenting program content for disruptive child behavior—a network meta-analysis. *Journal of Child Psychology and Psychiatry*, 63(2), 132–142.
- Martin, M., Lachman, J. M., Calderon, F., Han, Q., Shenderovich, Y., Nydetabura, E., Mwakakeke, S., Chikola, L., Munga, S., Manjengenja, N., Exavery, A., Gardner, F., & Wamoyi, J. (2025). *Assessing facilitator delivery of a parenting program at scale in Tanzania: A psychometric evaluation of an observational measure of facilitator competent adherence* (in submission).
- Martin, M., Lachman, J., Wamoyi, J., Shenderovich, Y., Wambura, M., Munga, S., Nydetabura, E., Ally, A., Barankena, A., Exavery, A., & Manjengenja, N. (2021a). A mixed methods evaluation of the large-scale implementation of a school- and community-based parenting program to reduce violence against children in Tanzania: A study protocol. *Implementation Science Communications*, 2(1), 52. <https://doi.org/10.1186/s43058-021-00154-5>
- Martin, M., Shenderovich, Y., Caron, E. B., Smith, J. D., Siu, G., & Breitenstein, S. M. (2023a). The case for assessing and reporting on facilitator fidelity: Introducing the fidelity of implementation in parenting programs guideline. *Global Implementation Research and Applications*. <https://doi.org/10.1007/s43477-023-00092-5>, 2023/09/09.
- Martin, M., Steele, B., Lachman, J. M., & Gardner, F. (2021b). Measures of facilitator competent adherence used in parenting programs and their psychometric properties: A systematic review. *Clinical Child and Family Psychology Review*, 1–20. <https://doi.org/10.1007/s10567-021-00350-8>
- Martin, M., Steele, B., Spreckelsen, T. F., Lachman, J. M., Gardner, F., & Shenderovich, Y. (2023b). The association between facilitator competent adherence and outcomes in parenting programs: A systematic review and swim analysis. *Prevention Science*, 1–13. <https://doi.org/10.1007/s11121-023-01515-3>
- McCoy, A., Melendez-Torres, G. J., & Gardner, F. (2020). Parenting interventions to prevent violence against children in low- and middle-income countries in east and southeast asia: A systematic review and multi-level meta-analysis. *Child Abuse & Neglect*, 103, Article 104444. <https://doi.org/10.1016/j.chiabu.2020.104444>
- McHugh, R. K., Murray, H. W., & Barlow, D. H. (2009). Balancing fidelity and adaptation in the dissemination of empirically-supported treatments: The promise of transdiagnostic interventions. *Behaviour Research and Therapy*, 47(11), 946–953.
- Melendez-Torres, G. J., Leijten, P., & Gardner, F. (2019). What are the optimal combinations of parenting intervention components to reduce physical child abuse recurrence? Reanalysis of a systematic review using qualitative comparative analysis. *Child Abuse Review*, 28(3), 181–197.
- Miller, C. J., Barnett, M. L., Baumann, A. A., Gutner, C. A., & Wiltsey-Stirman, S. (2021). The frame-is: A framework for documenting modifications to implementation strategies in healthcare. *Implementation Science*, 16(1), 36. <https://doi.org/10.1186/s13012-021-01105-3>
- Naylor, P.-J., Nettlefold, L., Race, D., Hoy, C., Ashe, M. C., Wharf Higgins, J., & McKay, H. A. (2015). Implementation of school based physical activity interventions: A systematic review. *Preventive Medicine*, 72, 95–115. <https://doi.org/10.1016/j.ypmed.2014.12.034>
- Owen, J., & Hilsenroth, M. J. (2014). Treatment adherence: The importance of therapist flexibility in relation to therapy outcomes. *Journal of Counseling Psychology*, 61(2), 280.
- Petersilia, J. (1990). Conditions that permit intensive supervision programs to survive. *Crime & Delinquency*, 36(1), 126–145.
- Proctor, E., Silmere, H., Raghavan, R., Hovmand, P., Aarons, G., Bunger, A., Griffey, R., & Hensley, M. (2011). Outcomes for implementation research: Conceptual distinctions, measurement challenges, and research agenda. *Administration and Policy in Mental Health and Mental Health Services Research*, 38(2), 65–76. <https://doi.org/10.1007/s10488-010-0319-7>
- R Core Team. (2021). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing. <https://www.R-project.org/>.

- Shenderovich, Y., Eisner, M., Cluver, L., Doubt, J., Berezin, M., Majokweni, S., & Murray, A. L. (2019). Delivering a parenting program in South Africa: The impact of implementation on outcomes. *Journal of Child and Family Studies*, 28(4), 1005–1017.
- Shenderovich, Y., Wamoyi, J., Mguni, S., Martin, M., Nydetabura, E., Manjengwa, N., & Lachman, J. M. (2025). *Adapting a violence prevention parenting programme as part of scaling up* (in press).
- Shenderovich, Y., Ward, C. L., Lachman, J. M., Wessels, I., Sacolo-Gwebu, H., Okop, K., Oliver, D., Ngcobo, L. L., Tomlinson, M., Fang, Z., Janowski, R., Hutchings, J., Gardner, F., & Cluver, L. (2020). Evaluating the dissemination and scale-up of two evidence-based parenting interventions to reduce violence against children: Study protocol. *Implementation Science Communications*, 1(1), 109. <https://doi.org/10.1186/s43058-020-00086-6>
- Skivington, K., Matthews, L., Simpson, S. A., Craig, P., Baird, J., Blazeby, J. M., Boyd, K. A., Craig, N., French, D. P., & McIntosh, E. (2021). A new framework for developing and evaluating complex interventions: Update of medical research council guidance. *BMJ*, 374.
- Smith, J. D., Dishion, T. J., Shaw, D. S., & Wilson, M. N. (2013). Indirect effects of fidelity to the family check-up on changes in parenting and early childhood problem behaviors. *Journal of Consulting and Clinical Psychology*, 81(6), 962.
- Snider, M. D. (2019). *Examining the impact of treatment fidelity on client outcomes in a statewide implementation of parent-child interaction therapy*. Master's Thesis, Western Virginia University.
- Stirman, S. W., Gutner, C. A., Crits-Christoph, P., Edmunds, J., Evans, A. C., & Beidas, R. S. (2015). Relationships between clinician-level attributes and fidelity-consistent and fidelity-inconsistent modifications to an evidence-based psychotherapy. *Implementation Science*, 10(1), 1–10.
- Stoltenborgh, M., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2013). The neglect of child neglect: A meta-analytic review of the prevalence of neglect. *Social Psychiatry and Psychiatric Epidemiology*, 48(3), 345–355. <https://doi.org/10.1007/s00127-012-0549-y>
- UNICEF. (2010). *Child disciplinary practices at home. Evidence from a range of low and middle-income countries*. New York: UNICEF.
- UNICEF. (2022). MICS. <https://mics.unicef.org>.
- WHO. (2023). *Who guidelines on parenting interventions to prevent maltreatment and enhance parent-child relationships with children 0-17 years*. <https://www.who.int/publications/i/item/9789240065505>.
- Wickham, H., Averick, M., Bryan, J., Chang, W., McGowan, L., François, R., Grolemund, G., Hayes, A., Henry, L., Hester, J., Kuhn, M., Pedersen, T., Miller, E., Bache, S., Müller, K., Ooms, J., Robinson, D., Seidel, D., Spinu, V., ... Yutani, H. (2019). Welcome to the tidyverse. *Journal of Open Source Software*, 4(43), 1686. <https://doi.org/10.21105/joss.01686>
- Wickham, H., François, R., Henry, L., Müller, K., & D, V. (2023). *Dplyr: A grammar of data manipulation*. <https://CRAN.R-project.org/package=dplyr>.
- Wilson, S. J., Lipsey, M. W., & Derzon, J. H. (2003). The effects of school-based intervention programs on aggressive behavior: A meta-analysis. *Journal of Consulting and Clinical Psychology*, 71(1), 136.
- Wolpert, M., & Rutter, H. (2018). Using flawed, uncertain, proximate and sparse (fups) data in the context of complexity: Learning from the case of child mental health. *BMC Medicine*, 16(1), 82. <https://doi.org/10.1186/s12916-018-1079-6>
- World Health Organization. (n.d.). *Parenting for Lifelong Health: A suite of parenting programmes to reduce violence against children*. <https://www.who.int/teams/social-determinants-of-health/parenting-for-lifelong-health>. [
- World Health Organization. (2022). *WHO guidelines on parenting interventions to prevent maltreatment and enhance parent-child relationships with children aged 0-17 years*. <https://iris.who.int/bitstream/handle/10665/365814/9789240065505-eng.pdf?sequence=1>.